

APPENDIX 1

LETTER OF COOPERATION WITH BOSTON PUBLIC SCHOOLS

BOSTON PUBLIC SCHOOLS



OFFICE OF THE SUPERINTENDENT

April 13, 2012

Mr. Edmund Barry Gaither
Mr. Barry E. Feldman
P-3 Partners, LLC
300 Walnut Street
Roxbury, MA 02119

Re: Letter of Cooperation- Tremont Crossing Development

Dear Messrs. Gaither and Feldman:

This Letter of Cooperation is in reference to the ongoing conversations that Boston Public Schools (“BPS”) and P-3 Partners, LLC (“P-3 Partners” or the “Developer”) have had regarding the mixed-use, development project at the site that is commonly referred to as Parcel P-3 in Roxbury, Massachusetts (“Parcel P-3” or the “Development Site”). In that regard, it is the understanding of BPS that the Developer’s project will consist of approximately one million square feet of uses that will include both large and small format retail, multifamily residential, office space, a cultural/museum facility and a multi-level Parking Facility consisting of approximately 1,700 parking spaces (the “Project”). To that end, the Developer has represented that all of the aforementioned uses and the Parking Facility will be located on Parcel P-3. However, P-3 Partners has indicated to BPS that the viability of the Project necessitates that a portion of land that is owned in part by BPS and also by the Boston Redevelopment Authority (the “BRA”) be shared with and/or utilized by the Developer (the “Shared Access”). This Shared Access would be used by P-3 Partners for the purpose of vehicular access to the Project and for the relocation of the Stony Brook Interceptor (the “Interceptor”), which is a fifty-four (54) inch sanitary sewage and storm drain that currently bisects Parcel P-3.

Specifically, the Developer has identified the Shared Access as consisting of the existing drive lane that is currently utilized by the Madison Park Technical Vocational High School

("MPHS") as a means of access to the school's parking facilities and for a portion of their street parking (the "Existing Drive Lane"). The Existing Drive Lane emanates from Tremont Street and continues in a southeasterly direction for approximately six hundred (600) feet with a terminus at the entrance to a building structure that consists of various facilities of the MPHS, including a parking structure and receiving and loading for the school's deliveries. It is recognized by BPS that the first approximately two hundred (200) feet of the Existing Drive Lane is currently owned by the BRA and is located on land that is a part of Parcel P-3. The aforementioned portion of the Existing Drive Lane that is owned by BPS consists of the remaining approximately four hundred (400) feet of drive lane ("BPS Owned Land"). The Developer has proposed to BPS that the Shared Access be used in a capacity whereby MPHS has continued access to its building and parking facilities and in a manner which will also allow for access to the Project's Parking Facility in addition to connecting the Project's circulation to a secondary means of ingress/egress at Whittier Street.

Additionally, P-3 Partners has indicated that the Project would sit atop the Interceptor, making the necessary access for maintenance impossible. Therefore, it has been determined by the Developer that a portion of the Interceptor will need to be rerouted around the back southeasterly side of the Project (the "New Sewer Route"). The Developer has indicated to BPS that the New Sewer Route would include portions of the BPS Owned Land.

Further, it has been represented by P-3 Partners, that relative to their investigation into the impact of the Shared Access, that they have conducted a series of field studies of the MPHS parking inventory in order to quantify the number of parking spaces that are being utilized by the school. Their findings are as follows: The MPHS currently utilizes approximately forty-five (45) parking spaces along the BPS Owned Land. Thirty-four (34) of these spaces are striped, head-in parking that are along the north side of the drive, adjacent to Parcel P-3. The Developer has determined that in order to facilitate its traffic circulation program and for reasons of safety that these head in spaces would need to be replaced by approximately fourteen (14) parallel parking spaces. This would result in a loss of approximately twenty (20) spaces. Additionally, MPHS utilizes the south side of the BPS Owned Land (along the Existing Drive Lane) for parallel parking. The exact number of such spaces is approximate, as parking in this area is not striped and is done in an improvised manner. However, through several field studies, the Developer has determined that there are approximately eleven (11) such spaces currently in use. It has also been determined by the Developer that all of these spaces would be utilized for a new traffic lane in the Shared Access. Thus, in total, MPHS would have approximately thirty-one (31) Authorized Parking spaces displaced as a result of the construction of the Project.

In addition to the aforementioned authorized parking, MPHS currently utilizes an additional twenty-seven (27) spaces in an area of Parcel P-3 that is closest to the MPHS. It was indicated to the Developer by representatives of MPHS during one of the field studies that this was the

“unofficial area” of Parcel P-3 where MPHS employees parked (hereinafter referred to as the Unofficial Parking Area). As a result of the Project’s anticipated site plan, MPHS would no longer have use of the twenty-seven (27) parking spaces in the Unofficial Parking Area, as the Project’s buildings would be occupying this portion of Parcel P-3. Thus, in total, the aggregate number of MPHS parking spaces that will be displaced by the Project would be fifty-eight (58) (including the thirty-one (31) Official Spaces and the twenty-seven (27) spaces in the Unofficial Parking Area).

Relative to the above, it is the position of BPS that it agrees in concept to a Shared Access with the Developer that would include portions of the BPS Owned Land. Further, it is recognized that this Shared Access would accommodate the relocation of a portion of the Interceptor. BPS looks forward to working out the specific details of such an arrangement and feels confident that based on the conversations that it has had with the Developer for over a year that a mutually satisfactory agreement can be achieved. The conditions of such an agreement would include, but not be limited to, a satisfactory plan of emergency preparedness, adequate access of MPHS delivery vehicles, parking engineering studies, drafting of mutually satisfactory easements for BRA and BPS land comprising the Existing Drive Lane and adequate consideration of the displaced MPHS parking spaces which would, in concept, include the following: The Developer will agree to replace the thirty-one (31) Authorized Parking Spaces that will be displaced in the Project’s Parking Facility at its expense. Additionally, the Developer will agree to accommodate the replacement of the twenty-seven (27) spaces that will be displaced in the Unofficial Parking Area in the Parking Facility. However, it is recognized that the inclusion of these unauthorized spaces in the Parking Structure is predicated on the Developer entering into a financial arrangement with BPS and/or another City agency to cover the expense of replacing such spaces or leasing them at a market rate. BPS looks forward to our continued cooperation with P-3 Partners on these matters and to our memorializing them in a mutually satisfactory, binding agreement in the near future.

Sincerely,



Dr. Carol R. Johnson

Superintendent Boston Public Schools

APPENDIX 2

TRAFFIC

Appendix 2-A: Traffic Count Data
Appendix 2-B: Crash Rate Worksheets
Appendix 2-C: Trip Generation Calculations
Appendix 2-D: Background Traffic Data
Appendix 2-E: Signal Warrant Analysis
Appendix 2-F: Shared Parking Analysis
Appendix 2-G: Capacity Analyses Worksheets
Appendix 2-H: Queue Length Figures
Appendix 2-I: Proposed Improvement Plans

Appendix 2-A: Traffic Count Data



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Tremont Street/ Columbus Ave (Rt 28)
E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 A
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Tremont Street (Route 28) From North				Malcom X Boulevard From East				Columbus Avenue (Route 28) From South				Tremont Street From West			Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left		
11:00 AM	38	134	44	3	70	44	15	24	158	20	0	23	46	37	656	
11:15 AM	40	125	39	4	67	65	18	15	183	21	0	19	62	34	692	
11:30 AM	41	138	38	4	55	73	11	19	174	28	1	27	68	34	711	
11:45 AM	53	148	36	4	63	72	18	21	187	30	0	17	38	41	728	
Total	172	545	157	15	255	254	62	79	702	99	1	86	214	146	2787	
12:00 PM	40	134	31	1	57	64	16	10	181	22	0	28	66	36	686	
12:15 PM	43	160	28	1	72	60	11	20	182	20	0	15	43	35	690	
12:30 PM	44	151	32	1	58	53	14	13	190	25	0	36	44	45	706	
12:45 PM	38	173	29	3	66	59	18	10	168	27	1	34	47	40	713	
Total	165	618	120	6	253	236	59	53	721	94	1	113	200	156	2795	
Grand Total	337	1163	277	21	508	490	121	132	1423	193	2	199	414	302	5582	
Apprch %	18.7	64.7	15.4	1.2	45.4	43.8	10.8	7.5	81.3	11	0.1	21.7	45.2	33		
Total %	6	20.8	5	0.4	9.1	8.8	2.2	2.4	25.5	3.5	0	3.6	7.4	5.4		
Cars	333	1134	228	21	462	469	118	130	1389	190	2	192	403	297	5368	
% Cars	98.8	97.5	82.3	100	90.9	95.7	97.5	98.5	97.6	98.4	100	96.5	97.3	98.3	96.2	
Heavy Vehicles	4	29	49	0	46	21	3	2	34	3	0	7	11	5	214	
% Heavy Vehicles	1.2	2.5	17.7	0	9.1	4.3	2.5	1.5	2.4	1.6	0	3.5	2.7	1.7	3.8	

Start Time	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:15 AM																			
11:15 AM	40	125	39	4	208	67	65	18	150	15	183	21	0	219	19	62	34	115	692
11:30 AM	41	138	38	4	221	55	73	11	139	19	174	28	1	222	27	68	34	129	711
11:45 AM	53	148	36	4	241	63	72	18	153	21	187	30		238	17	38	41	96	728
12:00 PM	40	134	31	1	206	57	64	16	137	10	181	22	0	213	28	66	36	130	686
Total Volume	174	545	144	13	876	242	274	63	579	65	725	101	1	892	91	234	145	470	2817
% App. Total	19.9	62.2	16.4	1.5		41.8	47.3	10.9		7.3	81.3	11.3	0.1		19.4	49.8	30.9		
PHF	.821	.921	.923	.813	.909	.903	.938	.875	.946	.774	.969	.842	.250	.937	.813	.860	.884	.904	.967
Cars	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% Cars	99.4	97.8	83.3	100	95.8	88.8	95.6	98.4	93.1	98.5	97.7	100	100	98.0	97.8	97.4	99.3	98.1	96.3
Heavy Vehicles	1	12	24	0	37	27	12	1	40	1	17	0	0	18	2	6	1	9	104
% Heavy Vehicles	0.6	2.2	16.7	0	4.2	11.2	4.4	1.6	6.9	1.5	2.3	0	0	2.0	2.2	2.6	0.7	1.9	3.7



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E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 A
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

Start Time	Tremont Street (Route 28) From North				Malcom X Boulevard From East				Columbus Avenue (Route 28) From South				Tremont Street From West			Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left		
11:00 AM	38	126	36	3	66	43	13	24	153	19	0	21	44	36	622	
11:15 AM	40	124	32	4	63	62	18	15	180	21	0	18	60	34	671	
11:30 AM	40	133	32	4	48	71	11	18	169	28	1	26	67	33	681	
11:45 AM	53	146	31	4	56	68	18	21	181	30	0	17	37	41	703	
Total	171	529	131	15	233	244	60	78	683	98	1	82	208	144	2677	
12:00 PM	40	130	25	1	48	61	15	10	178	22	0	28	64	36	658	
12:15 PM	42	157	22	1	68	57	11	19	178	20	0	15	41	35	666	
12:30 PM	43	148	25	1	53	51	14	13	188	23	0	34	44	44	681	
12:45 PM	37	170	25	3	60	56	18	10	162	27	1	33	46	38	686	
Total	162	605	97	6	229	225	58	52	706	92	1	110	195	153	2691	
Grand Total	333	1134	228	21	462	469	118	130	1389	190	2	192	403	297	5368	
Apprch %	19.4	66.1	13.3	1.2	44	44.7	11.2	7.6	81.2	11.1	0.1	21.5	45.2	33.3		
Total %	6.2	21.1	4.2	0.4	8.6	8.7	2.2	2.4	25.9	3.5	0	3.6	7.5	5.5		

Start Time	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:15 AM																			
11:15 AM	40	124	32	4	200	63	62	18	143	15	180	21	0	216	18	60	34	112	671
11:30 AM	40	133	32	4	209	48	71	11	130	18	169	28	1	216	26	67	33	126	681
11:45 AM	53	146	31	4	234	56	68	18	142	21	181	30		232	17	37	41	95	703
12:00 PM	40	130	25	1	196	48	61	15	124	10	178	22	0	210	28	64	36	128	658
Total Volume	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% App. Total	20.6	63.5	14.3	1.5		39.9	48.6	11.5		7.3	81	11.6	0.1		19.3	49.5	31.2		
PHF	.816	.913	.938	.813	.896	.853	.923	.861	.942	.762	.978	.842	.250	.942	.795	.851	.878	.900	.965



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	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	
11:00 AM	0	8	8	0	4	1	2	0	5	1	0	2	2	1	34
11:15 AM	0	1	7	0	4	3	0	0	3	0	0	1	2	0	21
11:30 AM	1	5	6	0	7	2	0	1	5	0	0	1	1	1	30
11:45 AM	0	2	5	0	7	4	0	0	6	0	0	0	1	0	25
Total	1	16	26	0	22	10	2	1	19	1	0	4	6	2	110
12:00 PM	0	4	6	0	9	3	1	0	3	0	0	0	2	0	28
12:15 PM	1	3	6	0	4	3	0	1	4	0	0	0	2	0	24
12:30 PM	1	3	7	0	5	2	0	0	2	2	0	2	0	1	25
12:45 PM	1	3	4	0	6	3	0	0	6	0	0	1	1	2	27
Total	3	13	23	0	24	11	1	1	15	2	0	3	5	3	104
Grand Total	4	29	49	0	46	21	3	2	34	3	0	7	11	5	214
Apprch %	4.9	35.4	59.8	0	65.7	30	4.3	5.1	87.2	7.7	0	30.4	47.8	21.7	
Total %	1.9	13.6	22.9	0	21.5	9.8	1.4	0.9	15.9	1.4	0	3.3	5.1	2.3	

Start Time	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:00 AM																			
11:00 AM	0	8	8	0	16	4	1	2	7	0	5	1	0	6	2	2	1	5	34
11:15 AM	0	1	7	0	8	4	3	0	7	0	3	0	0	3	1	2	0	3	21
11:30 AM	1	5	6	0	12	7	2	0	9	1									
11:45 AM	0	2	5	0	7	7	4	0	11	0	6	0	0	6	0	1	0	1	25
Total Volume	1	16	26	0	43	22	10	2	34	1	19	1	0	21	4	6	2	12	110
% App. Total	2.3	37.2	60.5	0		64.7	29.4	5.9		4.8	90.5	4.8	0		33.3	50	16.7		
PHF	.250	.500	.813	.000	.672	.786	.625	.250	.773	.250	.792	.250	.000	.875	.500	.750	.500	.600	.809

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Groups Printed- Peds and Bicycles

Start Time	Tremont Street (Route 28) From North				Malcom X Boulevard From East				Columbus Avenue (Route 28) From South				Tremont Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	0	17	0	0	0	20	0	0	0	29	0	0	0	11	77
11:15 AM	0	0	0	29	0	0	0	20	0	0	0	21	0	0	1	12	83
11:30 AM	0	0	0	32	0	0	0	20	0	0	0	17	0	0	0	19	88
11:45 AM	0	0	0	40	0	0	0	19	0	0	0	30	0	1	0	14	104
Total	0	0	0	118	0	0	0	79	0	0	0	97	0	1	1	56	352
12:00 PM	0	0	0	30	1	0	0	21	0	0	0	41	0	1	0	13	107
12:15 PM	0	2	0	31	0	0	0	28	0	0	0	14	0	0	0	19	94
12:30 PM	0	0	0	38	0	0	0	10	0	2	0	49	0	0	0	34	133
12:45 PM	0	0	0	52	0	0	0	12	0	0	0	27	0	1	0	32	124
Total	0	2	0	151	1	0	0	71	0	2	0	131	0	2	0	98	458
Grand Total	0	2	0	269	1	0	0	150	0	2	0	228	0	3	1	154	810
Apprch %	0	0.7	0	99.3	0.7	0	0	99.3	0	0.9	0	99.1	0	1.9	0.6	97.5	
Total %	0	0.2	0	33.2	0.1	0	0	18.5	0	0.2	0	28.1	0	0.4	0.1	19	

Start Time	Tremont Street (Route 28) From North					Malcom X Boulevard From East					Columbus Avenue (Route 28) From South					Tremont Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	30	30	1	0	0	21	22	0	0	0	41	41	0	1	0	13	14	107
12:15 PM	0	2	0	31	33	0	0	0	28	28	0	0	0	14	14	0	0	0	19	19	94
12:30 PM	0	0	0	38	38	0	0	0	10	10	0	2	0	49	51	0	0	0	34	34	133
12:45 PM	0	0	0	52	52	0	0	0	12	12	0	0	0	27	27	0	1	0	32	33	124
Total Volume	0	2	0	151	153	1	0	0	71	72	0	2	0	131	133	0	2	0	98	100	458
% App. Total	0	1.3	0	98.7		1.4	0	0	98.6		0	1.5	0	98.5		0	2	0	98		
PHF	.000	.250	.000	.726	.736	.250	.000	.000	.634	.643	.000	.250	.000	.668	.652	.000	.500	.000	.721	.735	.861



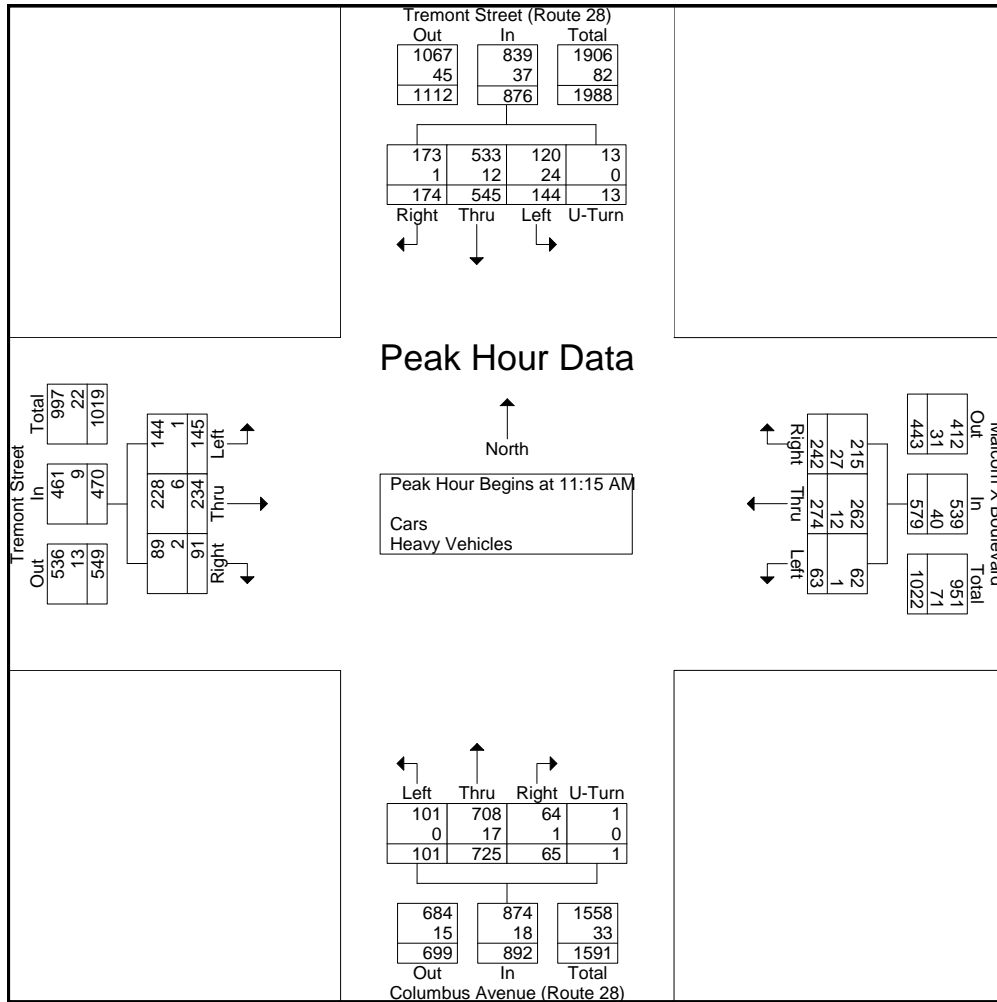
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	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	
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11:30 AM	41	138	38	4	221	55	73	11	139	19	174	28	1	222	27	68	34	129	711
11:45 AM	53	148	36	4	241	63	72	18	153	21	187	30		238	17	38	41	96	728
12:00 PM	40	134	31	1	206	57	64	16	137	10	181	22	0	213	28	66	36	130	686
Total Volume	174	545	144	13	876	242	274	63	579	65	725	101	1	892	91	234	145	470	2817
% App. Total	19.9	62.2	16.4	1.5		41.8	47.3	10.9		7.3	81.3	11.3	0.1		19.4	49.8	30.9		
PHF	.821	.921	.923	.813	.909	.903	.938	.875	.946	.774	.969	.842	.250	.937	.813	.860	.884	.904	.967
Cars	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% Cars	99.4	97.8	83.3	100	95.8	88.8	95.6	98.4	93.1	98.5	97.7	100	100	98.0	97.8	97.4	99.3	98.1	96.3
Heavy Vehicles	1	12	24	0	37	27	12	1	40	1	17	0	0	18	2	6	1	9	104
% Heavy Vehicles	0.6	2.2	16.7	0	4.2	11.2	4.4	1.6	6.9	1.5	2.3	0	0	2.0	2.2	2.6	0.7	1.9	3.7





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N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			Int. Total
	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	
11:00 AM	11	13	11	193	12	240	22	1	503
11:15 AM	6	7	13	203	7	274	20	0	530
11:30 AM	5	12	7	220	4	250	16	0	514
11:45 AM	5	13	9	225	1	281	16	0	550
Total	27	45	40	841	24	1045	74	1	2097
12:00 PM	2	20	10	190	5	252	25	0	504
12:15 PM	6	12	12	235	4	278	18	0	565
12:30 PM	5	13	9	201	2	271	18	0	519
12:45 PM	5	11	17	239	2	276	11	0	561
Total	18	56	48	865	13	1077	72	0	2149
Grand Total	45	101	88	1706	37	2122	146	1	4246
Apprch %	30.8	69.2	4.8	93.2	2	93.5	6.4	0	
Total %	1.1	2.4	2.1	40.2	0.9	50	3.4	0	
Cars	44	99	87	1625	37	2035	145	1	4073
% Cars	97.8	98	98.9	95.3	100	95.9	99.3	100	95.9
Heavy Vehicles	1	2	1	81	0	87	1	0	173
% Heavy Vehicles	2.2	2	1.1	4.7	0	4.1	0.7	0	4.1

Start Time	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				Int. Total
	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	20	22	10	190	5	205	252	25	0	277	504
12:15 PM	6	12	18	12	235	4	251	278	18	0	296	565
12:30 PM	5	13	18	9	201	2	212	271	18	0	289	519
12:45 PM	5	11	16	17	239	2	258	276	11	0	287	561
Total Volume	18	56	74	48	865	13	926	1077	72	0	1149	2149
% App. Total	24.3	75.7		5.2	93.4	1.4		93.7	6.3	0		
PHF	.750	.700	.841	.706	.905	.650	.897	.969	.720	.000	.970	.951
Cars	18	55	73	47	826	13	886	1032	72	0	1104	2063
% Cars	100	98.2	98.6	97.9	95.5	100	95.7	95.8	100	0	96.1	96.0
Heavy Vehicles	0	1	1	1	39	0	40	45	0	0	45	86
% Heavy Vehicles	0	1.8	1.4	2.1	4.5	0	4.3	4.2	0	0	3.9	4.0



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N/S: Prentis Street/ Driveway
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City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			Int. Total
	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	
11:00 AM	10	13	11	179	12	229	22	1	477
11:15 AM	6	6	13	194	7	266	20	0	512
11:30 AM	5	12	7	209	4	238	15	0	490
11:45 AM	5	13	9	217	1	270	16	0	531
Total	26	44	40	799	24	1003	73	1	2010
12:00 PM	2	20	9	181	5	239	25	0	481
12:15 PM	6	12	12	224	4	269	18	0	545
12:30 PM	5	12	9	191	2	264	18	0	501
12:45 PM	5	11	17	230	2	260	11	0	536
Total	18	55	47	826	13	1032	72	0	2063
Grand Total	44	99	87	1625	37	2035	145	1	4073
Apprch %	30.8	69.2	5	92.9	2.1	93.3	6.6	0	
Total %	1.1	2.4	2.1	39.9	0.9	50	3.6	0	

Start Time	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				Int. Total
	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	20	22	9	181	5	195	239	25	0	264	481
12:15 PM	6	12	18	12	224	4	240	269	18	0	287	545
12:30 PM	5	12	17	9	191	2	202	264	18	0	282	501
12:45 PM	5	11	16	17	230	2	249	260	11	0	271	536
Total Volume	18	55	73	47	826	13	886	1032	72	0	1104	2063
% App. Total	24.7	75.3		5.3	93.2	1.5		93.5	6.5	0		
PHF	.750	.688	.830	.691	.898	.650	.890	.959	.720	.000	.962	.946



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City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			Int. Total
	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	
11:00 AM	1	0	0	14	0	11	0	0	26
11:15 AM	0	1	0	9	0	8	0	0	18
11:30 AM	0	0	0	11	0	12	1	0	24
11:45 AM	0	0	0	8	0	11	0	0	19
Total	1	1	0	42	0	42	1	0	87
12:00 PM	0	0	1	9	0	13	0	0	23
12:15 PM	0	0	0	11	0	9	0	0	20
12:30 PM	0	1	0	10	0	7	0	0	18
12:45 PM	0	0	0	9	0	16	0	0	25
Total	0	1	1	39	0	45	0	0	86
Grand Total	1	2	1	81	0	87	1	0	173
Apprch %	33.3	66.7	1.2	98.8	0	98.9	1.1	0	
Total %	0.6	1.2	0.6	46.8	0	50.3	0.6	0	

Start Time	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				Int. Total
	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 11:00 AM												
11:00 AM	1	0	1	0	14	0	14	11	0	0	11	26
11:15 AM	0	1	0	0	11	0	11	12	1	0	13	24
11:30 AM	0	0	0	0	8	0	8	11	0	0	11	19
11:45 AM	0	0	0	0	8	0	8	11	0	0	11	19
Total Volume	1	1	2	0	42	0	42	42	1	0	43	87
% App. Total	50	50		0	100	0		97.7	2.3	0		
PHF	.250	.250	.500	.000	.750	.000	.750	.875	.250	.000	.827	.837



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File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Prentis Street From North			Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			Int. Total
	Right	Left	Peds	Right	Thru	Peds	Thru	Left	Peds	
11:00 AM	0	0	5	0	0	4	0	0	3	12
11:15 AM	0	1	5	0	0	0	0	0	1	7
11:30 AM	0	0	13	0	0	0	1	0	6	20
11:45 AM	1	0	7	0	0	1	0	0	0	9
Total	1	1	30	0	0	5	1	0	10	48
12:00 PM	0	0	3	0	1	9	0	0	0	13
12:15 PM	0	0	3	0	1	3	1	0	0	8
12:30 PM	0	0	10	0	1	7	0	0	4	22
12:45 PM	0	0	2	0	0	1	0	0	1	4
Total	0	0	18	0	3	20	1	0	5	47
Grand Total	1	1	48	0	3	25	2	0	15	95
Apprch %	2	2	96	0	10.7	89.3	11.8	0	88.2	
Total %	1.1	1.1	50.5	0	3.2	26.3	2.1	0	15.8	

Start Time	Prentis Street From North				Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:45 AM													
11:45 AM	1	0	7	8	0	0	1	1	0	0	0	0	9
12:00 PM	0	0	3	3	0	1	9	10	0	0	0	0	13
12:15 PM	0	0	3	3	0	1	3	4	1	0	0	1	8
12:30 PM	0	0	10	10	0	1	7	8	0	0	4	4	22
Total Volume	1	0	23	24	0	3	20	23	1	0	4	5	52
% App. Total	4.2	0	95.8		0	13	87		20	0	80		
PHF	.250	.000	.575	.600	.000	.750	.556	.575	.250	.000	.250	.313	.591



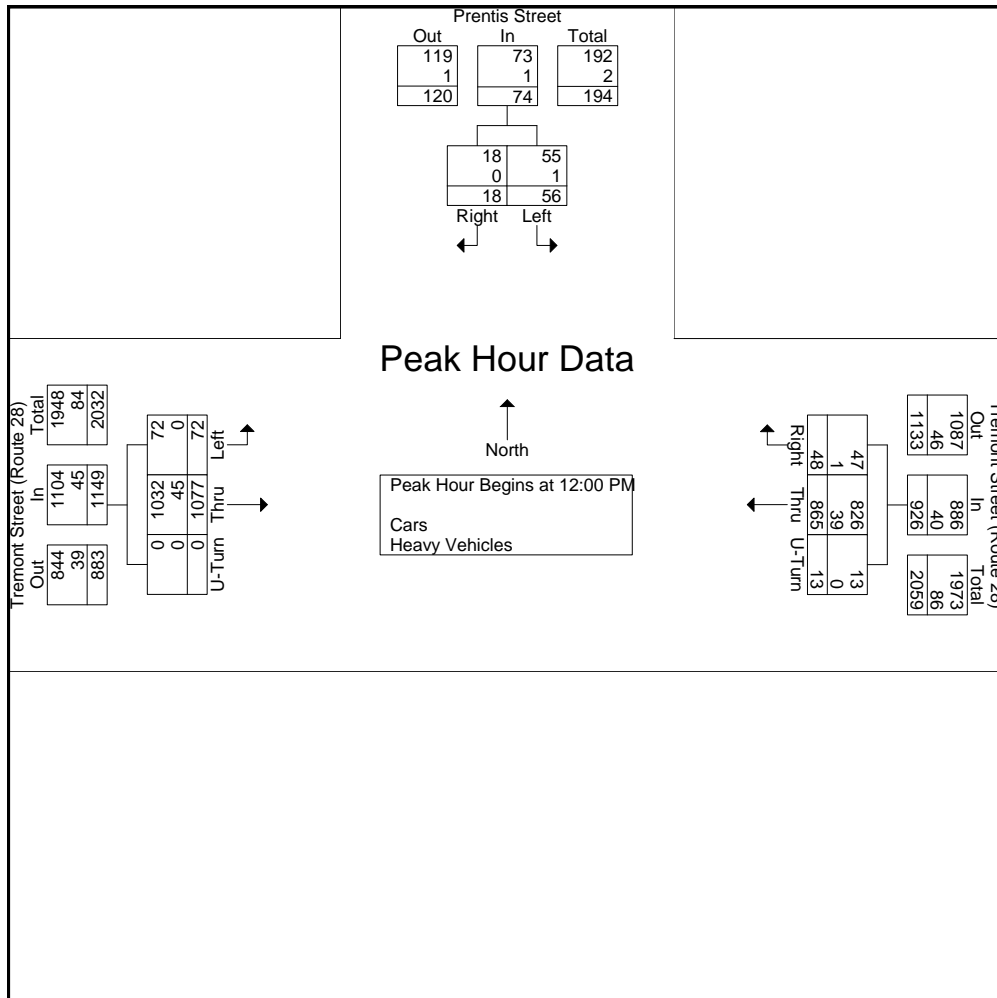
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N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				Int. Total
	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	20	22	10	190	5	205	252	25	0	277	504
12:15 PM	6	12	18	12	235	4	251	278	18	0	296	565
12:30 PM	5	13	18	9	201	2	212	271	18	0	289	519
12:45 PM	5	11	16	17	239	2	258	276	11	0	287	561
Total Volume	18	56	74	48	865	13	926	1077	72	0	1149	2149
% App. Total	24.3	75.7		5.2	93.4	1.4		93.7	6.3	0		
PHF	.750	.700	.841	.706	.905	.650	.897	.969	.720	.000	.970	.951
Cars	18	55	73	47	826	13	886	1032	72	0	1104	2063
% Cars	100	98.2	98.6	97.9	95.5	100	95.7	95.8	100	0	96.1	96.0
Heavy Vehicles	0	1	1	1	39	0	40	45	0	0	45	86
% Heavy Vehicles	0	1.8	1.4	2.1	4.5	0	4.3	4.2	0	0	3.9	4.0





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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Ruggles Street From North			Tremont Street (Route 28) From East				Whittier Street From South			Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	
11:00 AM	25	0	88	84	199	0	4	4	1	1	0	203	28	7	644
11:15 AM	32	0	75	84	178	0	3	3	0	2	0	239	30	9	655
11:30 AM	31	0	92	86	192	0	3	3	0	2	0	250	26	5	690
11:45 AM	19	0	84	88	210	0	5	5	0	4	0	260	26	4	705
Total	107	0	339	342	779	0	15	15	1	9	0	952	110	25	2694
12:00 PM	33	0	90	94	187	0	2	2	0	2	0	257	38	4	709
12:15 PM	35	0	90	87	196	0	8	8	1	2	0	262	36	5	730
12:30 PM	26	0	89	99	179	0	2	3	0	1	0	263	27	8	697
12:45 PM	30	0	92	101	224	0	2	2	0	7	0	259	32	4	753
Total	124	0	361	381	786	0	14	15	1	12	0	1041	133	21	2889
Grand Total	231	0	700	723	1565	0	29	30	2	21	0	1993	243	46	5583
Apprch %	24.8	0	75.2	31.2	67.5	0	1.3	56.6	3.8	39.6	0	87.3	10.6	2	
Total %	4.1	0	12.5	13	28	0	0.5	0.5	0	0.4	0	35.7	4.4	0.8	
Cars	175	0	668	706	1545	0	29	29	2	21	0	1957	191	46	5369
% Cars	75.8	0	95.4	97.6	98.7	0	100	96.7	100	100	0	98.2	78.6	100	96.2
Heavy Vehicles	56	0	32	17	20	0	0	1	0	0	0	36	52	0	214
% Heavy Vehicles	24.2	0	4.6	2.4	1.3	0	0	3.3	0	0	0	1.8	21.4	0	3.8

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	33	0	90	123	94	187	0	2	283	2	0	2	4	0	257	38	4	299	709
12:15 PM	35	0	90	125	87	196	0	8	291	8	1	2	11	0	262	36	5	303	730
12:30 PM	26	0	89	115	99	179	0	2	280	3	0	1	4	0	263	27	8	298	697
12:45 PM	30	0	92	122	101	224	0	2	327	2	0	7							753
Total Volume	124	0	361	485	381	786	0	14	1181	15	1	12	28	0	1041	133	21	1195	2889
% App. Total	25.6	0	74.4		32.3	66.6	0	1.2		53.6	3.6	42.9		0	87.1	11.1	1.8		
PHF	.886	.000	.981	.970	.943	.877	.000	.438	.903	.469	.250	.429	.636	.000	.990	.875	.656	.986	.959
Cars	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% Cars	77.4	0	94.7	90.3	98.2	98.7	0	100	98.6	93.3	100	100	96.4	0	98.7	77.4	100	96.3	96.2
Heavy Vehicles	28	0	19	47	7	10	0	0	17	1	0	0	1	0	14	30	0	44	109
% Heavy Vehicles	22.6	0	5.3	9.7	1.8	1.3	0	0	1.4	6.7	0	0	3.6	0	1.3	22.6	0	3.7	3.8



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E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East				Whittier Street From South			Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left		Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	
11:00 AM	16	0	85		81	195	0	4	4	1	1	0	198	21	7	613
11:15 AM	25	0	74		83	177	0	3	3	0	2	0	235	25	9	636
11:30 AM	25	0	87		85	188	0	3	3	0	2	0	242	22	5	662
11:45 AM	13	0	80		83	209	0	5	5	0	4	0	255	20	4	678
Total	79	0	326		332	769	0	15	15	1	9	0	930	88	25	2589
12:00 PM	25	0	87		91	183	0	2	2	0	2	0	255	28	4	679
12:15 PM	26	0	84		85	195	0	8	8	1	2	0	259	30	5	703
12:30 PM	19	0	84		98	177	0	2	2	0	1	0	260	21	8	672
12:45 PM	26	0	87		100	221	0	2	2	0	7	0	253	24	4	726
Total	96	0	342		374	776	0	14	14	1	12	0	1027	103	21	2780
Grand Total	175	0	668		706	1545	0	29	29	2	21	0	1957	191	46	5369
Apprch %	20.8	0	79.2		31	67.8	0	1.3	55.8	3.8	40.4	0	89.2	8.7	2.1	
Total %	3.3	0	12.4		13.1	28.8	0	0.5	0.5	0	0.4	0	36.4	3.6	0.9	

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	25	0	87	112	91	183	0	2	276	2	0	2	4	0	255	28	4	287	679
12:15 PM	26	0	84	110	85	195	0	8	288	8	1	2	11	0	259	30	5	294	703
12:30 PM	19	0	84	103	98	177	0	2	277	2	0	1	3	0	260	21	8	289	672
12:45 PM	26	0	87	113	100	221	0	2	323	2	0	7							726
Total Volume	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% App. Total	21.9	0	78.1		32.1	66.7	0	1.2		51.9	3.7	44.4		0	89.2	8.9	1.8		
PHF	.923	.000	.983	.969	.935	.878	.000	.438	.901	.438	.250	.429	.614	.000	.988	.858	.656	.979	.957



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File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East				Whittier Street From South				Tremont Street (Route 28) From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
11:00 AM	9	0	3	0	3	4	0	0	0	0	0	0	0	5	7	0	0	31
11:15 AM	7	0	1	0	1	1	0	0	0	0	0	0	0	4	5	0	0	19
11:30 AM	6	0	5	0	1	4	0	0	0	0	0	0	0	8	4	0	0	28
11:45 AM	6	0	4	0	5	1	0	0	0	0	0	0	0	5	6	0	0	27
Total	28	0	13	0	10	10	0	0	0	0	0	0	0	22	22	0	0	105
12:00 PM	8	0	3	0	3	4	0	0	0	0	0	0	0	2	10	0	0	30
12:15 PM	9	0	6	0	2	1	0	0	0	0	0	0	0	3	6	0	0	27
12:30 PM	7	0	5	0	1	2	0	0	1	0	0	0	0	3	6	0	0	25
12:45 PM	4	0	5	0	1	3	0	0	0	0	0	0	0	6	8	0	0	27
Total	28	0	19	0	7	10	0	0	1	0	0	0	0	14	30	0	0	109
Grand Total	56	0	32	0	17	20	0	0	1	0	0	0	0	36	52	0	0	214
Apprch %	63.6	0	36.4	0	45.9	54.1	0	0	100	0	0	0	0	40.9	59.1	0	0	
Total %	26.2	0	15	0	7.9	9.3	0	0	0.5	0	0	0	0	16.8	24.3	0	0	

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:30 AM																			
11:30 AM	6	0	5	11	1	4	0	0	5	0	0	0	0	0	8	4	0	12	28
11:45 AM	6	0	4	10	5	1	0	0	6	0	0	0	0	0	5	6	0	11	27
12:00 PM	8	0	3	11	3	4	0	0	7	0	0	0	0	0	2	10	0	12	30
12:15 PM	9	0	6	15	2	1	0	0	3	0	0	0	0	0	3	6	0	9	27
Total Volume	29	0	18	47	11	10	0	0	21	0	0	0	0	0	18	26	0	44	112
% App. Total	61.7	0	38.3		52.4	47.6	0	0		0	0	0		0	40.9	59.1	0		
PHF	.806	.000	.750	.783	.550	.625	.000	.000	.750	.000	.000	.000	.000	.000	.563	.650	.000	.917	.933



PRECISION
D A T A
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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East				Whittier Street From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	0	5	0	0	0	2	0	0	0	10	0	0	0	1	18
11:15 AM	0	0	0	4	0	0	0	1	0	1	0	17	0	1	0	4	28
11:30 AM	0	0	1	12	0	0	0	4	0	0	0	18	0	0	0	1	36
11:45 AM	0	0	0	2	0	0	0	1	0	0	0	36	0	0	0	0	39
Total	0	0	1	23	0	0	0	8	0	1	0	81	0	1	0	6	121
12:00 PM	1	0	0	1	0	0	0	3	0	0	0	14	0	0	0	1	20
12:15 PM	0	0	0	3	1	2	0	7	0	1	0	15	0	1	0	2	32
12:30 PM	0	0	0	8	0	0	0	0	0	2	0	6	0	2	0	2	20
12:45 PM	0	0	0	5	1	0	0	1	0	0	0	9	0	0	0	6	22
Total	1	0	0	17	2	2	0	11	0	3	0	44	0	3	0	11	94
Grand Total	1	0	1	40	2	2	0	19	0	4	0	125	0	4	0	17	215
Apprch %	2.4	0	2.4	95.2	8.7	8.7	0	82.6	0	3.1	0	96.9	0	19	0	81	
Total %	0.5	0	0.5	18.6	0.9	0.9	0	8.8	0	1.9	0	58.1	0	1.9	0	7.9	

Start Time	Ruggles Street From North					Tremont Street (Route 28) From East					Whittier Street From South					Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	1	12	13	0	0	0	4	4	0	0	0	18	18	0	0	0	1	1	36
11:45 AM	0	0	0	2	2	0	0	0	1	1	0	0	0	36	36	0	0	0	0	0	39
12:00 PM	1	0	0	0	1	1	2	0	7	10	0	1	0	15	16	0	1	0	2	3	32
12:15 PM	0	0	0	3	3	1	2	0	7	10	0	1	0	15	16	0	1	0	2	3	32
Total Volume	1	0	1	18	20	1	2	0	15	18	0	1	0	83	84	0	1	0	4	5	127
% App. Total	5	0	5	90		5.6	11.1	0	83.3		0	1.2	0	98.8		0	20	0	80		
PHF	.250	.000	.250	.375	.385	.250	.250	.000	.536	.450	.000	.250	.000	.576	.583	.000	.250	.000	.500	.417	.814



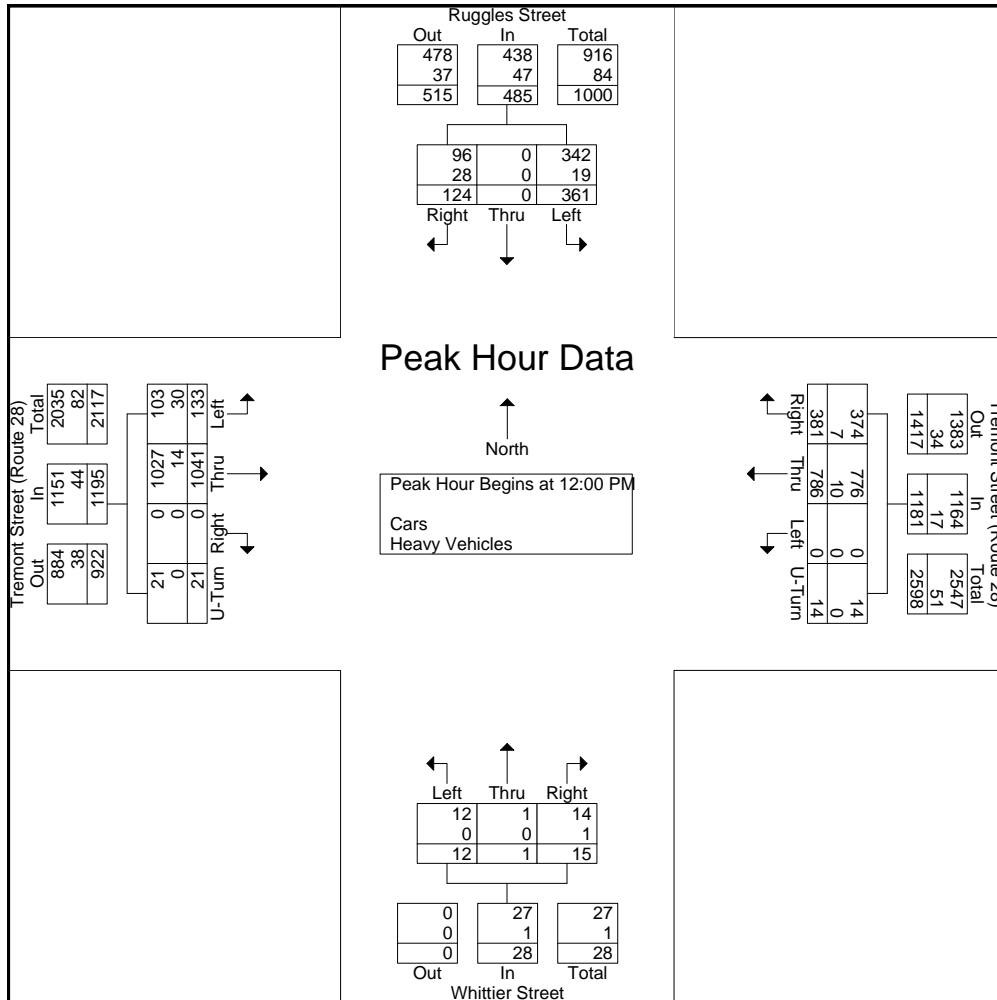
PRECISION
D A T A
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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	33	0	90	123	94	187	0	2	283	2	0	2	4	0	257	38	4	299	709
12:15 PM	35	0	90	125	87	196	0	8	291	8	1	2	11	0	262	36	5	303	730
12:30 PM	26	0	89	115	99	179	0	2	280	3	0	1	4	0	263	27	8	298	697
12:45 PM	30	0	92	122	101	224	0	2	327	2	0	7							753
Total Volume	124	0	361	485	381	786	0	14	1181	15	1	12	28	0	1041	133	21	1195	2889
% App. Total	25.6	0	74.4		32.3	66.6	0	1.2		53.6	3.6	42.9		0	87.1	11.1	1.8		
PHF	.886	.000	.981	.970	.943	.877	.000	.438	.903	.469	.250	.429	.636	.000	.990	.875	.656	.986	.959
Cars	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% Cars	77.4	0	94.7	90.3	98.2	98.7	0	100	98.6	93.3	100	100	96.4	0	98.7	77.4	100	96.3	96.2
Heavy Vehicles	28	0	19	47	7	10	0	0	17	1	0	0	1	0	14	30	0	44	109
% Heavy Vehicles	22.6	0	5.3	9.7	1.8	1.3	0	0	1.4	6.7	0	0	3.6	0	1.3	22.6	0	3.7	3.8





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City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	8	0	0	0	275	0	0	0	0	18	271	0	572
11:15 AM	8	0	0	0	266	0	0	0	0	19	302	0	595
11:30 AM	3	0	0	0	277	0	0	0	0	26	319	0	625
11:45 AM	11	0	0	0	284	0	0	0	0	21	331	0	647
Total	30	0	0	0	1102	0	0	0	0	84	1223	0	2439
12:00 PM	12	0	0	0	280	0	0	0	0	20	335	0	647
12:15 PM	12	0	0	0	270	0	0	0	0	31	335	0	648
12:30 PM	8	0	0	0	272	0	0	0	0	20	336	0	636
12:45 PM	10	0	0	0	312	0	0	0	0	21	337	0	680
Total	42	0	0	0	1134	0	0	0	0	92	1343	0	2611
Grand Total	72	0	0	0	2236	0	0	0	0	176	2566	0	5050
Aprch %	100	0	0	0	100	0	0	0	0	6.4	93.6	0	
Total %	1.4	0	0	0	44.3	0	0	0	0	3.5	50.8	0	
Cars	71	0	0	0	2201	0	0	0	0	168	2504	0	4944
% Cars	98.6	0	0	0	98.4	0	0	0	0	95.5	97.6	0	97.9
Heavy Vehicles	1	0	0	0	35	0	0	0	0	8	62	0	106
% Heavy Vehicles	1.4	0	0	0	1.6	0	0	0	0	4.5	2.4	0	2.1

Start Time	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	12	0	0	12	0	280	0	280	0	0	0	0	20	335	0	355	647
12:15 PM	12	0	0	12	0	270	0	270	0	0	0	0	31	335	0	366	648
12:30 PM	8	0	0	8	0	272	0	272	0	0	0	0	20	336	0	356	636
12:45 PM	10	0	0	10	0	312	0	312	0	0	0	0	21	337	0	358	680
Total Volume	42	0	0	42	0	1134	0	1134	0	0	0	0	92	1343	0	1435	2611
% App. Total	100	0	0	0	0	100	0	0	0	0	0	0	6.4	93.6	0	0	
PHF	.875	.000	.000	.875	.000	.909	.000	.909	.000	.000	.000	.000	.742	.996	.000	.980	.960
Cars	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% Cars	97.6	0	0	97.6	0	98.7	0	98.7	0	0	0	0	95.7	97.8	0	97.6	98.1
Heavy Vehicles	1	0	0	1	0	15	0	15	0	0	0	0	4	30	0	34	50
% Heavy Vehicles	2.4	0	0	2.4	0	1.3	0	1.3	0	0	0	0	4.3	2.2	0	2.4	1.9



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N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

Start Time	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	8	0	0	0	268	0	0	0	0	18	263	0	557
11:15 AM	8	0	0	0	264	0	0	0	0	18	297	0	587
11:30 AM	3	0	0	0	272	0	0	0	0	25	307	0	607
11:45 AM	11	0	0	0	278	0	0	0	0	19	324	0	632
Total	30	0	0	0	1082	0	0	0	0	80	1191	0	2383
12:00 PM	12	0	0	0	274	0	0	0	0	20	330	0	636
12:15 PM	11	0	0	0	268	0	0	0	0	29	328	0	636
12:30 PM	8	0	0	0	269	0	0	0	0	19	328	0	624
12:45 PM	10	0	0	0	308	0	0	0	0	20	327	0	665
Total	41	0	0	0	1119	0	0	0	0	88	1313	0	2561
Grand Total	71	0	0	0	2201	0	0	0	0	168	2504	0	4944
Apprch %	100	0	0	0	100	0	0	0	0	6.3	93.7	0	
Total %	1.4	0	0	0	44.5	0	0	0	0	3.4	50.6	0	

Start Time	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	12	0	0	12	0	274	0	274	0	0	0	0	20	330	0	350	636
12:15 PM	11	0	0	11	0	268	0	268	0	0	0	0	29	328	0	357	636
12:30 PM	8	0	0	8	0	269	0	269	0	0	0	0	19	328	0	347	624
12:45 PM	10	0	0	10	0	308	0	308	0	0	0	0	20	327	0	347	665
Total Volume	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% App. Total	100	0	0		0	100	0		0	0	0		6.3	93.7	0		
PHF	.854	.000	.000	.854	.000	.908	.000	.908	.000	.000	.000	.000	.759	.995	.000	.981	.963



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File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	0	0	0	0	7	0	0	0	0	0	8	0	15
11:15 AM	0	0	0	0	2	0	0	0	0	1	5	0	8
11:30 AM	0	0	0	0	5	0	0	0	0	1	12	0	18
11:45 AM	0	0	0	0	6	0	0	0	0	2	7	0	15
Total	0	0	0	0	20	0	0	0	0	4	32	0	56
12:00 PM	0	0	0	0	6	0	0	0	0	0	5	0	11
12:15 PM	1	0	0	0	2	0	0	0	0	2	7	0	12
12:30 PM	0	0	0	0	3	0	0	0	0	1	8	0	12
12:45 PM	0	0	0	0	4	0	0	0	0	1	10	0	15
Total	1	0	0	0	15	0	0	0	0	4	30	0	50
Grand Total	1	0	0	0	35	0	0	0	0	8	62	0	106
Apprch %	100	0	0	0	100	0	0	0	0	11.4	88.6	0	
Total %	0.9	0	0	0	33	0	0	0	0	7.5	58.5	0	

Start Time	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				Int. Total	
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total		
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 11:00 AM																		
11:00 AM	0	0	0	0	0	7	0	7	0	0	0	0	0	0	8	0	8	15
11:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	5	0	6	8
11:30 AM	0	0	0	0	0	5	0	5	0	0	0	0	0	1	12	0	13	18
11:45 AM	0	0	0	0	0	6	0	6	0	0	0	0	0	2	7	0	9	15
Total Volume	0	0	0	0	0	20	0	20	0	0	0	0	0	4	32	0	36	56
% App. Total	0	0	0	0	0	100	0	100	0	0	0	0	0	11.1	88.9	0		
PHF	.000	.000	.000	.000	.000	.714	.000	.714	.000	.000	.000	.000	.000	.500	.667	.000	.692	.778



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Groups Printed- Peds and Bicycles

Start Time	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	0	6	0	0	0	10	0	0	0	8	1	0	0	1	26
11:15 AM	0	0	0	4	0	0	0	5	0	0	0	11	0	1	0	1	22
11:30 AM	0	0	0	10	0	0	0	16	0	0	0	18	1	0	0	0	45
11:45 AM	0	0	0	2	0	0	0	8	0	0	0	36	0	0	0	2	48
Total	0	0	0	22	0	0	0	39	0	0	0	73	2	1	0	4	141
12:00 PM	0	0	0	6	0	0	0	13	0	0	0	19	0	0	0	1	39
12:15 PM	2	0	0	6	0	1	0	15	0	0	0	7	0	0	0	8	39
12:30 PM	0	0	0	2	0	0	0	10	0	0	0	7	0	0	0	3	22
12:45 PM	0	0	0	4	0	1	0	11	0	0	0	3	0	0	0	2	21
Total	2	0	0	18	0	2	0	49	0	0	0	36	0	0	0	14	121
Grand Total	2	0	0	40	0	2	0	88	0	0	0	109	2	1	0	18	262
Apprch %	4.8	0	0	95.2	0	2.2	0	97.8	0	0	0	100	9.5	4.8	0	85.7	
Total %	0.8	0	0	15.3	0	0.8	0	33.6	0	0	0	41.6	0.8	0.4	0	6.9	

Start Time	Columbus Avenue From North					Tremont Street (Route 28) From East					Ruggles Street From South					Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	0	10	10	0	0	0	16	16	0	0	0	18	18	1	0	0	0	1	45
11:45 AM	0	0	0	2	2	0	0	0	8	8	0	0	0	36	36	0	0	0	2	2	48
12:00 PM	0	0	0	6	6	0	0	0	13	13	0	0	0	19	19	0	0	0	1	1	39
12:15 PM	2						1												8	8	39
Total Volume	2	0	0	24	26	0	1	0	52	53	0	0	0	80	80	1	0	0	11	12	171
% App. Total	7.7	0	0	92.3		0	1.9	0	98.1		0	0	0	100		8.3	0	0	91.7		
PHF	.250	.000	.000	.600	.650	.000	.250	.000	.813	.828	.000	.000	.000	.556	.556	.250	.000	.000	.344	.375	.891



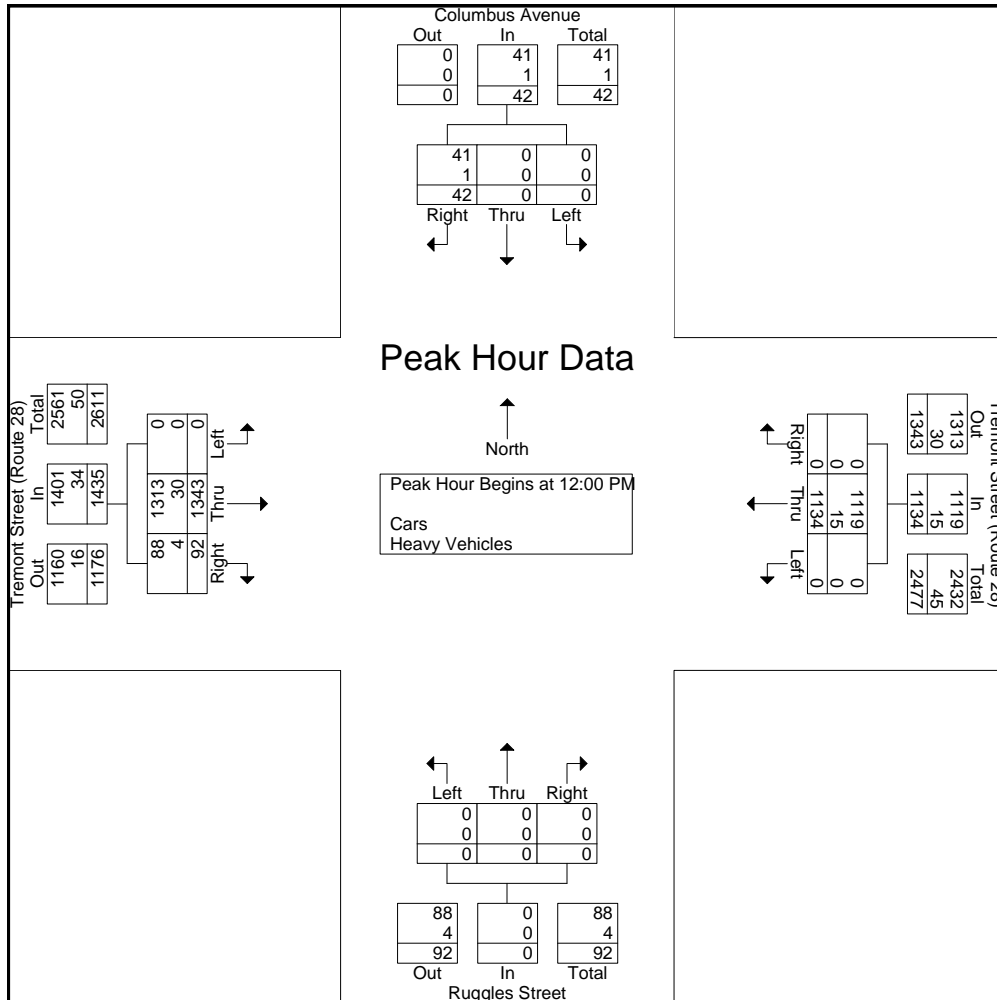
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	12	0	0	12	0	280	0	280	0	0	0	0	20	335	0	355	647
12:15 PM	12	0	0	12	0	270	0	270	0	0	0	0	31	335	0	366	648
12:30 PM	8	0	0	8	0	272	0	272	0	0	0	0	20	336	0	356	636
12:45 PM	10	0	0	10	0	312	0	312	0	0	0	0	21	337	0	358	680
Total Volume	42	0	0	42	0	1134	0	1134	0	0	0	0	92	1343	0	1435	2611
% App. Total	100	0	0		0	100	0		0	0	0	0	6.4	93.6	0		
PHF	.875	.000	.000	.875	.000	.909	.000	.909	.000	.000	.000	.000	.742	.996	.000	.980	.960
Cars	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% Cars	97.6	0	0	97.6	0	98.7	0	98.7	0	0	0	0	95.7	97.8	0	97.6	98.1
Heavy Vehicles	1	0	0	1	0	15	0	15	0	0	0	0	4	30	0	34	50
% Heavy Vehicles	2.4	0	0	2.4	0	1.3	0	1.3	0	0	0	0	4.3	2.2	0	2.4	1.9





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N/S: Melnea Cass Boulevard
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	34	7	0	2	67	9	12	15	174	172	85	21	598
11:15 AM	21	5	0	1	83	8	14	16	162	172	99	32	613
11:30 AM	43	8	3	1	73	2	7	14	160	185	94	36	626
11:45 AM	43	14	3	1	76	2	8	22	167	180	112	38	666
Total	141	34	6	5	299	21	41	67	663	709	390	127	2503
12:00 PM	40	12	1	5	78	8	10	22	164	204	89	34	667
12:15 PM	39	12	2	5	75	8	6	19	156	205	102	28	657
12:30 PM	36	16	1	1	81	9	8	21	157	208	109	28	675
12:45 PM	44	10	1	4	89	8	16	13	182	202	98	37	704
Total	159	50	5	15	323	33	40	75	659	819	398	127	2703
Grand Total	300	84	11	20	622	54	81	142	1322	1528	788	254	5206
Apprch %	75.9	21.3	2.8	2.9	89.4	7.8	5.2	9.2	85.6	59.5	30.7	9.9	
Total %	5.8	1.6	0.2	0.4	11.9	1	1.6	2.7	25.4	29.4	15.1	4.9	
Cars	298	80	10	11	614	53	79	127	1294	1490	773	248	5077
% Cars	99.3	95.2	90.9	55	98.7	98.1	97.5	89.4	97.9	97.5	98.1	97.6	97.5
Heavy Vehicles	2	4	1	9	8	1	2	15	28	38	15	6	129
% Heavy Vehicles	0.7	4.8	9.1	45	1.3	1.9	2.5	10.6	2.1	2.5	1.9	2.4	2.5

Start Time	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	1	53	5	78	8	91	10	22	164	196	204	89	34	327	667
12:15 PM	39	12	2	53	5	75	8	88	6	19	156	181	205	102	28	335	657
12:30 PM	36	16	1	53	1	81	9	91	8	21	157	186	208	109	28	345	675
12:45 PM	44	10	1	55	4	89	8	101	16	13	182	211	202	98	37	337	704
Total Volume	159	50	5	214	15	323	33	371	40	75	659	774	819	398	127	1344	2703
% App. Total	74.3	23.4	2.3		4	87.1	8.9		5.2	9.7	85.1		60.9	29.6	9.4		
PHF	.903	.781	.625	.973	.750	.907	.917	.918	.625	.852	.905	.917	.984	.913	.858	.974	.960
Cars	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% Cars	100	98.0	80.0	99.1	60.0	98.8	97.0	97.0	100	94.7	98.5	98.2	97.2	99.0	98.4	97.8	97.9
Heavy Vehicles	0	1	1	2	6	4	1	11	0	4	10	14	23	4	2	29	56
% Heavy Vehicles	0	2.0	20.0	0.9	40.0	1.2	3.0	3.0	0	5.3	1.5	1.8	2.8	1.0	1.6	2.2	2.1



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N/S: Melnea Cass Boulevard
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

Start Time	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	34	7	0	1	64	9	12	11	168	166	84	21	577
11:15 AM	21	5	0	0	83	8	14	14	160	171	97	31	604
11:30 AM	42	7	3	0	72	2	7	12	156	180	88	34	603
11:45 AM	42	12	3	1	76	2	6	19	161	177	110	37	646
Total	139	31	6	2	295	21	39	56	645	694	379	123	2430
12:00 PM	40	12	0	3	77	8	10	20	159	199	89	34	651
12:15 PM	39	12	2	3	74	8	6	18	155	201	100	27	645
12:30 PM	36	16	1	0	80	9	8	20	155	201	108	28	662
12:45 PM	44	9	1	3	88	7	16	13	180	195	97	36	689
Total	159	49	4	9	319	32	40	71	649	796	394	125	2647
Grand Total	298	80	10	11	614	53	79	127	1294	1490	773	248	5077
Apprch %	76.8	20.6	2.6	1.6	90.6	7.8	5.3	8.5	86.3	59.3	30.8	9.9	
Total %	5.9	1.6	0.2	0.2	12.1	1	1.6	2.5	25.5	29.3	15.2	4.9	

Start Time	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	0	52	3	77	8	88	10	20	159	189	199	89	34	322	651
12:15 PM	39	12	2	53	3	74	8	85	6	18	155	179	201	100	27	328	645
12:30 PM	36	16	1	53	0	80	9	89	8	20	155	183	201	108	28	337	662
12:45 PM	44	9	1	54	3	88	7	98	16	13	180	209	195	97	36	328	689
Total Volume	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% App. Total	75	23.1	1.9		2.5	88.6	8.9		5.3	9.3	85.4		60.5	30	9.5		
PHF	.903	.766	.500	.981	.750	.906	.889	.918	.625	.888	.901	.909	.990	.912	.868	.976	.960



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N/S: Melnea Cass Boulevard
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
11:00 AM	0	0	0	1	3	0	0	4	6	6	1	0	21
11:15 AM	0	0	0	1	0	0	0	2	2	1	2	1	9
11:30 AM	1	1	0	1	1	0	0	2	4	5	6	2	23
11:45 AM	1	2	0	0	0	0	2	3	6	3	2	1	20
Total	2	3	0	3	4	0	2	11	18	15	11	4	73
12:00 PM	0	0	1	2	1	0	0	2	5	5	0	0	16
12:15 PM	0	0	0	2	1	0	0	1	1	4	2	1	12
12:30 PM	0	0	0	1	1	0	0	1	2	7	1	0	13
12:45 PM	0	1	0	1	1	1	0	0	2	7	1	1	15
Total	0	1	1	6	4	1	0	4	10	23	4	2	56
Grand Total	2	4	1	9	8	1	2	15	28	38	15	6	129
Apprch %	28.6	57.1	14.3	50	44.4	5.6	4.4	33.3	62.2	64.4	25.4	10.2	
Total %	1.6	3.1	0.8	7	6.2	0.8	1.6	11.6	21.7	29.5	11.6	4.7	

Start Time	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	1	3	0	4	0	4	6	10	6	1	0	7	21
11:15 AM	0	0	0	0	1	0	0	1	0	2	2	4	1	2	1	4	9
11:30 AM	1	1	0	2	1	1	0	2	0	2	4	6	5	6	2	13	23
11:45 AM	1	2	0	3	0	0	0	0	2	3	6	11	3	2	1	6	20
Total Volume	2	3	0	5	3	4	0	7	2	11	18	31	15	11	4	30	73
% App. Total	40	60	0		42.9	57.1	0		6.5	35.5	58.1		50	36.7	13.3		
PHF	.500	.375	.000	.417	.750	.333	.000	.438	.250	.688	.750	.705	.625	.458	.500	.577	.793



PRECISION
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INDUSTRIES, LLC

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N/S: Melnea Cass Boulevard
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	0	5	0	0	0	1	0	0	0	1	0	0	0	2	9
11:15 AM	0	0	0	6	0	0	0	1	0	0	0	1	1	0	0	2	11
11:30 AM	0	0	0	8	0	0	0	3	0	0	0	4	0	0	0	1	16
11:45 AM	0	0	0	5	0	0	0	5	0	0	0	10	0	0	0	2	22
Total	0	0	0	24	0	0	0	10	0	0	0	16	1	0	0	7	58
12:00 PM	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	0	6
12:15 PM	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	1	7
12:30 PM	0	0	0	4	0	0	0	2	0	0	0	2	1	1	0	1	11
12:45 PM	0	0	0	5	0	0	0	4	0	0	0	2	0	0	0	0	11
Total	0	0	0	16	0	0	0	9	0	0	0	6	1	1	0	2	35
Grand Total	0	0	0	40	0	0	0	19	0	0	0	22	2	1	0	9	93
Apprch %	0	0	0	100	0	0	0	100	0	0	0	100	16.7	8.3	0	75	
Total %	0	0	0	43	0	0	0	20.4	0	0	0	23.7	2.2	1.1	0	9.7	

Start Time	Melnea Cass Boulevard From North					Tremont Street From East					Melnea Cass Boulevard (Route 28) From South					Tremont Street (Route 28) From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:00 AM																					
11:00 AM	0	0	0	5	5	0	0	0	1	1	0	0	0	1	1	0	0	0	2	2	9
11:15 AM	0	0	0	6	6	0	0	0	1	1	0	0	0	1	1	1	0	0	2	3	11
11:30 AM	0	0	0	8	8	0	0	0	3	3	0	0	0	4	4	0	0	0	1	1	16
11:45 AM	0	0	0	5	5	0	0	0	5	5	0	0	0	10	10	0	0	0	2	2	22
Total Volume	0	0	0	24	24	0	0	0	10	10	0	0	0	16	16	1	0	0	7	8	58
% App. Total	0	0	0	100		0	0	0	100		0	0	0	100		12.5	0	0	87.5		
PHF	.000	.000	.000	.750	.750	.000	.000	.000	.500	.500	.000	.000	.000	.400	.400	.250	.000	.000	.875	.667	.659



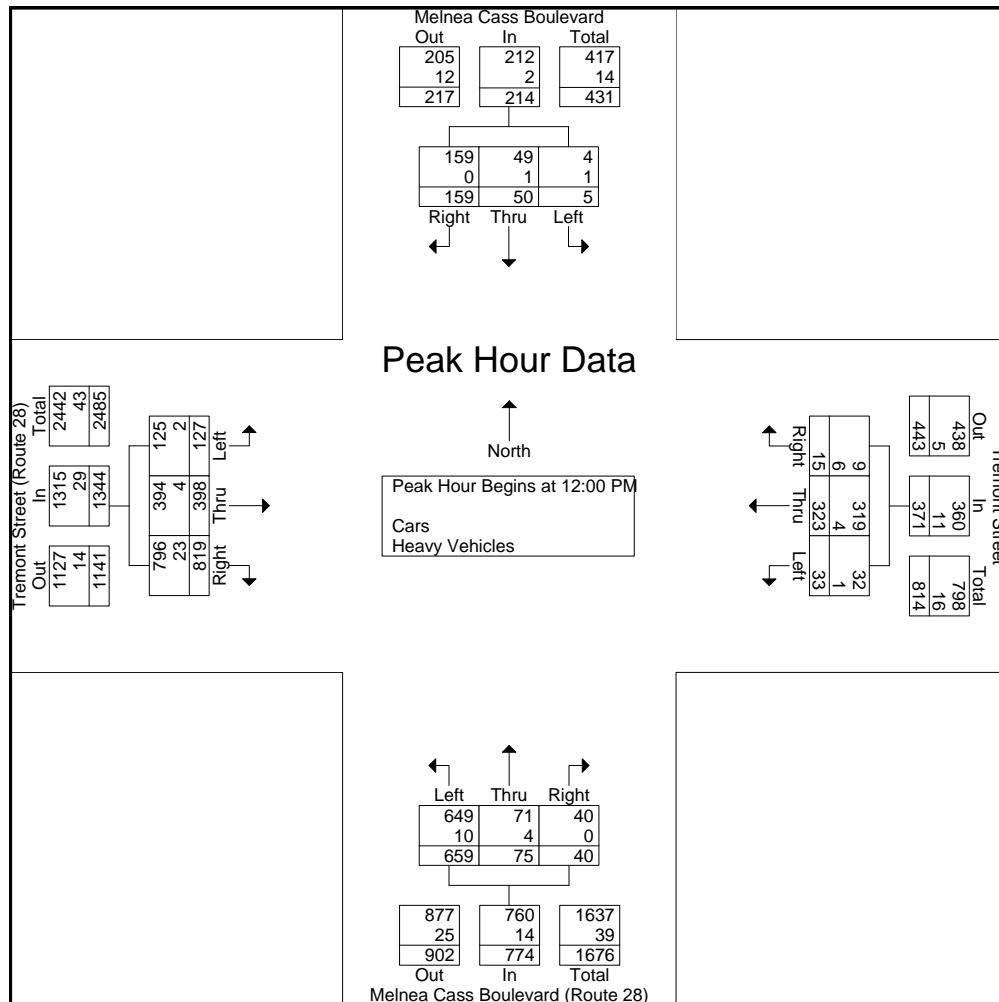
PRECISION
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INDUSTRIES, LLC

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N/S: Melnea Cass Boulevard
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	1	53	5	78	8	91	10	22	164	196	204	89	34	327	667
12:15 PM	39	12	2	53	5	75	8	88	6	19	156	181	205	102	28	335	657
12:30 PM	36	16	1	53	1	81	9	91	8	21	157	186	208	109	28	345	675
12:45 PM	44	10	1	55	4	89	8	101	16	13	182	211	202	98	37	337	704
Total Volume	159	50	5	214	15	323	33	371	40	75	659	774	819	398	127	1344	2703
% App. Total	74.3	23.4	2.3		4	87.1	8.9		5.2	9.7	85.1		60.9	29.6	9.4		
PHF	.903	.781	.625	.973	.750	.907	.917	.918	.625	.852	.905	.917	.984	.913	.858	.974	.960
Cars	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% Cars	100	98.0	80.0	99.1	60.0	98.8	97.0	97.0	100	94.7	98.5	98.2	97.2	99.0	98.4	97.8	97.9
Heavy Vehicles	0	1	1	2	6	4	1	11	0	4	10	14	23	4	2	29	56
% Heavy Vehicles	0	2.0	20.0	0.9	40.0	1.2	3.0	3.0	0	5.3	1.5	1.8	2.8	1.0	1.6	2.2	2.1





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N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

Start Time	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
11:00 AM	0	0	0	14	0	0	26	0	0	40
11:15 AM	0	0	0	16	0	0	17	0	0	33
11:30 AM	0	0	0	22	0	0	19	0	0	41
11:45 AM	0	0	0	22	0	0	15	0	0	37
Total	0	0	0	74	0	0	77	0	0	151
12:00 PM	0	1	0	22	0	0	10	0	0	33
12:15 PM	0	0	0	44	0	0	16	0	0	60
12:30 PM	0	0	0	24	0	0	11	0	0	35
12:45 PM	0	0	0	30	0	0	9	0	0	39
Total	0	1	0	120	0	0	46	0	0	167
Grand Total	0	1	0	194	0	0	123	0	0	318
Apprch %	0	100	0	100	0	0	100	0	0	
Total %	0	0.3	0	61	0	0	38.7	0	0	

Start Time	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				Int. Total
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	22	0	0	22	19	0	0	19	41
11:45 AM	0	0	0	0	22	0	0	22	15	0	0	15	37
12:00 PM	0	1	0	1	22	0	0	22	10	0	0	10	33
12:15 PM	0	0	0	0	44	0	0	44	16	0	0	16	60
Total Volume	0	1	0	1	110	0	0	110	60	0	0	60	171
% App. Total	0	100	0		100	0	0		100	0	0		
PHF	.000	.250	.000	.250	.625	.000	.000	.625	.789	.000	.000	.789	.713



PRECISION
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N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
11:00 AM	0	0	0	0	0	31	0	0	0	31
11:15 AM	0	0	0	0	0	36	0	0	0	36
11:30 AM	0	0	0	0	0	70	0	0	0	70
11:45 AM	0	0	0	0	0	71	0	0	0	71
Total	0	0	0	0	0	208	0	0	0	208
12:00 PM	0	0	0	0	0	65	0	0	0	65
12:15 PM	0	0	0	0	0	55	0	0	0	55
12:30 PM	0	0	0	0	0	54	0	0	0	54
12:45 PM	0	0	0	0	0	41	0	0	0	41
Total	0	0	0	0	0	215	0	0	0	215
Grand Total	0	0	0	0	0	423	0	0	0	423
Apprch %	0	0	0	0	0	100	0	0	0	
Total %	0	0	0	0	0	100	0	0	0	

Start Time	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				Int. Total
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	0	0	70	70	0	0	0	0	70
11:45 AM	0	0	0	0	0	0	71	71	0	0	0	0	71
12:00 PM	0	0	0	0	0	0	65	65	0	0	0	0	65
12:15 PM	0	0	0	0	0	0	55	55	0	0	0	0	55
Total Volume	0	0	0	0	0	0	261	261	0	0	0	0	261
% App. Total	0	0	0	0	0	0	100	100	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.919	.919	.000	.000	.000	.000	.919



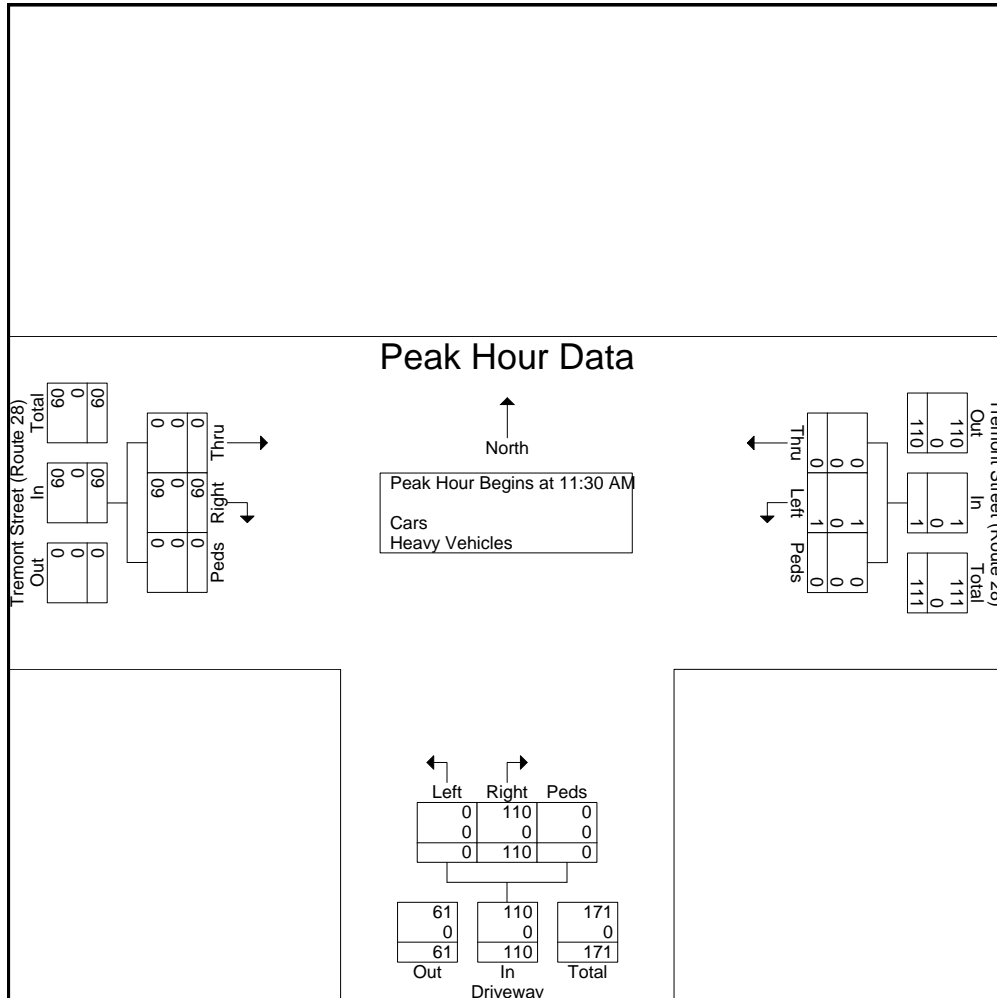
PRECISION
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N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Start Time	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				Int. Total
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	22	0	0	22	19	0	0	19	41
11:45 AM	0	0	0	0	22	0	0	22	15	0	0	15	37
12:00 PM	0	1	0	1	22	0	0	22	10	0	0	10	33
12:15 PM	0	0	0	0	44	0	0	44	16	0	0	16	60
Total Volume	0	1	0	1	110	0	0	110	60	0	0	60	171
% App. Total	0	100	0	100	100	0	0	100	100	0	0	100	100
PHF	.000	.250	.000	.250	.625	.000	.000	.625	.789	.000	.000	.789	.713
Cars	0	1	0	1	110	0	0	110	60	0	0	60	171
% Cars	0	100	0	100	100	0	0	100	100	0	0	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0





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File Name : 123026 E
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Cars - Heavy Vehicles

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	19	0	108	0	134	165	0	1	4	9	6	0	0	267	49	0	762
07:15 AM	43	0	121	0	134	172	0	0	3	10	9	0	0	310	49	0	851
07:30 AM	35	0	157	0	153	201	0	4	4	12	7	0	0	309	39	0	921
07:45 AM	26	0	135	0	119	177	0	0	1	8	14	0	0	334	51	0	865
Total	123	0	521	0	540	715	0	5	12	39	36	0	0	1220	188	0	3399
08:00 AM	21	0	113	0	106	196	0	0	11	2	4	0	0	351	60	0	864
08:15 AM	29	0	87	0	113	158	0	3	5	3	4	0	0	341	33	0	776
08:30 AM	27	0	100	0	99	170	0	3	5	7	8	0	0	339	64	1	823
08:45 AM	23	0	105	0	121	180	0	1	3	4	12	0	0	310	60	0	819
Total	100	0	405	0	439	704	0	7	24	16	28	0	0	1341	217	1	3282
Grand Total	223	0	926	0	979	1419	0	12	36	55	64	0	0	2561	405	1	6681
Apprch %	19.4	0	80.6	0	40.6	58.9	0	0.5	23.2	35.5	41.3	0	0	86.3	13.7	0	
Total %	3.3	0	13.9	0	14.7	21.2	0	0.2	0.5	0.8	1	0	0	38.3	6.1	0	
Cars	123	0	815	0	903	1303	0	11	33	50	59	0	0	2441	302	1	6041
% Cars	55.2	0	88	0	92.2	91.8	0	91.7	91.7	90.9	92.2	0	0	95.3	74.6	100	90.4
Heavy Vehicles	100	0	111	0	76	116	0	1	3	5	5	0	0	120	103	0	640
% Heavy Vehicles	44.8	0	12	0	7.8	8.2	0	8.3	8.3	9.1	7.8	0	0	4.7	25.4	0	9.6

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	43	0	121	0	164	134	172	0	0	306	3	10	9	0	22	0	310	49	0	359	851
07:30 AM	35	0	157	0	192	153	201	0	4	358	4	12	7	0	23	0	309	39	0	348	921
07:45 AM	26	0	135	0	161	119	177	0	0	296	1	8	14	0	23	0	334	51	0	385	865
08:00 AM	21	0	113	0	134	106	196	0	0	302	11	2	4	0	17	0	351	60	0	411	864
Total Volume	125	0	526	0	651	512	746	0	4	1262	19	32	34	0	85	0	1304	199	0	1503	3501
% App. Total																					
PHF	.727	.000	.838	.000	.848	.837	.928	.000	.250	.881	.432	.667	.607	.000	.924	.000	.929	.829	.000	.914	.950
Cars	75	0	479	0	554	478	687	0	4	1169	17	29	31	0	77	0	1252	146	0	1398	3198
% Cars	60.0	0	91.1	0	85.1	93.4	92.1	0	100	92.6	89.5	90.6	91.2	0	90.6	0	96.0	73.4	0	93.0	91.3
Heavy Vehicles																					
% Heavy Vehicles	40.0	0	8.9	0	14.9	6.6	7.9	0	0	7.4	10.5	9.4	8.8	0	9.4	0	4.0	26.6	0	7.0	8.7



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File Name : 123026 E
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Cars

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	8	0	92	0	120	147	0	1	4	8	6	0	0	247	37	0	670
07:15 AM	27	0	111	0	126	157	0	0	3	8	9	0	0	298	33	0	772
07:30 AM	23	0	145	0	142	186	0	4	4	11	5	0	0	293	30	0	843
07:45 AM	14	0	120	0	111	161	0	0	1	8	13	0	0	323	36	0	787
Total	72	0	468	0	499	651	0	5	12	35	33	0	0	1161	136	0	3072
08:00 AM	11	0	103	0	99	183	0	0	9	2	4	0	0	338	47	0	796
08:15 AM	16	0	70	0	97	145	0	3	5	3	4	0	0	325	23	0	691
08:30 AM	13	0	87	0	93	158	0	3	4	7	7	0	0	319	48	1	740
08:45 AM	11	0	87	0	115	166	0	0	3	3	11	0	0	298	48	0	742
Total	51	0	347	0	404	652	0	6	21	15	26	0	0	1280	166	1	2969
Grand Total	123	0	815	0	903	1303	0	11	33	50	59	0	0	2441	302	1	6041
Apprch %	13.1	0	86.9	0	40.7	58.8	0	0.5	23.2	35.2	41.5	0	0	89	11	0	
Total %	2	0	13.5	0	14.9	21.6	0	0.2	0.5	0.8	1	0	0	40.4	5	0	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	27	0	111	0	138	126	157	0	0	283	3	8	9	0	20	0	298	33	0	331	772
07:30 AM	23	0	145	0	168	142	186	0	4	332	4	11	5	0	20	0	293	30	0	323	843
07:45 AM	14	0	120	0	134	111	161	0	0	272	1	8	13	0	22	0	323	36	0	359	787
08:00 AM	11	0	103	0	114	99	183	0	0	282	9					0	338	47	0	385	
Total Volume	75	0	479	0	554	478	687	0	4	1169	17	29	31	0	77	0	1252	146	0	1398	3198
% App. Total																					
PHF	.694	.000	.826	.000	.824	.842	.923	.000	.250	.880	.472	.659	.596	.000	.875	.000	.926	.777	.000	.908	.948



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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

File Name : 123026 E
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	11	0	16	0	14	18	0	0	0	1	0	0	0	20	12	0	92
07:15 AM	16	0	10	0	8	15	0	0	0	2	0	0	0	12	16	0	79
07:30 AM	12	0	12	0	11	15	0	0	0	1	2	0	0	16	9	0	78
07:45 AM	12	0	15	0	8	16	0	0	0	0	1	0	0	11	15	0	78
Total	51	0	53	0	41	64	0	0	0	4	3	0	0	59	52	0	327
08:00 AM	10	0	10	0	7	13	0	0	2	0	0	0	0	13	13	0	68
08:15 AM	13	0	17	0	16	13	0	0	0	0	0	0	0	16	10	0	85
08:30 AM	14	0	13	0	6	12	0	0	1	0	1	0	0	20	16	0	83
08:45 AM	12	0	18	0	6	14	0	1	0	1	1	0	0	12	12	0	77
Total	49	0	58	0	35	52	0	1	3	1	2	0	0	61	51	0	313
Grand Total	100	0	111	0	76	116	0	1	3	5	5	0	0	120	103	0	640
Apprch %	47.4	0	52.6	0	39.4	60.1	0	0.5	23.1	38.5	38.5	0	0	53.8	46.2	0	
Total %	15.6	0	17.3	0	11.9	18.1	0	0.2	0.5	0.8	0.8	0	0	18.8	16.1	0	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
07:00 AM	11	0	16	0	27	14	18	0	0	32	0	1	0	0	1	0	20	12	0	32	92
07:15 AM	16	0	10	0	26	8	15	0	0	23	0	2	0	0	2	0	12	16	0	28	79
07:30 AM	12	0	12	0	24	11	15	0	0	26	0	1	2	0	3	0	16	9	0	25	78
07:45 AM	12	0	15	0	27	8	16	0	0	24	0	0	1	0	1	0	11	15	0	26	78
Total Volume	51	0	53	0	104	41	64	0	0	105	0	4	3	0	7	0	59	52	0	111	327
% App. Total	49	0	51	0		39	61	0	0		0	57.1	42.9	0		0	53.2	46.8	0		
PHF	.797	.000	.828	.000	.963	.732	.889	.000	.000	.820	.000	.500	.375	.000	.583	.000	.738	.813	.000	.867	.889

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 07:00 AM



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Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Peds and Bikes

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	2	0	1	0	1	0	0	0	10	0	1	0	3	18
07:15 AM	0	0	1	0	1	0	0	4	0	0	0	8	0	2	0	0	16
07:30 AM	0	0	1	3	1	0	0	1	0	0	0	3	0	2	1	1	13
07:45 AM	0	0	2	8	0	0	0	6	0	0	0	10	0	3	0	3	32
Total	0	0	4	13	2	1	0	12	0	0	0	31	0	8	1	7	79
08:00 AM	0	0	2	0	2	0	0	2	0	0	0	3	0	0	0	0	9
08:15 AM	0	0	0	1	0	0	0	6	0	0	0	11	0	3	1	0	22
08:30 AM	0	0	4	0	0	1	0	0	0	1	0	2	0	3	1	0	12
08:45 AM	0	0	3	0	0	0	0	3	0	1	0	11	0	7	0	0	25
Total	0	0	9	1	2	1	0	11	0	2	0	27	0	13	2	0	68
Grand Total	0	0	13	14	4	2	0	23	0	2	0	58	0	21	3	7	147
Apprch %	0	0	48.1	51.9	13.8	6.9	0	79.3	0	3.3	0	96.7	0	67.7	9.7	22.6	
Total %	0	0	8.8	9.5	2.7	1.4	0	15.6	0	1.4	0	39.5	0	14.3	2	4.8	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 07:00 AM																						
07:00 AM	0	0	0	2	2	0	1	0	1	2	0	0	0	10	10	0	1	0	3	4	18	
07:15 AM	0	0	1	0	1	1	0	0	4	5	0	0	0	8	8	0	2	0	0	2	16	
07:30 AM	0	0	1	3	4	1	0	0	1	2	0	0	0	3	3	0	2	1	1	4	13	
07:45 AM	0	0	2	8	10	0	0	0	6	6						3				6	32	
Total Volume	0	0	4	13	17	2	1	0	12	15	0	0	0	31	31	0	8	1	7	16	79	
% App. Total	0	0	23.5	76.5	13.3	6.7	0	80	0	0	0	100	0	50	6.2	43.8						
PHF	.000	.000	.500	.406	.425	.500	.250	.000	.500	.625	.000	.000	.000	.775	.775	.000	.667	.250	.583	.667	.617	



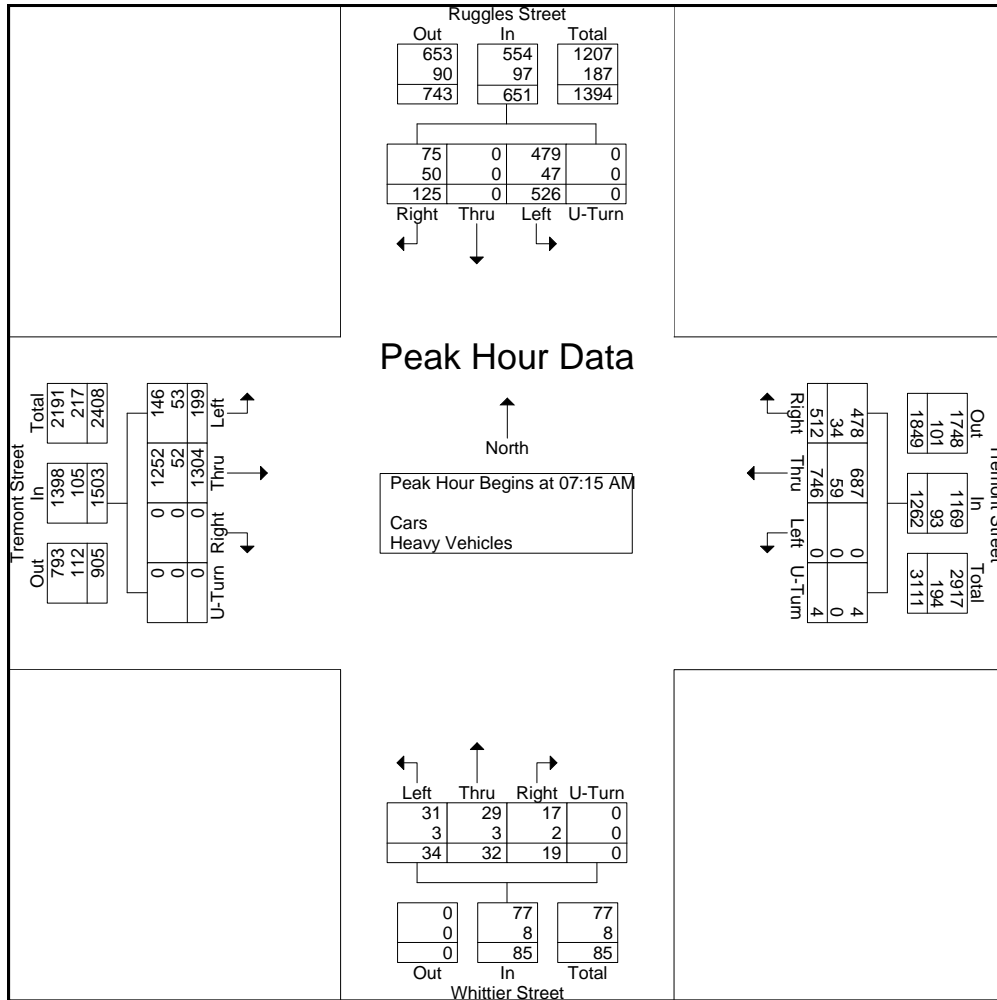
PRECISION
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File Name : 123026 E
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	43	0	121	0	164	134	172	0	0	306	3	10	9	0	22	0	310	49	0	359	851
07:30 AM	35	0	157	0	192	153	201	0	4	358	4	12	7	0	23	0	309	39	0	348	921
07:45 AM	26	0	135	0	161	119	177	0	0	296	1	8	14	0	23	0	334	51	0	385	865
08:00 AM	21	0	113	0	134	106	196	0	0	302	11	2	4	0	17	0	351	60	0	411	864
Total Volume	125	0	526	0	651	512	746	0	4	1262	19	32	34	0	85	0	1304	199	0	1503	3501
% App. Total	.727	.000	.838	.000	.848	.837	.928	.000	.250	.881	.432	.667	.607	.000	.924	.000	.929	.829	.000	.914	.950
PHF	.727	.000	.838	.000	.848	.837	.928	.000	.250	.881	.432	.667	.607	.000	.924	.000	.929	.829	.000	.914	.950
Cars	75	0	479	0	554	478	687	0	4	1169	17	29	31	0	77	0	1252	146	0	1398	3198
% Cars	60.0	0	91.1	0	85.1	93.4	92.1	0	100	92.6	89.5	90.6	91.2	0	90.6	0	96.0	73.4	0	93.0	91.3
Heavy Vehicles	40.0	0	8.9	0	14.9	6.6	7.9	0	0	7.4	10.5	9.4	8.8	0	9.4	0	4.0	26.6	0	7.0	8.7
% Heavy Vehicles	40.0	0	8.9	0	14.9	6.6	7.9	0	0	7.4	10.5	9.4	8.8	0	9.4	0	4.0	26.6	0	7.0	8.7





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File Name : 123026 EE
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Cars - Heavy Vehicles

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	61	0	131	0	141	206	0	2	9	3	7	0	0	307	15	0	882
04:15 PM	23	0	156	0	114	195	0	0	7	1	14	0	0	282	39	0	831
04:30 PM	41	0	129	0	122	168	0	0	13	4	6	0	0	280	42	0	805
04:45 PM	34	0	143	0	147	181	0	1	6	5	10	0	0	264	30	0	821
Total	159	0	559	0	524	750	0	3	35	13	37	0	0	1133	126	0	3339
05:00 PM	33	0	126	0	99	179	0	2	9	3	5	0	0	266	58	0	780
05:15 PM	64	0	125	0	137	222	0	3	9	2	18	0	0	301	39	0	920
05:30 PM	27	0	142	0	158	200	0	1	12	9	24	0	0	262	34	0	869
05:45 PM	47	0	110	0	139	222	0	0	6	5	15	0	0	275	23	0	842
Total	171	0	503	0	533	823	0	6	36	19	62	0	0	1104	154	0	3411
Grand Total	330	0	1062	0	1057	1573	0	9	71	32	99	0	0	2237	280	0	6750
Apprch %	23.7	0	76.3	0	40.1	59.6	0	0.3	35.1	15.8	49	0	0	88.9	11.1	0	
Total %	4.9	0	15.7	0	15.7	23.3	0	0.1	1.1	0.5	1.5	0	0	33.1	4.1	0	
Cars	330	0	978	0	981	1540	0	9	67	32	98	0	0	2132	280	0	6447
% Cars	100	0	92.1	0	92.8	97.9	0	100	94.4	100	99	0	0	95.3	100	0	95.5
Heavy Vehicles	0	0	84	0	76	33	0	0	4	0	1	0	0	105	0	0	303
% Heavy Vehicles	0	0	7.9	0	7.2	2.1	0	0	5.6	0	1	0	0	4.7	0	0	4.5

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total	
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 05:00 PM																						
05:00 PM	33	0	126	0	159	99	179	0	2	280	9	3	5	0	17	0	266	58	0	324	780	
05:15 PM	64	0	125	0	189	137	222	0	3	362	9	2	18	0	0	0	301	39	0	340	920	
05:30 PM	27	0	142	0	169	158	200	0	1	359	12	9	24	0	45	0	262	34	0	296	869	
05:45 PM	47	0	110	0	157	139	222	0	0	361	6	5	15	0	26	0	275	23	0	298	842	
Total Volume	171	0	503	0	674	533	823	0	6	1362	36	19	62	0	117	0	1104	154	0	1258	3411	
% App. Total	PHF	.668	.000	.886	.000	.892	.843	.927	.000	.500	.941	.750	.528	.646	.000	.650	.000	.917	.664	.000	.925	.927
Cars	171	0	468	0	639	502	812	0	6	1320	35	19	61	0	115	0	1062	154	0	1216	3290	
% Cars	100	0	93.0	0	94.8	94.2	98.7	0	100	96.9	97.2	100	98.4	0	98.3	0	96.2	100	0	96.7	96.5	
Heavy Vehicles	0	0	7.0	0	5.2	5.8	1.3	0	0	3.1	2.8	0	1.6	0	1.7	0	3.8	0	0	3.3	3.5	
% Heavy Vehicles	0	0	7.0	0	5.2	5.8	1.3	0	0	3.1	2.8	0	1.6	0	1.7	0	3.8	0	0	3.3	3.5	



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File Name : 123026 EE
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Cars

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	61	0	122	0	125	201	0	2	8	3	7	0	0	288	15	0	832
04:15 PM	23	0	141	0	101	188	0	0	7	1	14	0	0	270	39	0	784
04:30 PM	41	0	119	0	111	163	0	0	11	4	6	0	0	266	42	0	763
04:45 PM	34	0	128	0	142	176	0	1	6	5	10	0	0	246	30	0	778
Total	159	0	510	0	479	728	0	3	32	13	37	0	0	1070	126	0	3157
05:00 PM	33	0	115	0	90	173	0	2	9	3	5	0	0	257	58	0	745
05:15 PM	64	0	119	0	129	218	0	3	9	2	18	0	0	291	39	0	892
05:30 PM	27	0	132	0	152	199	0	1	11	9	23	0	0	248	34	0	836
05:45 PM	47	0	102	0	131	222	0	0	6	5	15	0	0	266	23	0	817
Total	171	0	468	0	502	812	0	6	35	19	61	0	0	1062	154	0	3290
Grand Total	330	0	978	0	981	1540	0	9	67	32	98	0	0	2132	280	0	6447
Apprch %	25.2	0	74.8	0	38.8	60.9	0	0.4	34	16.2	49.7	0	0	88.4	11.6	0	
Total %	5.1	0	15.2	0	15.2	23.9	0	0.1	1	0.5	1.5	0	0	33.1	4.3	0	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	33	0	115	0	148	90	173	0	2	265	9	3	5	0	17	0	257	58	0	315	745
05:15 PM	64	0	119	0	183	129	218	0	3	350	9	2	18	0	29	0	291	39	0	330	892
05:30 PM	27	0	132	0	159	152	199	0	1	352	11	9	23	0	43	0	248	34	0	282	836
05:45 PM	47	0	102	0	149	131	222	0	0	353	6	5	15	0	0	0	266	23	0	0	0
Total Volume	171	0	468	0	639	502	812	0	6	1320	35	19	61	0	115	0	1062	154	0	1216	3290
% App. Total																					
PHF	.668	.000	.886	.000	.873	.826	.914	.000	.500	.935	.795	.528	.663	.000	.669	.000	.912	.664	.000	.921	.922



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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Heavy Vehicles

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	9	0	16	5	0	0	1	0	0	0	0	19	0	0	50
04:15 PM	0	0	15	0	13	7	0	0	0	0	0	0	0	12	0	0	47
04:30 PM	0	0	10	0	11	5	0	0	2	0	0	0	0	14	0	0	42
04:45 PM	0	0	15	0	5	5	0	0	0	0	0	0	0	18	0	0	43
Total	0	0	49	0	45	22	0	0	3	0	0	0	0	63	0	0	182
05:00 PM	0	0	11	0	9	6	0	0	0	0	0	0	0	9	0	0	35
05:15 PM	0	0	6	0	8	4	0	0	0	0	0	0	0	10	0	0	28
05:30 PM	0	0	10	0	6	1	0	0	1	0	1	0	0	14	0	0	33
05:45 PM	0	0	8	0	8	0	0	0	0	0	0	0	0	9	0	0	25
Total	0	0	35	0	31	11	0	0	1	0	1	0	0	42	0	0	121
Grand Total	0	0	84	0	76	33	0	0	4	0	1	0	0	105	0	0	303
Apprch %	0	0	100	0	69.7	30.3	0	0	80	0	20	0	0	100	0	0	
Total %	0	0	27.7	0	25.1	10.9	0	0	1.3	0	0.3	0	0	34.7	0	0	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	9	0	9	16	5	0	0	21	1	0	0	0	1	0	19	0	0	19	50
04:15 PM	0	0	15	0	15	13	7	0	0	20	0	0	0	0	0	0	12	0	0	12	47
04:30 PM	0	0	10	0	10	11	5	0	0	16	2	0	0	0	2	0	14	0	0	14	42
04:45 PM	0	0	15	0	15	5	5	0	0	10	0	0	0	0	0	0	18	0	0	18	43
Total Volume	0	0	49	0	49	45	22	0	0	67	3	0	0	0	3	0	63	0	0	63	182
% App. Total	0	0	100	0		67.2	32.8	0	0		100	0	0	0		0	100	0	0		
PHF	.000	.000	.817	.000	.817	.703	.786	.000	.000	.798	.375	.000	.000	.000	.375	.000	.829	.000	.000	.829	.910



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N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Peds and Bikes

Start Time	Ruggles Street From North				Tremont Street From East				Whittier Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	4	0	2	0	8	0	0	1	21	0	2	0	2	40
04:15 PM	1	0	0	0	0	0	0	1	0	0	0	12	0	1	0	4	19
04:30 PM	1	0	1	0	0	0	0	2	0	0	1	16	0	2	0	6	29
04:45 PM	1	0	3	0	0	0	0	4	0	0	0	16	0	0	0	11	35
Total	3	0	4	4	0	2	0	15	0	0	2	65	0	5	0	23	123
05:00 PM	1	0	2	0	0	1	0	8	2	0	0	11	0	2	0	4	31
05:15 PM	0	0	3	1	0	3	0	5	0	1	0	14	0	2	0	9	38
05:30 PM	1	0	3	0	0	0	0	15	0	0	0	19	0	2	0	3	43
05:45 PM	0	0	0	0	1	5	0	37	0	0	0	14	0	2	0	4	63
Total	2	0	8	1	1	9	0	65	2	1	0	58	0	8	0	20	175
Grand Total	5	0	12	5	1	11	0	80	2	1	2	123	0	13	0	43	298
Apprch %	22.7	0	54.5	22.7	1.1	12	0	87	1.6	0.8	1.6	96.1	0	23.2	0	76.8	
Total %	1.7	0	4	1.7	0.3	3.7	0	26.8	0.7	0.3	0.7	41.3	0	4.4	0	14.4	

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	0	2	0	3	0	1	0	8	9	2	0	0	11	13	0	2	0	4	6	31
05:15 PM	0	0	3	1	4	0	3	0	5	8	0	1	0	14	15	0	2	0	9	11	38
05:30 PM	1	0	3	0	4	0	0	0	15	15	0	0	0	19	19	0	2	0	3	5	43
05:45 PM	0	0	0	0	0	1	5	0	37	43	0	0	0	0	0	0	0	0	0	0	63
Total Volume	2	0	8	1	11	1	9	0	65	75	2	1	0	58	61	0	8	0	20	28	175
% App. Total	18.2	0	72.7	9.1		1.3	12	0	86.7		3.3	1.6	0	95.1		0	28.6	0	71.4		
PHF	.500	.000	.667	.250	.688	.250	.450	.000	.439	.436	.250	.250	.000	.763	.803	.000	1.00	.000	.556	.636	.694



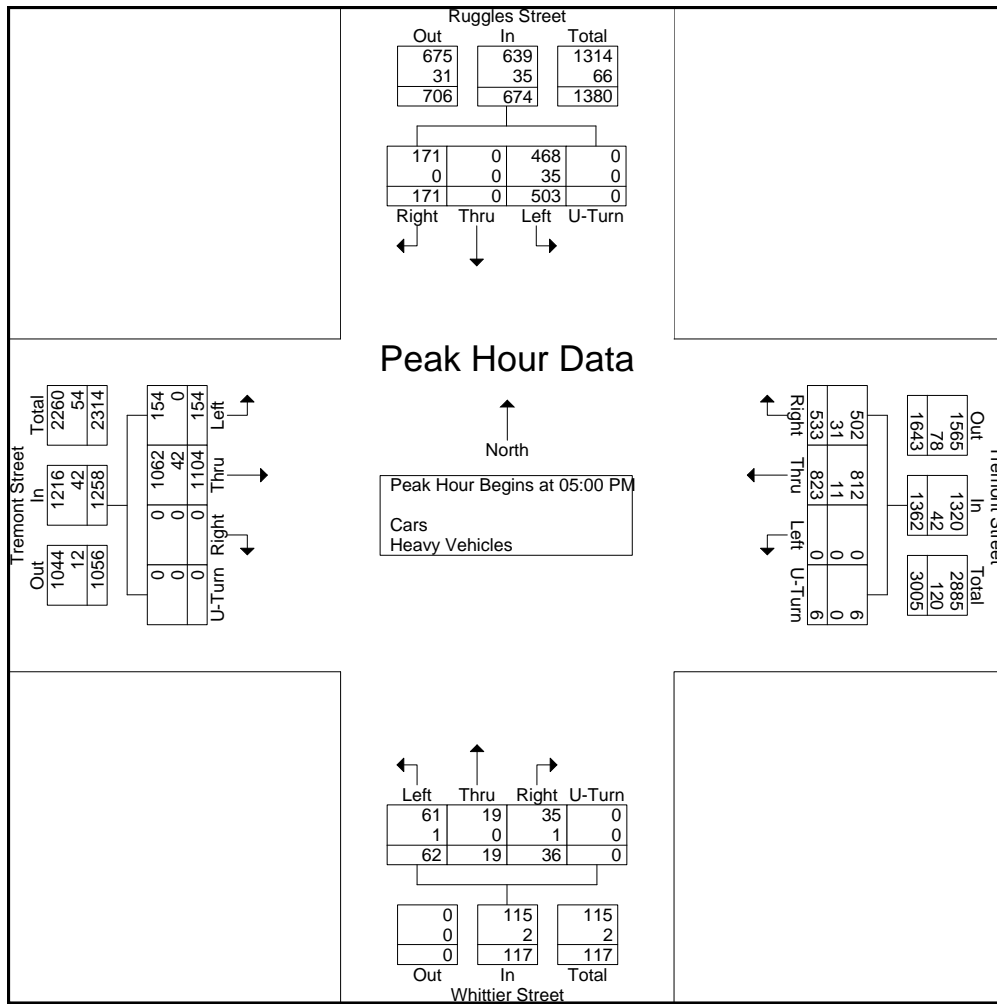
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File Name : 123026 EE
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Start Time	Ruggles Street From North					Tremont Street From East					Whittier Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	33	0	126	0	159	99	179	0	2	280	9	3	5	0	17	0	266	58	0	324	780
05:15 PM	64				189	137	222		3	362							301		340	920	
05:30 PM	27	0	142	0	169	158	200	0	1	359	12	9	24	0	45	0	262	34	0	296	869
05:45 PM	47	0	110	0	157	139	222	0	0	361	6	5	15	0	26	0	275	23	0	298	842
Total Volume	171	0	503	0	674	533	823	0	6	1362	36	19	62	0	117	0	1104	154	0	1258	3411
% App. Total	.668	.000	.886	.000	.892	.843	.927	.000	.500	.941	.750	.528	.646	.000	.650	.000	.917	.664	.000	.925	.927
PHF																					
Cars	171	0	468	0	639	502	812	0	6	1320	35	19	61	0	115	0	1062	154	0	1216	3290
% Cars	100	0	93.0	0	94.8	94.2	98.7	0	100	96.9	97.2	100	98.4	0	98.3	0	96.2	100	0	96.7	96.5
Heavy Vehicles																					
% Heavy Vehicles	0	0	7.0	0	5.2	5.8	1.3	0	0	3.1	2.8	0	1.6	0	1.7	0	3.8	0	0	3.3	3.5





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File Name : 123026 F
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

Groups Printed- Cars

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	4	0	0	0	0	282	0	0	0	0	0	0	0	23	325	0	0	634
07:15 AM	9	0	0	0	0	287	0	0	0	0	0	0	0	31	360	0	0	687
07:30 AM	7	0	0	0	0	321	0	0	0	0	0	0	0	26	431	0	0	785
07:45 AM	7	0	0	0	0	267	0	0	0	0	0	0	0	24	427	0	0	725
Total	27	0	0	0	0	1157	0	0	0	0	0	0	0	104	1543	0	0	2831
08:00 AM	12	0	0	0	0	248	0	0	0	0	0	0	0	28	443	0	0	731
08:15 AM	5	0	0	0	0	252	0	0	0	0	0	0	0	27	382	0	0	666
08:30 AM	5	0	0	0	0	264	0	0	0	0	0	0	0	28	364	0	0	661
08:45 AM	7	0	0	0	0	291	0	0	0	0	0	0	0	17	390	0	0	705
Total	29	0	0	0	0	1055	0	0	0	0	0	0	0	100	1579	0	0	2763
Grand Total	56	0	0	0	0	2212	0	0	0	0	0	0	0	204	3122	0	0	5594
Apprch %	100	0	0	0	0	100	0	0	0	0	0	0	0	6.1	93.9	0	0	
Total %	1	0	0	0	0	39.5	0	0	0	0	0	0	0	3.6	55.8	0	0	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	9	0	0	0	9	0	287	0	0	287	0	0	0	0	0	31	360	0	0	391	687
07:30 AM	7	0	0	0	7	0	321	0	0	321	0	0	0	0	0	24	427	0	0	451	725
07:45 AM	7	0	0	0	7	0	267	0	0	267	0	0	0	0	0	24	427	0	0	451	725
08:00 AM	12	0	0	0	12	0	248	0	0	248	0	0	0	0	0	28	443	0	0	471	731
Total Volume	35	0	0	0	35	0	1123	0	0	1123	0	0	0	0	0	109	1661	0	0	1770	2928
% App. Total																					
PHF	.729	.000	.000	.000	.729	.000	.875	.000	.000	.875	.000	.000	.000	.000	.000	.879	.937	.000	.000	.939	.932



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N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street
City, State: Boston, MA
Client: HSH/ J. SanClemente

File Name : 123026 F
Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	3	0	0	0	0	26	0	0	0	0	0	0	0	7	30	0	0	66
07:15 AM	2	0	0	0	0	16	0	0	0	0	0	0	0	4	17	0	0	39
07:30 AM	3	0	0	0	0	23	0	0	0	0	0	0	0	4	24	0	0	54
07:45 AM	2	0	0	0	0	25	0	0	0	0	0	0	0	4	19	0	0	50
Total	10	0	0	0	0	90	0	0	0	0	0	0	0	19	90	0	0	209
08:00 AM	1	0	0	0	0	17	0	0	0	0	0	0	0	5	20	0	0	43
08:15 AM	3	0	0	0	0	23	0	0	0	0	0	0	0	3	29	0	0	58
08:30 AM	4	0	0	0	0	15	0	0	0	0	0	0	0	5	22	0	0	46
08:45 AM	4	0	0	0	0	25	0	0	0	0	0	0	0	7	27	0	0	63
Total	12	0	0	0	0	80	0	0	0	0	0	0	0	20	98	0	0	210
Grand Total	22	0	0	0	0	170	0	0	0	0	0	0	0	39	188	0	0	419
Apprch %	100	0	0	0	0	100	0	0	0	0	0	0	0	17.2	82.8	0	0	
Total %	5.3	0	0	0	0	40.6	0	0	0	0	0	0	0	9.3	44.9	0	0	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	0	0	0	1	0	17	0	0	17	0	0	0	0	0	5	20	0	0	25	43
08:15 AM	3	0	0	0	3	0	23	0	0	23	0	0	0	0	0	3	29	0	0	32	58
08:30 AM	4	0	0	0	4	0	15	0	0	15	0	0	0	0	0	5	22	0	0	27	46
08:45 AM	4	0	0	0	4	0	25	0	0	25	0	0	0	0	0	7	27	0	0	34	63
Total Volume	12	0	0	0	12	0	80	0	0	80	0	0	0	0	0	20	98	0	0	118	210
% App. Total	100	0	0	0		0	100	0	0		0	0	0	0		16.9	83.1	0	0		
PHF	.750	.000	.000	.000	.750	.000	.800	.000	.000	.800	.000	.000	.000	.000	.000	.714	.845	.000	.000	.868	.833



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N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street
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Client: HSH/ J. SanClemente

Groups Printed- Peds and Bikes

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	7	0	2	0	36	0	0	0	7	0	1	0	3	56
07:15 AM	0	0	0	5	0	2	0	28	0	0	0	6	0	3	0	5	49
07:30 AM	0	0	0	3	0	1	0	13	0	0	0	3	1	2	0	3	26
07:45 AM	1	0	0	8	0	0	0	22	0	0	0	8	0	6	0	4	49
Total	1	0	0	23	0	5	0	99	0	0	0	24	1	12	0	15	180
08:00 AM	0	0	0	9	0	1	0	38	0	0	0	0	0	3	0	5	56
08:15 AM	0	0	0	5	0	1	0	31	0	0	0	5	0	3	0	0	45
08:30 AM	0	0	0	7	0	0	0	24	0	0	0	0	1	6	0	0	38
08:45 AM	0	0	0	12	0	0	0	18	0	0	0	0	0	12	0	0	42
Total	0	0	0	33	0	2	0	111	0	0	0	5	1	24	0	5	181
Grand Total	1	0	0	56	0	7	0	210	0	0	0	29	2	36	0	20	361
Apprch %	1.8	0	0	98.2	0	3.2	0	96.8	0	0	0	100	3.4	62.1	0	34.5	
Total %	0.3	0	0	15.5	0	1.9	0	58.2	0	0	0	8	0.6	10	0	5.5	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	1	0	0	8	9	0	0	0	22	22	0	0	0	8	8	0	6	0	4	10	49
08:00 AM	0	0	0	9	9	0	1	0	38	39	0	0	0	0	0	0	3	0	5	8	56
08:15 AM	0	0	0	5	5	0	1	0	31	32	0	0	0	5	5	0	3	0	0	3	45
08:30 AM	0	0	0	7	7	0	0	0	24	24	0	0	0	0	0	1	6	0	0	7	38
Total Volume	1	0	0	29	30	0	2	0	115	117	0	0	0	13	13	1	18	0	9	28	188
% App. Total	3.3	0	0	96.7		0	1.7	0	98.3		0	0	0	100		3.6	64.3	0	32.1		
PHF	.250	.000	.000	.806	.833	.000	.500	.000	.757	.750	.000	.000	.000	.406	.406	.250	.750	.000	.450	.700	.839



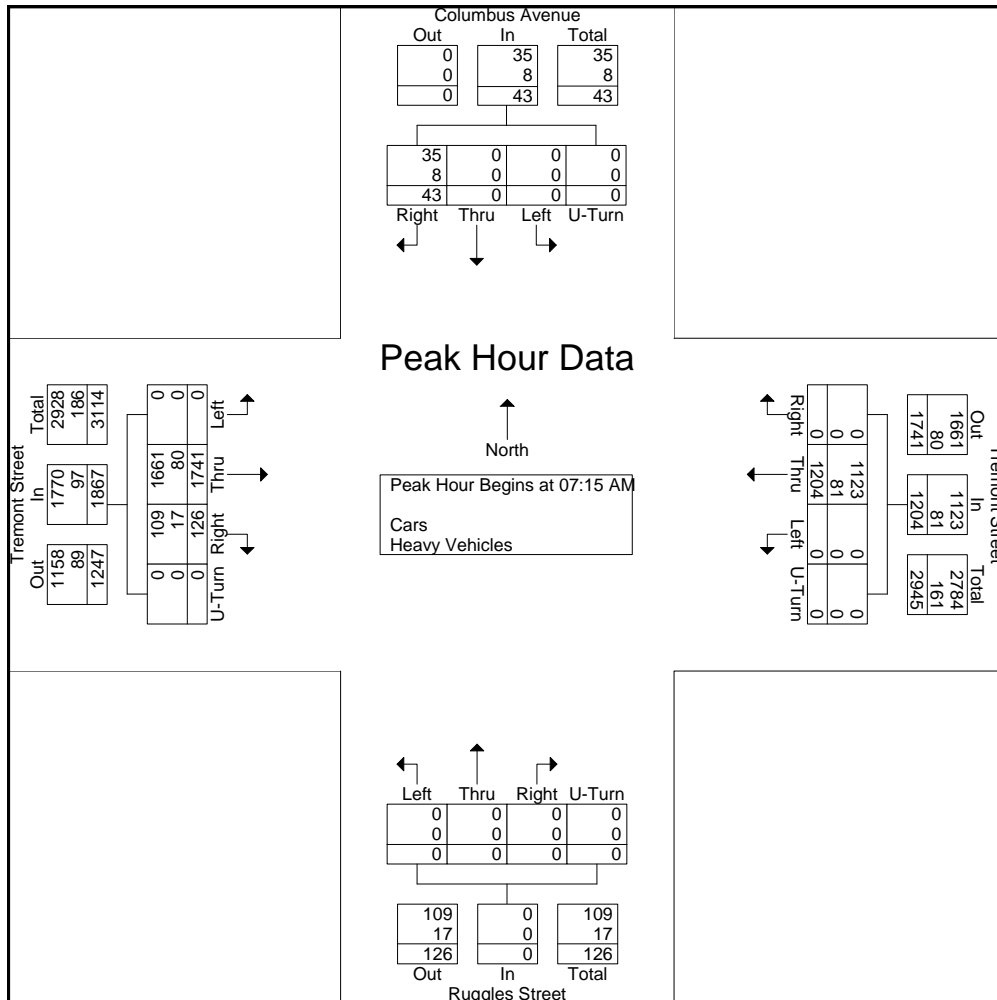
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N/S: Columbus Avenue/ Ruggles Street
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City, State: Boston, MA
Client: HSH/ J. SanClemente

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	11	0	0	0	11	0	303	0	0	303	0	0	0	0	0	35	377	0	0	412	726
07:30 AM	10	0	0	0	10	0	344	0	0	344	0	0	0	0	0	28	446	0	0	474	839
07:45 AM	9	0	0	0	9	0	292	0	0	292	0	0	0	0	0	28	446	0	0	474	775
08:00 AM	13	0	0	0	13	0	265	0	0	265	0	0	0	0	0	33	463	0	0	496	774
Total Volume	43	0	0	0	43	0	1204	0	0	1204	0	0	0	0	0	126	1741	0	0	1867	3114
% App. Total	.827	.000	.000	.000	.827	.000	.875	.000	.000	.875	.000	.000	.000	.000	.000	.900	.940	.000	.000	.941	.928
PHF	.827	.000	.000	.000	.827	.000	.875	.000	.000	.875	.000	.000	.000	.000	.000	.900	.940	.000	.000	.941	.928
Cars	35	0	0	0	35	0	1123	0	0	1123	0	0	0	0	0	109	1661	0	0	1770	2928
% Cars	81.4	0	0	0	81.4	0	93.3	0	0	93.3	0	0	0	0	0	86.5	95.4	0	0	94.8	94.0
Heavy Vehicles	18.6	0	0	0	18.6	0	6.7	0	0	6.7	0	0	0	0	0	13.5	4.6	0	0	5.2	6.0
% Heavy Vehicles	18.6	0	0	0	18.6	0	6.7	0	0	6.7	0	0	0	0	0	13.5	4.6	0	0	5.2	6.0





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File Name : 123026 FF
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Start Date : 9/25/2012
Page No : 1

Groups Printed- Cars

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
04:00 PM	17	0	0	0	0	255	0	0	0	0	0	0	0	62	359	0	0	693
04:15 PM	14	0	0	0	0	256	0	0	0	0	0	0	0	48	387	0	0	705
04:30 PM	24	0	0	0	0	247	0	0	0	0	0	0	0	39	351	0	0	661
04:45 PM	22	0	0	0	0	291	0	0	0	0	0	0	0	43	352	0	0	708
Total	77	0	0	0	0	1049	0	0	0	0	0	0	0	192	1449	0	0	2767
05:00 PM	21	0	0	0	0	262	0	0	0	0	0	0	0	51	340	0	0	674
05:15 PM	30	0	0	0	0	287	0	0	0	0	0	0	0	65	380	0	0	762
05:30 PM	28	0	0	0	0	314	0	0	0	0	0	0	0	59	333	0	0	734
05:45 PM	27	0	0	0	0	266	0	0	0	0	0	0	0	38	337	0	0	668
Total	106	0	0	0	0	1129	0	0	0	0	0	0	0	213	1390	0	0	2838
Grand Total	183	0	0	0	0	2178	0	0	0	0	0	0	0	405	2839	0	0	5605
Apprch %	100	0	0	0	0	100	0	0	0	0	0	0	0	12.5	87.5	0	0	
Total %	3.3	0	0	0	0	38.9	0	0	0	0	0	0	0	7.2	50.7	0	0	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	22	0	0	0	22	0	291	0	0	291	0	0	0	0	0	43	352	0	0	395	708
05:00 PM	21	0	0	0	21	0	262	0	0	262	0	0	0	0	0	51	340	0	0	391	674
05:15 PM	30	0	0	0	30	0	287	0	0	287	0	0	0	0	0	65	380	0	0	445	762
05:30 PM	28	0	0	0	28	0	314	0	0	314	0	0	0	0	0	59	333	0	0	392	734
Total Volume	101	0	0	0	101	0	1154	0	0	1154	0	0	0	0	0	218	1405	0	0	1623	2878
% App. Total																					
PHF	.842	.000	.000	.000	.842	.000	.919	.000	.000	.919	.000	.000	.000	.000	.000	.838	.924	.000	.000	.912	.944



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Site Code : 2011046_
Start Date : 9/25/2012
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
04:00 PM	3	0	0	0	0	17	0	0	0	0	0	0	0	4	24	0	0	48
04:15 PM	5	0	0	0	0	16	0	0	0	0	0	0	0	3	20	0	0	44
04:30 PM	3	0	0	0	0	14	0	0	0	0	0	0	0	5	23	0	0	45
04:45 PM	2	0	0	0	0	9	0	0	0	0	0	0	0	3	29	0	0	43
Total	13	0	0	0	0	56	0	0	0	0	0	0	0	15	96	0	0	180
05:00 PM	4	0	0	0	0	10	0	0	0	0	0	0	0	1	19	0	0	34
05:15 PM	5	0	0	0	0	8	0	0	0	0	0	0	0	5	12	0	0	30
05:30 PM	4	0	0	0	0	4	0	0	0	0	0	0	0	3	22	0	0	33
05:45 PM	3	0	0	0	0	5	0	0	0	0	0	0	0	0	16	0	0	24
Total	16	0	0	0	0	27	0	0	0	0	0	0	0	9	69	0	0	121
Grand Total	29	0	0	0	0	83	0	0	0	0	0	0	0	24	165	0	0	301
Apprch %	100	0	0	0	0	100	0	0	0	0	0	0	0	12.7	87.3	0	0	
Total %	9.6	0	0	0	0	27.6	0	0	0	0	0	0	0	8	54.8	0	0	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	3	0	0	0	3	0	17	0	0	17	0	0	0	0	0	4	24	0	0	28	48
04:15 PM	5	0	0	0	5	0	16	0	0	16	0	0	0	0	0	3	20	0	0	23	44
04:30 PM	3	0	0	0	3	0	14	0	0	14	0	0	0	0	0	5	23	0	0	28	45
04:45 PM	2	0	0	0	2	0	9	0	0	9	0	0	0	0	0	3	29	0	0	32	
Total Volume	13	0	0	0	13	0	56	0	0	56	0	0	0	0	0	15	96	0	0	111	180
% App. Total	100	0	0	0		0	100	0	0		0	0	0	0		13.5	86.5	0	0		
PHF	.650	.000	.000	.000	.650	.000	.824	.000	.000	.824	.000	.000	.000	.000	.000	.750	.828	.000	.000	.867	.938



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N/S: Columbus Avenue/ Ruggles Street
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Client: HSH/ J. SanClemente

Groups Printed- Peds and Bikes

Start Time	Columbus Avenue From North				Tremont Street From East				Ruggles Street From South				Tremont Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	3	0	32	0	0	0	10	0	0	0	3	48
04:15 PM	1	0	0	0	0	0	0	66	0	0	0	14	0	2	0	4	87
04:30 PM	0	0	0	0	0	0	0	37	0	0	0	5	0	2	0	2	46
04:45 PM	0	0	0	0	0	0	0	44	0	0	0	6	0	2	0	0	52
Total	1	0	0	0	0	3	0	179	0	0	0	35	0	6	0	9	233
05:00 PM	0	0	0	0	0	1	0	39	0	0	0	16	0	2	0	4	62
05:15 PM	2	0	0	0	0	4	0	44	0	0	0	17	0	4	0	9	80
05:30 PM	0	0	0	0	0	0	0	34	0	0	0	11	2	3	0	12	62
05:45 PM	0	0	0	2	0	2	0	29	0	0	0	16	0	2	0	8	59
Total	2	0	0	2	0	7	0	146	0	0	0	60	2	11	0	33	263
Grand Total	3	0	0	2	0	10	0	325	0	0	0	95	2	17	0	42	496
Apprch %	60	0	0	40	0	3	0	97	0	0	0	100	3.3	27.9	0	68.9	
Total %	0.6	0	0	0.4	0	2	0	65.5	0	0	0	19.2	0.4	3.4	0	8.5	

Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	1	0	39	40	0	0	0	16	16	0	2	0	4	6	62
05:15 PM	2	0	0	0	2	0	4	0	44	48	0	0	0	17	17	0	4	0	9	13	80
05:30 PM	0	0	0	0	0	0	0	0	34	34	0	0	0	11	11	2	3	0	12	17	62
05:45 PM	0	0	0	2	2	0	2	0	29	31	0	0	0	16	16	0	2	0	8	10	59
Total Volume	2	0	0	2	4	0	7	0	146	153	0	0	0	60	60	2	11	0	33	46	263
% App. Total	50	0	0	50		0	4.6	0	95.4		0	0	0	100		4.3	23.9	0	71.7		
PHF	.250	.000	.000	.250	.500	.000	.438	.000	.830	.797	.000	.000	.000	.882	.882	.250	.688	.000	.688	.676	.822



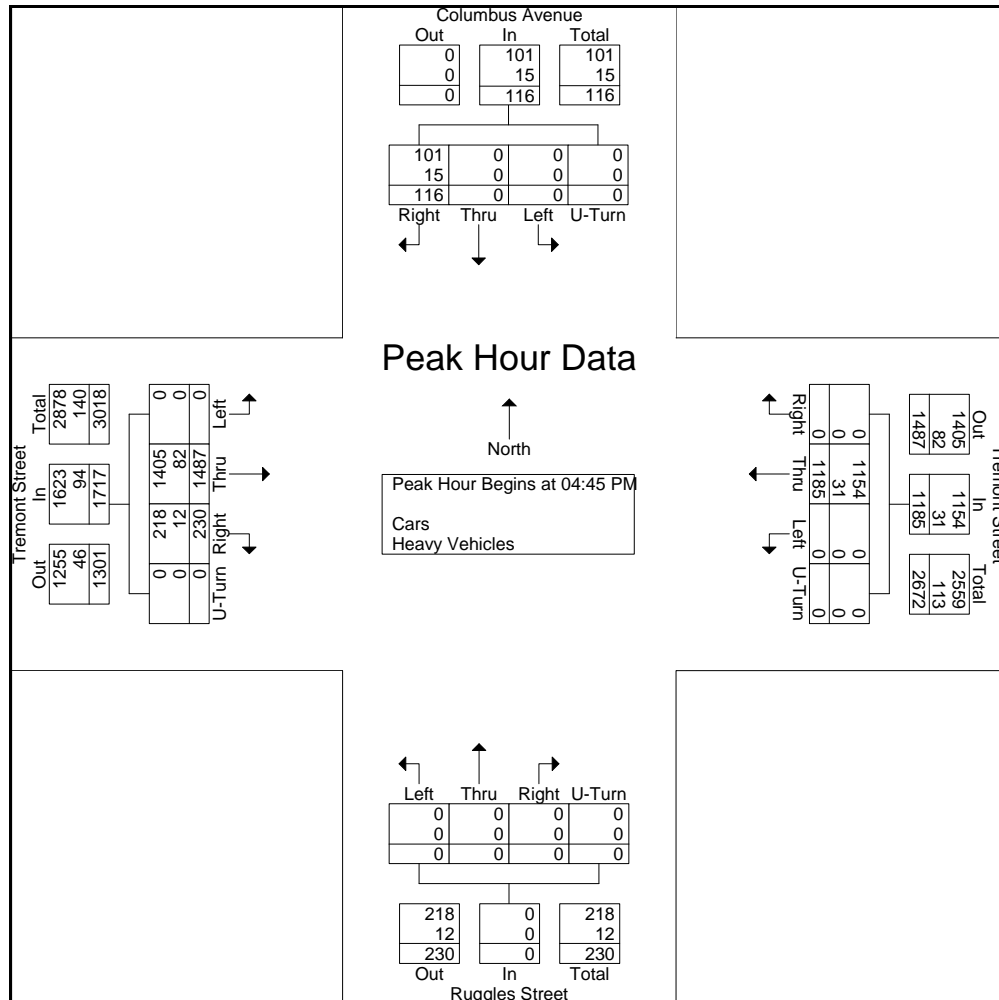
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Start Time	Columbus Avenue From North					Tremont Street From East					Ruggles Street From South					Tremont Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	24	0	0	0	24	0	300	0	0	300	0	0	0	0	0	46	381	0	0	427	751
05:00 PM	25	0	0	0	25	0	272	0	0	272	0	0	0	0	0	52	359	0	0	411	708
05:15 PM	35	0	0	0	35	0	295	0	0	295	0	0	0	0	0	70	392	0	0	462	792
05:30 PM	32	0	0	0	32	0	318	0	0	318	0	0	0	0	0	62	355	0	0	417	767
Total Volume	116	0	0	0	116	0	1185	0	0	1185	0	0	0	0	0	230	1487	0	0	1717	3018
% App. Total																					
PHF	.829	.000	.000	.000	.829	.000	.932	.000	.000	.932	.000	.000	.000	.000	.000	.821	.948	.000	.000	.929	.953
Cars	101	0	0	0	101	0	1154	0	0	1154	0	0	0	0	0	218	1405	0	0	1623	2878
% Cars	87.1	0	0	0	87.1	0	97.4	0	0	97.4	0	0	0	0	0	94.8	94.5	0	0	94.5	95.4
Heavy Vehicles																					
% Heavy Vehicles	12.9	0	0	0	12.9	0	2.6	0	0	2.6	0	0	0	0	0	5.2	5.5	0	0	5.5	4.6



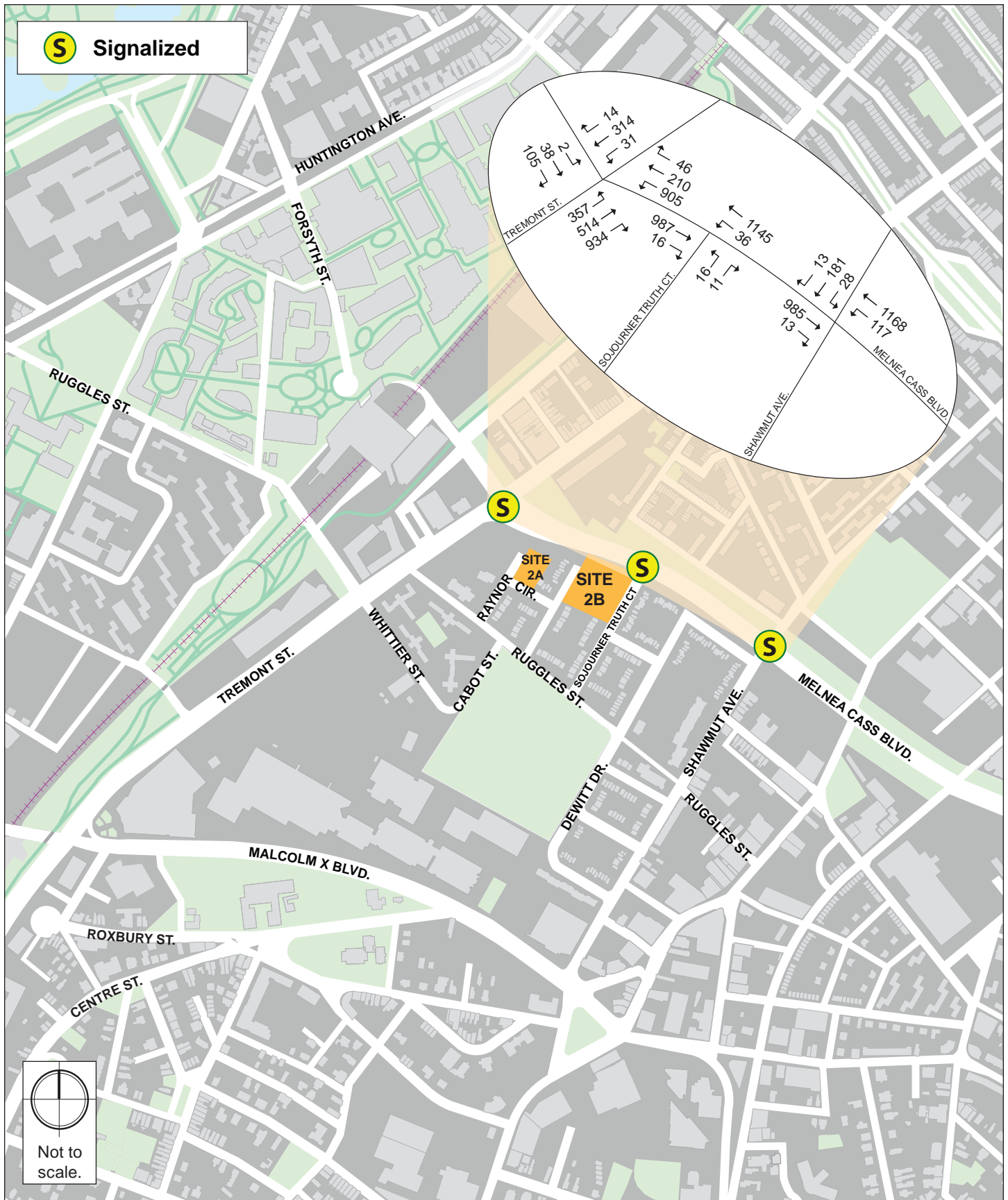


Figure 7.2
Existing Conditions (2014) Turning Movement Volumes, a.m. Peak Hour

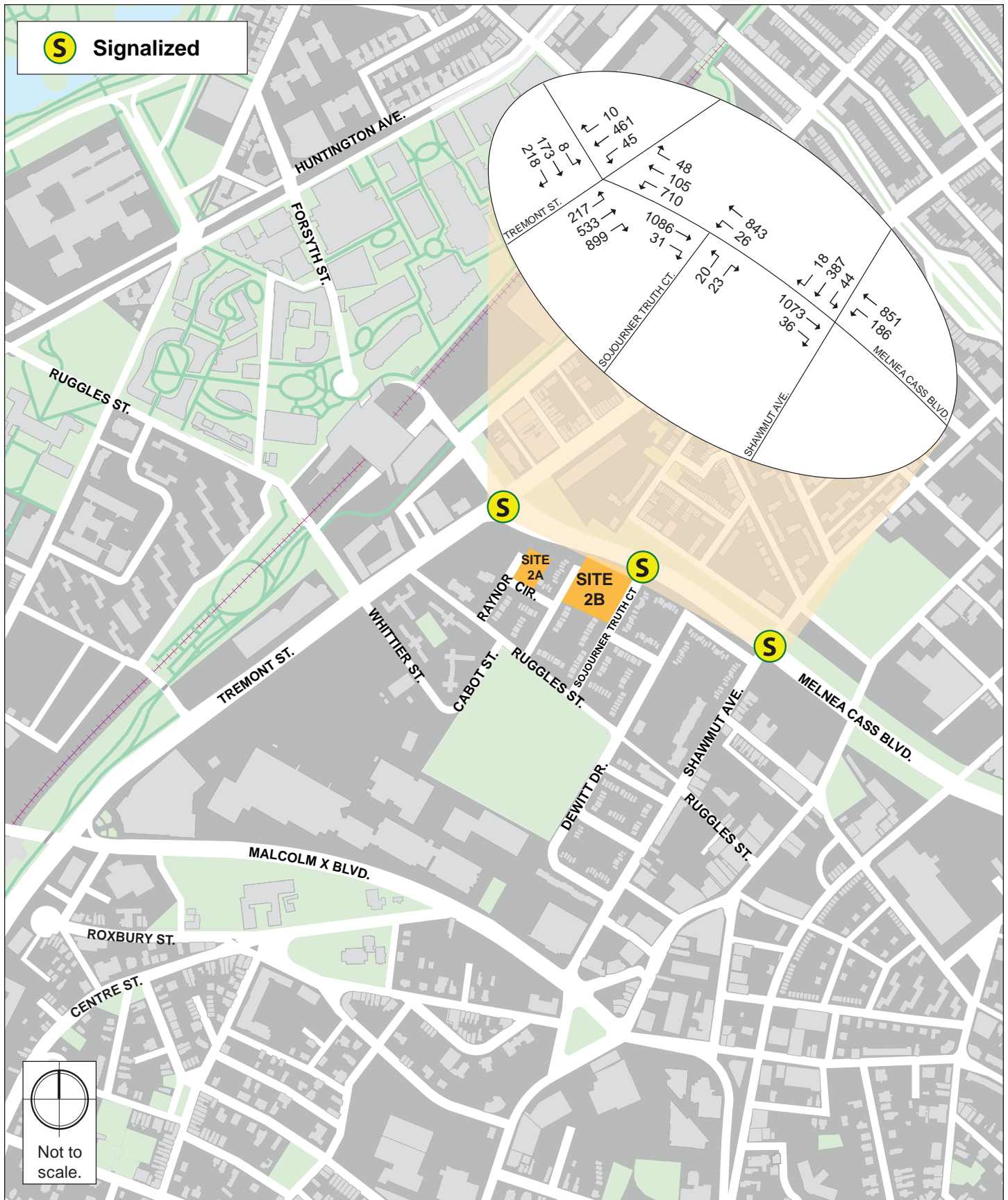


Figure 7.3

Existing Conditions (2014) Turning Movement Volumes, p.m. Peak Hour

Appendix 2-B: Crash Rate Worksheets

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Boston COUNT DATE : _____

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street

ST #

MINOR STREET(S) : Malcolm X Boulevard

ST #

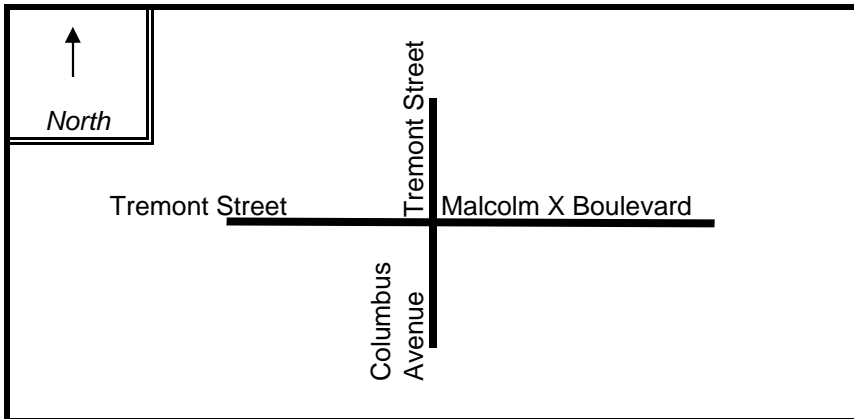
Columbus Avenue

ST #

ST #

ST #

**INTERSECTION
DIAGRAM
(Label Approaches)**



INTERSECTION

REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	743	773	1,070	853		3,439

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

CRASH RATE CALCULATION : RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : _____

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Boston COUNT DATE : _____

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street

ST #

MINOR STREET(S) : Melnea Cass Boulevard

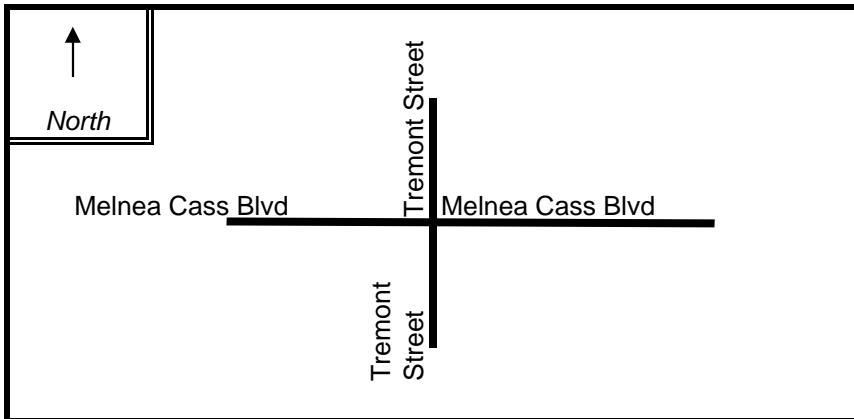
ST #

ST #

ST #

ST #

**INTERSECTION
DIAGRAM
(Label Approaches)**



INTERSECTION

REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	407	905	1,687	528		3,527

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

CRASH RATE CALCULATION : RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : _____

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Boston COUNT DATE : _____

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street

ST #

MINOR STREET(S) : Ruggles Street

ST #

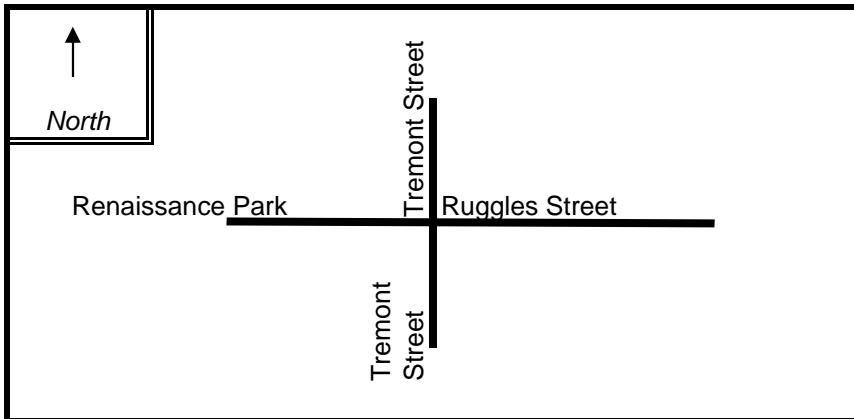
Renaissance Park

ST #

ST #

ST #

**INTERSECTION
DIAGRAM
(Label Approaches)**



INTERSECTION

REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	NB	SB			
VOLUMES (PM) :	120	1,769	1,246			3,135

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

CRASH RATE CALCULATION : RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : _____

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Boston COUNT DATE : _____

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street

ST #

MINOR STREET(S) : Prentiss Street

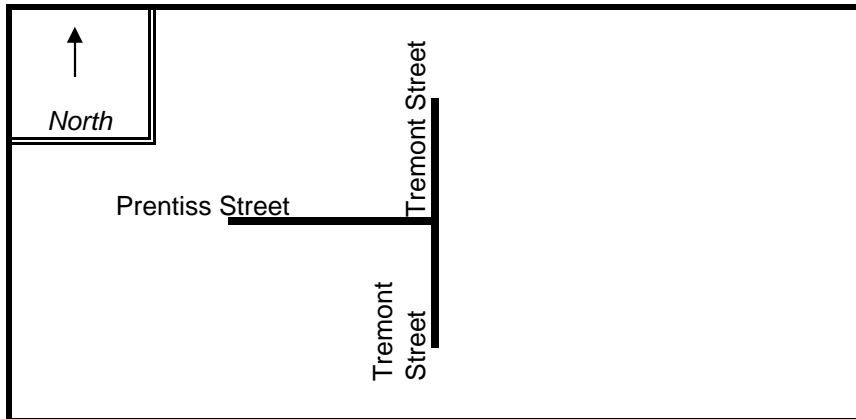
ST #

ST #

ST #

ST #

**INTERSECTION
DIAGRAM
(Label Approaches)**



INTERSECTION

REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	NB	SB			
VOLUMES (PM) :	297	1,288	1,230			2,815

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

CRASH RATE CALCULATION : RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : _____

Masshighway

CRASH RATE WORKSHEET

CITY/TOWN : Boston COUNT DATE : _____

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street

ST #

MINOR STREET(S) : Ruggles Street

ST #

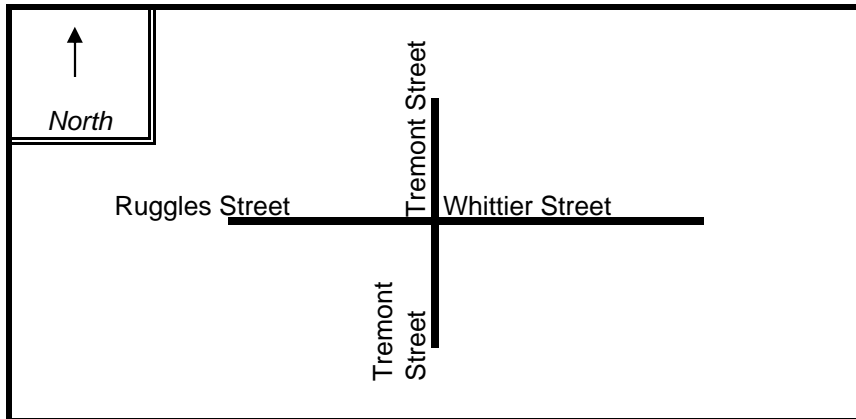
Whittier Street

ST #

ST #

ST #

**INTERSECTION
DIAGRAM
(Label Approaches)**



INTERSECTION

REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	691	120	1,308	1,421		3,540

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

CRASH RATE CALCULATION : RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : _____

Appendix 2-C: Trip Generation Calculations

LUC 220 Apartments

700 Dwelling Units

	<u>Equation</u>	<u>R²</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	$T = 6.06 (x) + 123.56$	0.87	50%	50%	4366	2183	2183
Weekday AM	$T = 0.49 (x) + 3.73$	0.83	20%	80%	347	70	277
Weekday PM	$T = 0.55 (x) + 17.65$	0.77	65%	35%	403	262	141
Saturday Middy	0.52		50%	50%	364	182	182

LUC 310 Hotel

200 Rooms

	<u>Rate</u>		<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	8.17		50%	50%	1634	817	817
Weekday AM	0.53		59%	41%	106	63	43
Weekday PM	0.60		51%	49%	120	62	58
Saturday Middy	0.72		56%	44%	144	81	63

LUC 580 Museum

31 1000 SF G.F.A.

	<u>Rate</u>		<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	0.98		50%	50%	30	15	15
Weekday AM	0.28		86%	14%	9	8	1
Weekday PM	0.18		16%	84%	6	1	5
Saturday Middy	0.66		71%	29%	20	15	5

LUC 710 General Office Building

200 1000 SF G.F.A.

	<u>Equation / Rate</u>	<u>R²</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	$\ln(T) = 0.76 \ln(x) + 3.68$	0.81	50%	50%	2223	1112	1111
Weekday AM	$\ln(T) = 0.80 \ln(x) + 1.57$	0.83	88%	12%	333	294	39
Weekday PM	$T = 1.12 (x) + 78.45$	0.82	17%	83%	302	52	250
Saturday Middy	0.43		54%	46%	86	47	39

LUC 820 Shopping Center

310.23 1000 SF G.L.A.

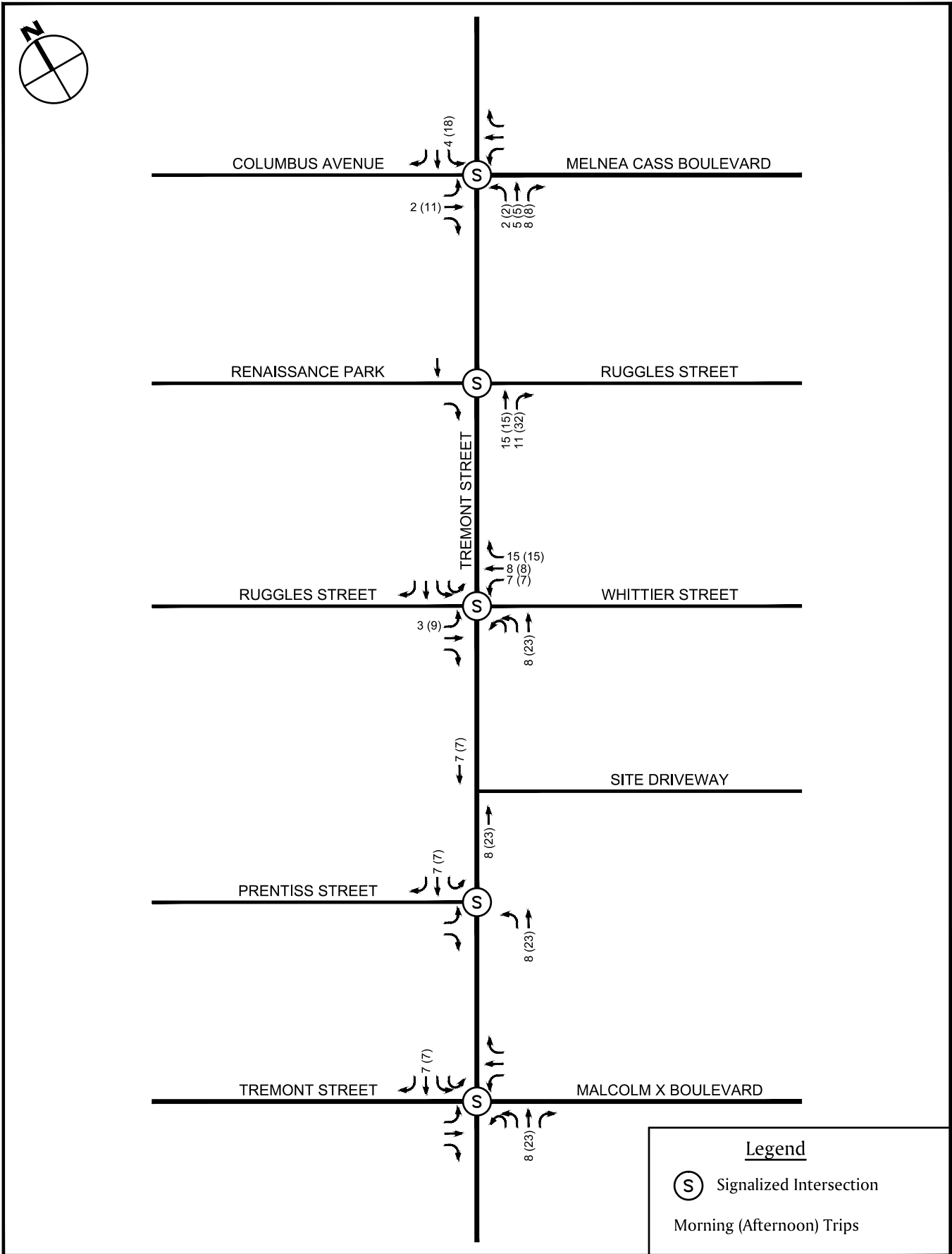
	<u>Equation</u>	<u>R²</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	$\ln(T) = 0.65 \ln(x) + 5.83$	0.79	50%	50%	14175	7088	7087
Weekday AM	0.96		62%	38%	298	185	113
Weekday PM	$\ln(T) = 0.67 \ln(x) + 3.31$	0.81	48%	52%	1279	614	665
Saturday Middy	$\ln(T) = 0.65 \ln(x) + 3.78$	0.83	52%	48%	1825	949	876

LUC 857 Discount Club

92 1000 SF G.F.A.

	<u>Equation</u>	<u>R²</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>
Weekday Daily	41.80		50%	50%	3846	1923	1923
Weekday AM	0.49		70%	30%	45	32	13
Weekday PM	4.18		50%	50%	385	193	192
Saturday Middy	6.37		49%	51%	586	288	298

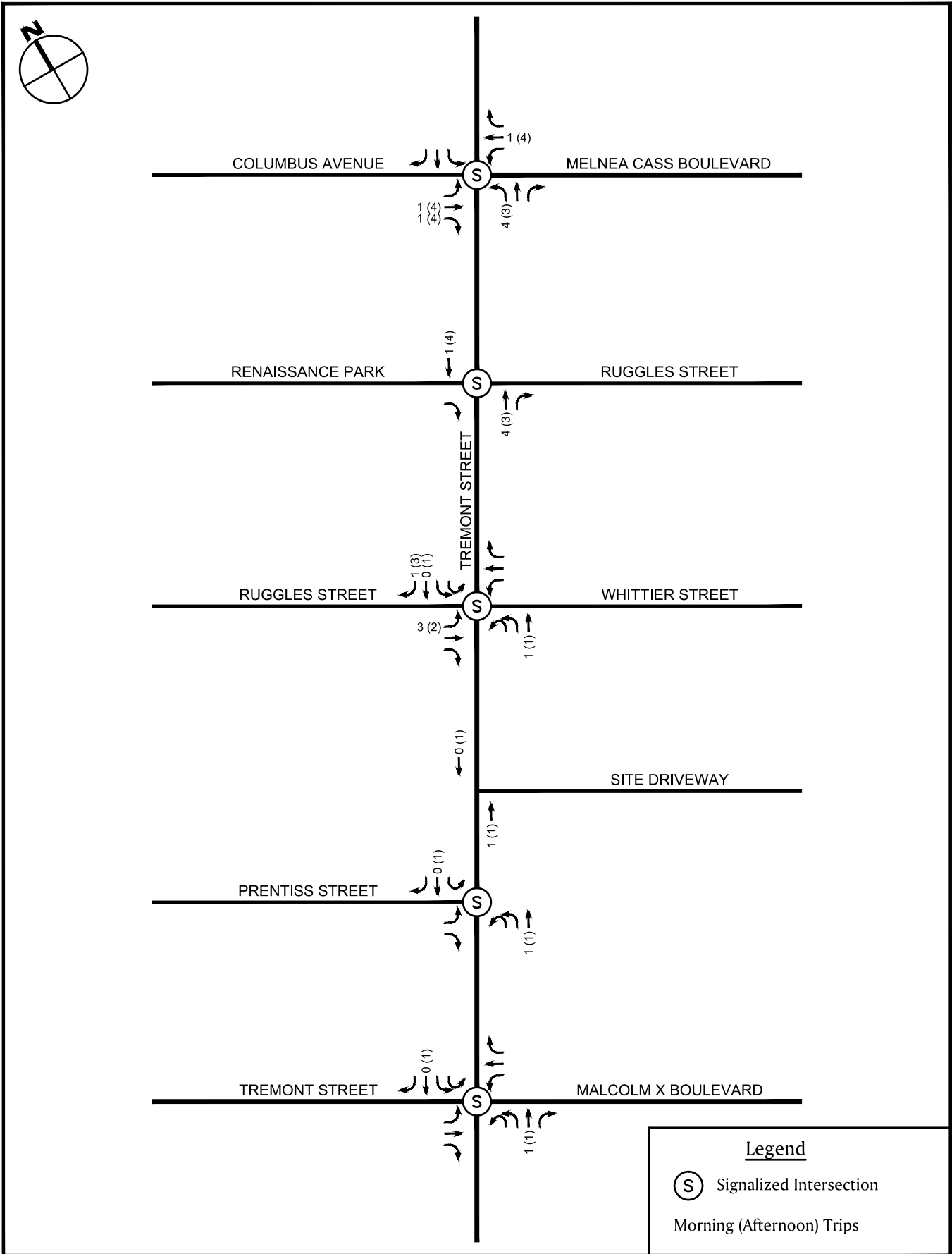
Appendix 2-D: Background Traffic Data



Whittier Choice Neighborhood
 Tremont Crossing
 Boston, Massachusetts

Not to Scale

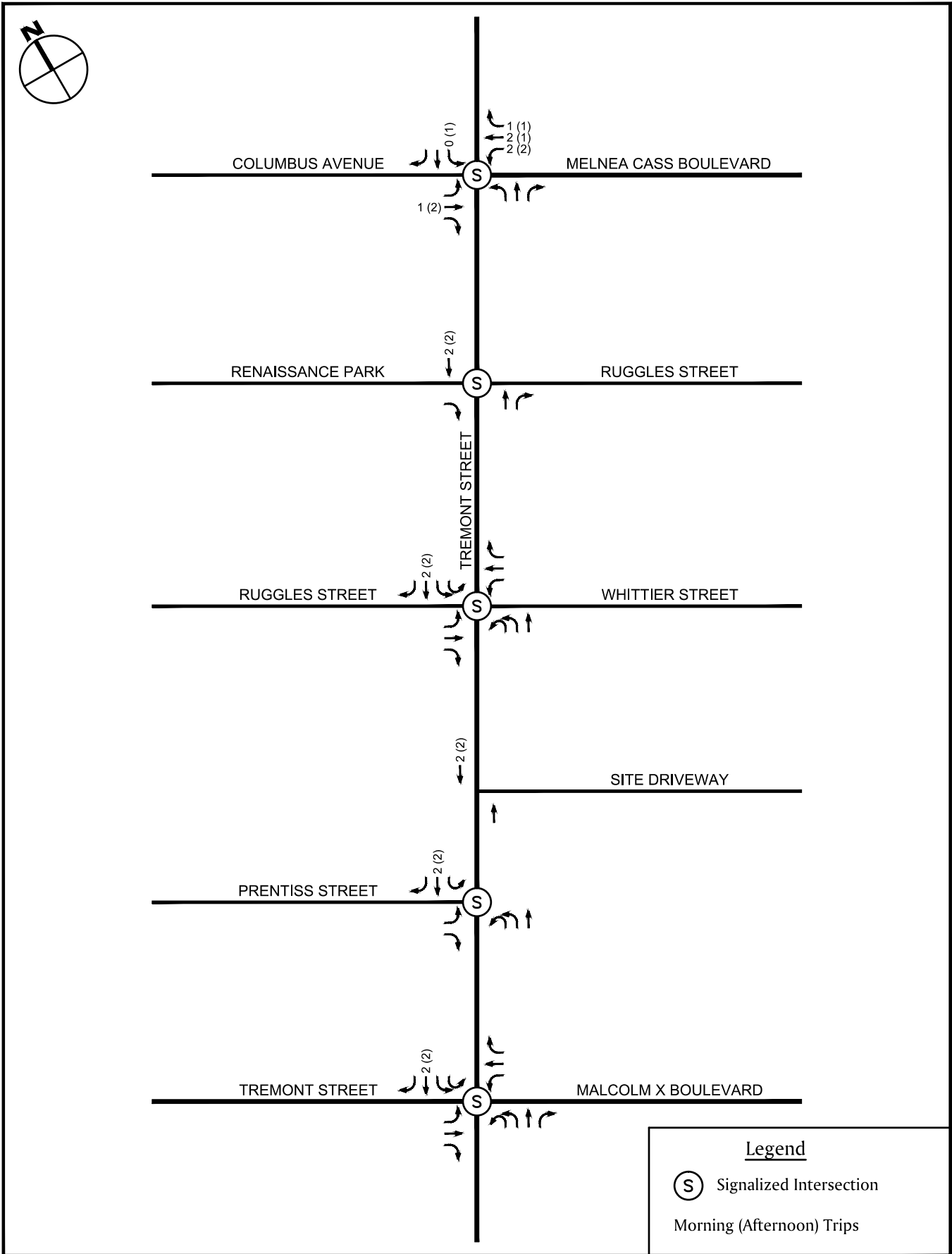




Northeastern Science and Engineering Building
 Tremont Crossing
 Boston, Massachusetts

Not to Scale

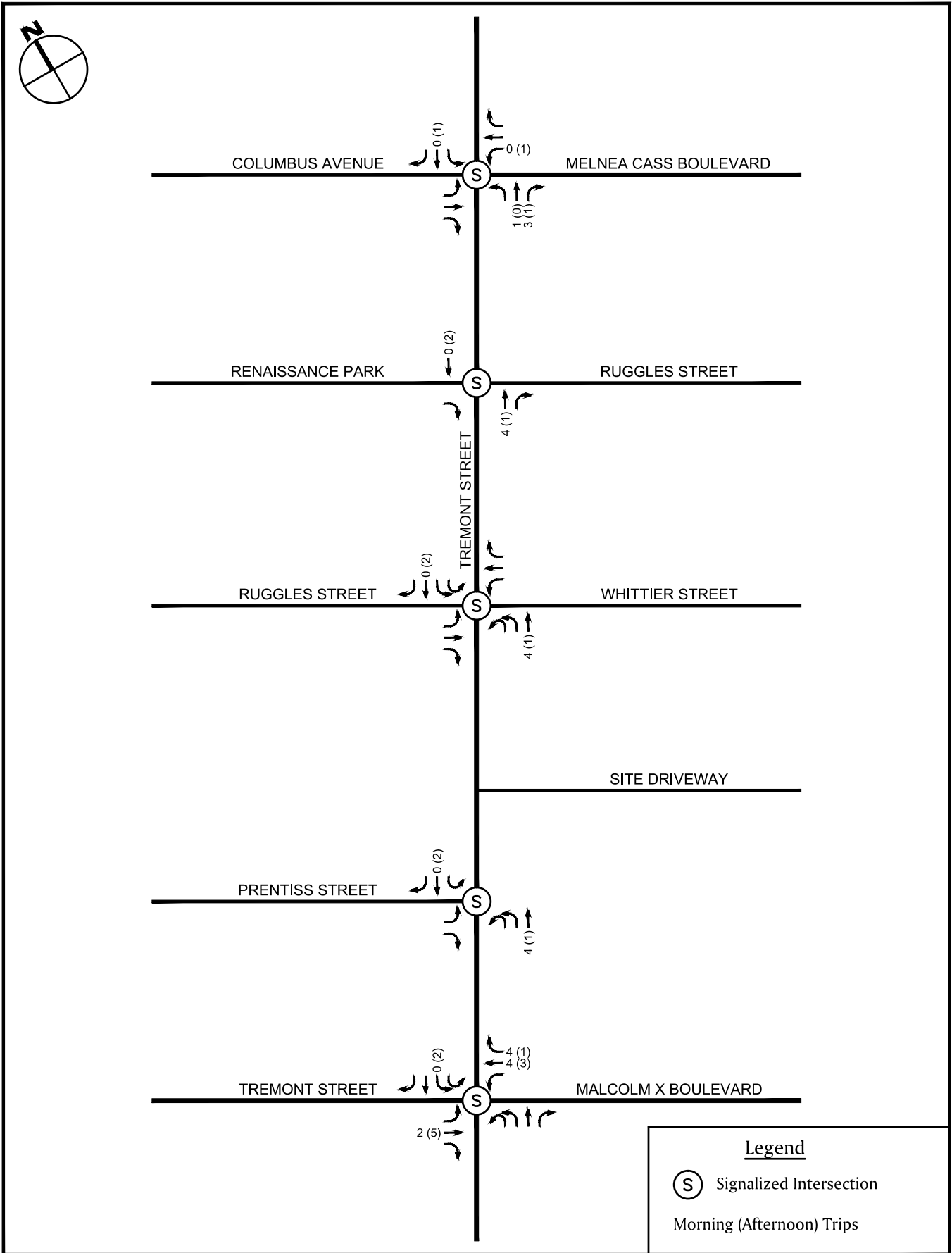




Madison Park Infill Sites
 Tremont Crossing
 Boston, Massachusetts

Not to Scale

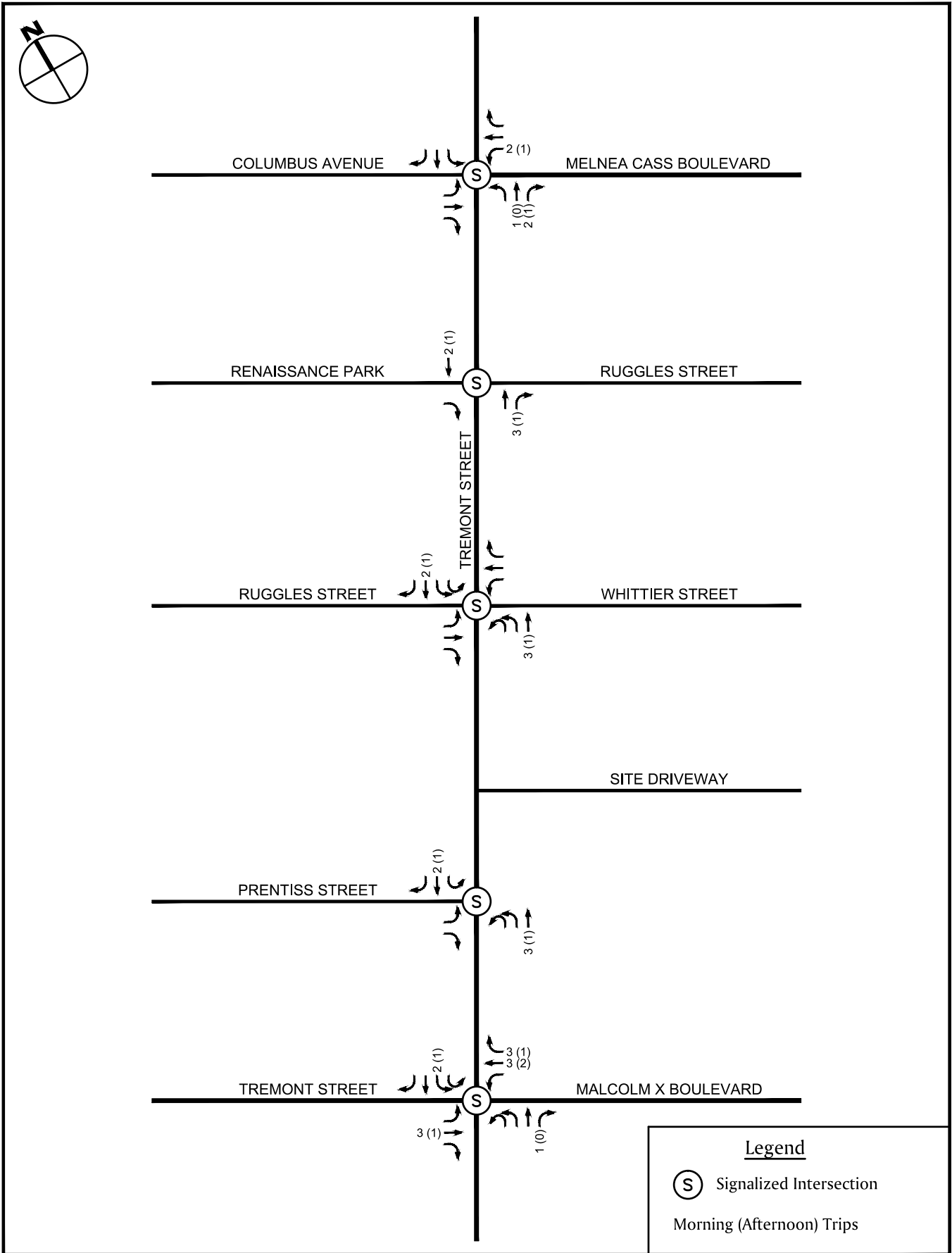




2451 Washington Street
 Tremont Crossing
 Boston, Massachusetts

Not to Scale

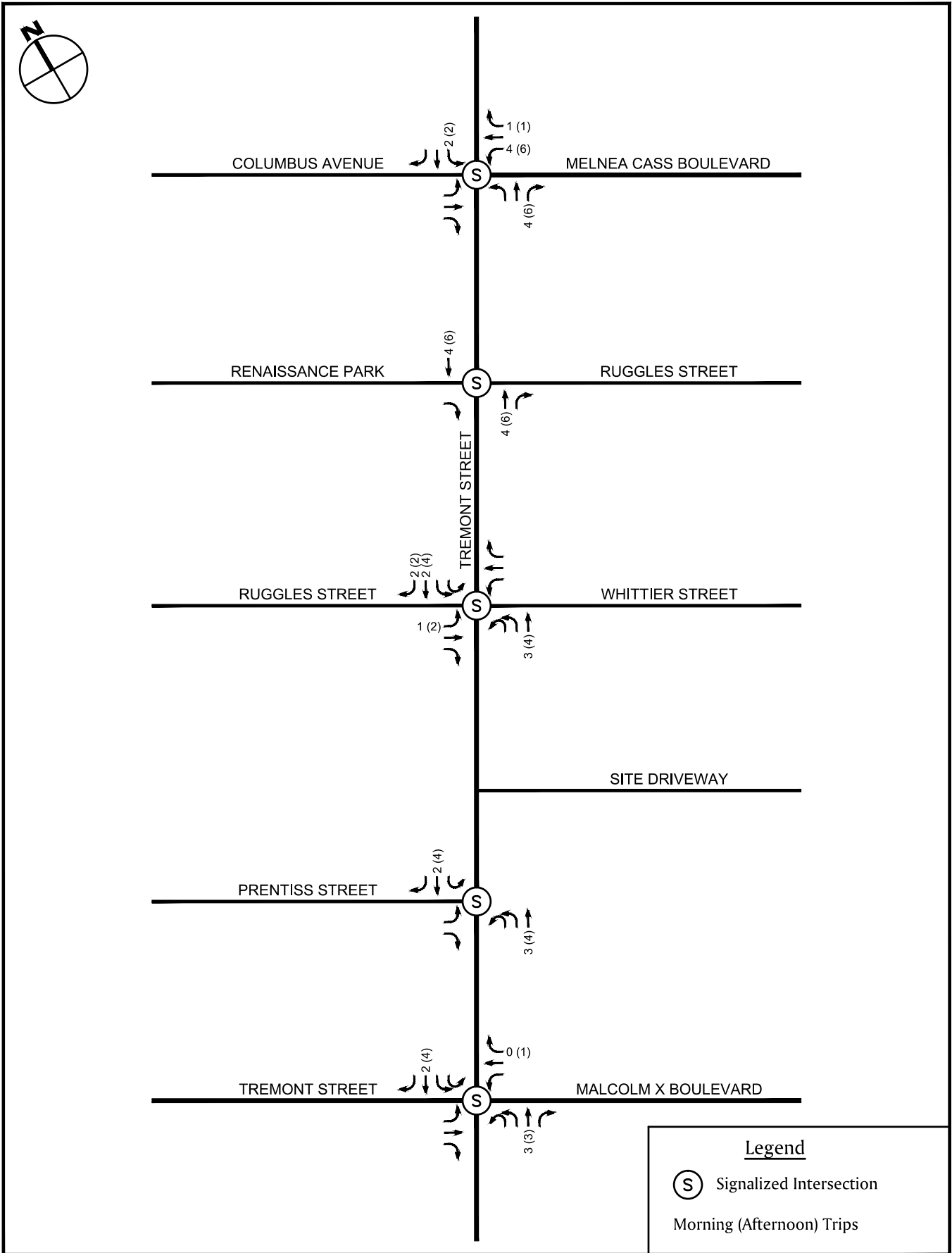




Bartlett Place
 Tremont Crossing
 Boston, Massachusetts

Not to Scale

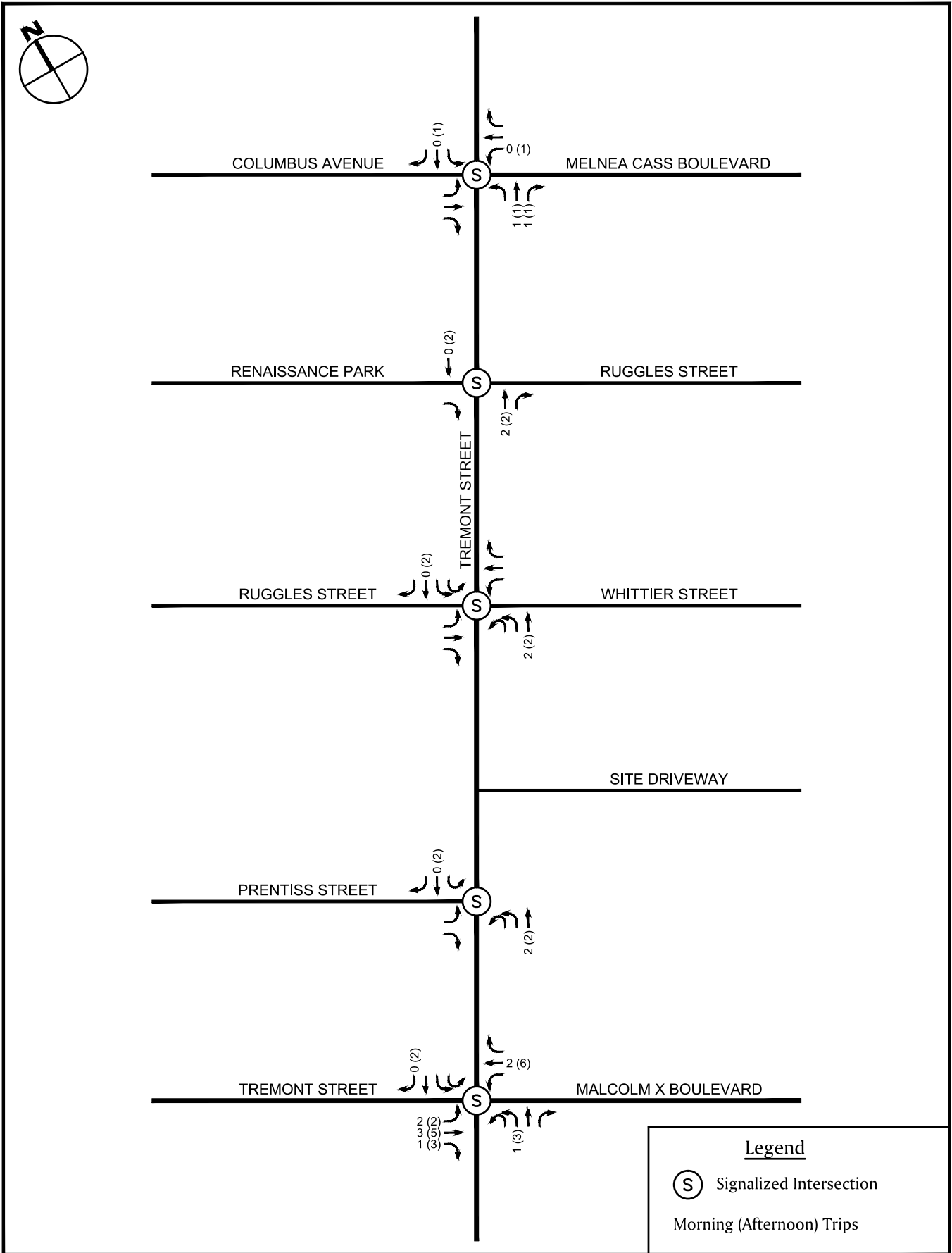




Parcel 9
 Tremont Crossing
 Boston, Massachusetts

Not to Scale





1486 Tremont Street
 Tremont Crossing
 Boston, Massachusetts

Not to Scale



Appendix 2-E: Signal Warrant Analysis

Analyst: JML
 Agency: BSC Group
 Date: 2/21/2012
 Project ID: 23155.00 Tremont Crossing
 EW Street: Site Drive
 Intersection: Tremont St at Site Drive
 Jurisdiction: District 6
 Units: U.S. Customary
 Analysis Year: 2012
 NS Street: Tremont Street

-----General Information-----

Major St. Speed (mph): 30
 Nearest Signal (ft): 200
 Crashes per Yr: 0
 Population: Not less than 10000
 Coordinated Signal System: Y

-----School Crossing-----

Students in Highest Hour: 0
 Adequate Gaps in Period: 0
 Minutes in Period: 0

-----Roadway Network-----

Two Major Routes: 0
 Weekend Count: 0
 5-yr Growth Factor: 0

-----Geometry and Traffic-----

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	3	1	1	3	0
LaneUsage				L	LR	R		T	R	L	LT	

-----Results-----

Warrant 1: Eight-Hour Vehicular Volume [X]
 1 A. Minimum Vehicular Volumes []
 1 B. Interruption of Continuous Traffic [X]
 1 80% Vehicular --and-- Interruption Volumes []
 Warrant 2: Four-Hour Vehicular Volume
 2 A. Four-Hour Vehicular Volumes [X]
 Warrant 3: Peak Hour [X]
 3 A. Peak-Hour Conditions []
 3 B. Peak-Hour Vehicular Volume Hours Met [X]
 Warrant 4: Pedestrian Volume []
 4 A. Pedestrian Volumes []
 4 B. Gaps Same Period []
 Warrant 5: School Crossing []
 5 A. Student Volumes []
 5 B. Gaps Same Period []
 Warrant 6: Coordinated Signal System
 6 Degree of Platooning [X]
 Warrant 7: Crash Experience []
 7 A. Adequate trials of alternatives []

Appendix 2-F: Capacity Analysis Worksheets

Capacity Summary Tables

Table G-1: LOS Summary – Weekday Morning Peak Hour

	2016 Existing			2021 Future No-Build			2021 Future Build					
	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)
SIGNALIZED INTERSECTIONS												
<i>Tremont St / Melnea Cass Blvd / Columbus</i>												
Ave	52.2	D	0.39	46	52.0	D	0.42	49	52.2	D	0.41	48
Columbus Ave EB LT	>80.0	F	0.09	34	>80.0	F	0.10	36	>80.0	F	0.10	38
Columbus Ave EB R	>80.0	F	1.12	650	>80.0	F	1.14	670	>80.0	F	1.18	703
Melnea Cass Blvd WB L	48.5	D	0.70	336	49.7	D	0.72	349	49.7	D	0.72	349
Melnea Cass Blvd WB TR	31.0	C	0.91	456	35.4	D	0.95	509	38.2	D	0.99	448
Tremont St NB LT	2.4	A	0.71	317	2.7	A	0.74	356	2.7	A	0.75	733
Tremont St NB R	54.5	D	1.24	318	63.8	E	1.50	352	74.4	E	1.33	403
Tremont St SB LTR	49.9	D	0.98		54.3	D	1.01		60.2	E	1.06	
<i>Overall</i>												
<i>Tremont St / Ruggles St / Renaissance St</i>												
Renaissance St EB R	46.9	D	0.05	0	46.9	D	0.05	0	46.9	D	0.05	2
Tremont St NB TR	4.6	A	0.63	8	4.2	A	0.66	15	5.3	A	0.73	92
Tremont St SB T	2.9	A	0.40	83	3.2	A	0.41	83	3.8	A	0.43	89
<i>Overall</i>	4.7	A	0.52		4.6	A	0.54		5.4	A	0.59	
<i>Tremont St / Ruggles St / Whittier St</i>												
Ruggles St EB L	59.7	E	0.89	367	62.0	E	0.91	382	69.4	E	0.92	389
Ruggles St EB R	>80.0	F	0.15	116	>80.0	F	0.15	121	>80.0	F	0.24	156
Whittier St WB LTR	59.5	E	0.55	113	61.7	E	0.66	145	64.6	E	0.73	172
Tremont St NB L	78.6	E	0.95	198	68.9	E	0.97	194	>80.0	F	1.03	312
Tremont St NB T	9.8	A	0.63	257	11.6	B	0.67	259	42.1	D	0.95	776
Tremont St SB L	-	-	-	-	-	-	-	-	>80.0	F	0.61	88
Tremont St SB T	27.3	C	0.82	570	33.4	C	0.88	586	54.1	D	0.96	635
Tremont St SB R	23.4	C	0.70	667	26.8	C	0.74	685	29.4	C	0.75	629
<i>Overall</i>	35.6	D	0.83		37.9	D	0.87		53.5	D	0.96	

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

Table G-1: LOS Summary – Weekday Morning Peak Hour

	2016 Existing				2021 Future No-Build				2021 Future Build				
	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	
SIGNALIZED INTERSECTIONS													
<i>Tremont St / Prentiss St</i>													
Prentiss St EB LR	>80.0	F	0.88	231	>80.0	F	0.89	235	61.6	E	0.72	213	
Tremont St NB LT	-	-	-	-	-	-	-	-	-	-	-	-	
Tremont St NB L	-	-	-	-	-	-	-	-	53.8	D	0.84	158	
Tremont St NB T	54.6	D	1.04	752	65.3	E	1.07	761	35.8	D	0.96	612	
Tremont St SB TR	>80.0	F	1.39	829	>80.0	F	1.39	860	9.6	A	0.81	96	
<i>Overall</i>	<i>>80.0</i>	<i>F</i>	<i>1.05</i>		<i>>80.0</i>	<i>F</i>	<i>1.08</i>		<i>31.2</i>	<i>C</i>	<i>0.93</i>		
<i>Tremont St / Malcolm X Blvd / Columbus Ave</i>													
Tremont St EB LTR	>80.0	F	1.40	530	>80.0	F	1.44	551	>80.0	F	1.53	577	
Malcolm X Blvd WB LT	>80.0	F	1.48	428	>80.0	F	1.57	448	>80.0	F	1.66	457	
Malcolm X Blvd WB R	0.6	A	0.28	0	0.6	A	0.28	0	0.6	A	0.30	0	
Columbus Ave NB L	>80.0	F	1.03	322	>80.0	F	1.05	330	>80.0	F	1.05	330	
Columbus Ave NB TR	>80.0	F	1.11	745	>80.0	F	1.13	768	>80.0	F	1.17	799	
Tremont St SB L	>80.0	F	1.05	115	>80.0	F	1.07	114	>80.0	F	1.11	217	
Tremont St SB TR	48.8	D	0.65	232	49.5	D	0.67	232	55.6	E	0.69	342	
<i>Overall</i>	<i>>80.0</i>	<i>F</i>	<i>1.03</i>		<i>>80.0</i>	<i>F</i>	<i>1.07</i>		<i>>80.0</i>	<i>F</i>	<i>1.11</i>		
<i>Tremont St / Site Drive</i>													
Site Drive WB L									36.3	D	0.09	59	
Site Drive WB R									24.7	C	0.04	26	
Tremont St NB T									9.2	A	0.85	110	
Tremont St NB R		Not Applicable					Not Applicable			0.9	A	0.20	2
Tremont St SB L									43.5	D	0.80	137	
Tremont St SB T									65.1	E	0.86	550	
<i>Overall</i>									<i>27.9</i>	<i>C</i>	<i>0.64</i>		

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

Table G-2: LOS Summary – Weekday Afternoon Peak Hour

	2016 Existing			2021 Future No-Build			2021 Future Build					
	Ave. Delay (sec)	V/C LOS	Queue Length (ft)	Ave. Delay (sec)	V/C LOS	Queue Length (ft)	Ave. Delay (sec)	V/C LOS	Queue Length (ft)			
SIGNALIZED INTERSECTIONS												
<i>Tremont St / Melnea Cass Blvd / Columbus Ave</i>												
Ave	>80.0	F	0.95	316	>80.0	F	1.03	359	>80.0	F	0.98	332
Columbus Ave EB LT	59.5	E	0.31	101	53.4	D	0.37	100	44.9	D	0.54	107
Columbus Ave EB R	67.5	E	0.94	463	69.0	E	0.95	485	>80.0	F	1.00	551
Melnea Cass Blvd WB L	42.6	D	0.47	208	42.5	D	0.49	219	41.6	D	0.47	219
Melnea Cass Blvd WB TR	58.8	E	1.00	412	78.0	E	1.06	462	>80.0	F	1.22	608
Tremont St NB LT	2.1	A	0.68	242	2.3	A	0.70	279	2.7	A	0.73	502
Tremont St NB R	61.3	E	0.94	409	>80.0	F	1.57	498	>80.0	F	1.69	563
Tremont St SB LTR	47.5	D	0.97		63.0	E	1.05		>80.0	F	1.11	
<i>Overall</i>												
<i>Tremont St / Ruggles St / Renaissance St</i>												
Renaissance St EB R	48.5	D	0.22	90	48.8	D	0.25	98	49.8	D	0.33	123
Tremont St NB TR	4.0	A	0.59	17	3.8	A	0.62	29	2.0	A	0.66	44
Tremont St SB T	3.2	A	0.42	110	3.3	A	0.43	99	5.4	A	0.49	124
<i>Overall</i>	5.4	A	0.51		5.3	A	0.54		5.1	A	0.59	
<i>Tremont St / Ruggles St / Whittier St</i>												
Ruggles St EB L	47.5	D	0.81	314	48.5	D	0.83	325	50.0	D	0.82	332
Ruggles St EB R	>80.0	F	0.18	135	>80.0	F	0.18	136	62.5	E	0.33	192
Whittier St WB LTR	53.9	D	0.47	155	55.6	E	0.58	193	69.7	E	0.83	302
Tremont St NB L	>80.0	F	0.93	225	>80.0	F	0.94	216	69.9	E	1.00	270
Tremont St NB T	27.1	C	0.58	280	28.4	C	0.62	292	48.9	D	0.88	579
Tremont St SB L	-	-	-	-	-	-	-	-	>80.0	F	1.20	254
Tremont St SB T	51.0	D	0.88	635	57.4	E	0.93	661	>80.0	F	1.15	736
Tremont St SB R	22.1	C	0.73	562	24.5	C	0.76	610	33.3	C	0.82	716
<i>Overall</i>	51.0	D	0.80		53.3	D	0.84		68.4	E	1.01	

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

Table G-2 cont'd: LOS Summary – Weekday Afternoon Peak Hour

	2016 Existing				2021 Future No-Build				2021 Future Build				
	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	
SIGNALIZED INTERSECTIONS													
<i>Tremont St / Prentiss St</i>													
Prentiss St EB LR	>80.0	F	0.93	418	>80.0	F	0.94	425	>80.0	F	1.04	476	
Tremont St NB LT	-	-	-	-	-	-	-	-	-	-	-	-	
Tremont St NB L	-	-	-	-	-	-	-	-	>80.0	F	0.92	113	
Tremont St NB T	37.1	D	0.88	349	39.5	D	0.92	358	19.4	B	0.95	153	
Tremont St SB TR	>80.0	F	1.14	927	>80.0	F	1.17	931	27.6	C	0.93	210	
<i>Overall</i>	<i>65.8</i>	<i>E</i>	<i>0.92</i>		<i>73.0</i>	<i>E</i>	<i>0.94</i>		<i>35.5</i>	<i>D</i>	<i>0.98</i>		
<i>Tremont St / Malcolm X Blvd / Columbus Ave</i>													
Tremont St EB LTR	>80.0	F	1.37	608	>80.0	F	1.43	637	>80.0	F	1.50	686	
Malcolm X Blvd WB LT	>80.0	F	1.40	451	>80.0	F	1.48	475	>80.0	F	1.56	484	
Malcolm X Blvd WB R	47.7	D	0.25	92	47.8	D	0.26	94	47.9	D	0.27	96	
Columbus Ave NB L	>80.0	F	0.95	309	>80.0	F	0.98	321	>80.0	F	0.98	321	
Columbus Ave NB TR	73.2	E	0.97	485	>80.0	F	1.01	515	>80.0	F	1.04	539	
Tremont St SB L	>80.0	F	1.09	173	>80.0	F	1.12	170	>80.0	F	1.23	262	
Tremont St SB TR	78.1	E	1.04	401	>80.0	F	1.07	398	>80.0	F	1.22	636	
<i>Overall</i>	<i>>80.0</i>	<i>F</i>	<i>0.94</i>		<i>>80.0</i>	<i>F</i>	<i>0.97</i>		<i>>80.0</i>	<i>F</i>	<i>1.06</i>		
<i>Tremont St / Site Drive</i>													
Site Drive WB L									27.1	C	0.30	181	
Site Drive WB R									17.0	B	0.27	128	
Tremont St NB T									21.1	C	0.92	126	
Tremont St NB R		Not Applicable					Not Applicable			9.1	A	0.15	13
Tremont St SB L									44.9	D	0.86	129	
Tremont St SB T									79.3	E	1.06	644	
<i>Overall</i>									<i>43.7</i>	<i>D</i>	<i>0.75</i>		

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

Table G-3: LOS Summary – Saturday Midday Peak Hour

	2016 Existing			2021 Future No-Build			2021 Future Build					
	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)	Ave. Delay (sec)	LOS	V/C Ratio	Queue Length (ft)
SIGNALIZED INTERSECTIONS												
<i>Tremont St / Melnea Cass Blvd / Columbus</i>												
Ave	52.2	D	0.47	91	52.3	D	0.48	91	52.3	D	0.48	91
Columbus Ave EB LT	49.9	D	0.14	49	49.9	D	0.14	49	51.5	D	0.37	76
Columbus Ave EB R	48.5	D	0.84	305	47.7	D	0.84	308	47.8	D	0.86	333
Melnea Cass Blvd WB L	35.0	D	0.34	123	34.7	C	0.34	126	33.2	C	0.32	124
Melnea Cass Blvd WB TR	13.3	B	0.60	205	13.9	B	0.62	213	24.8	C	0.79	342
Tremont St NB LT	1.7	A	0.62	270	1.7	A	0.62	273	1.9	A	0.66	678
Tremont St NB R	23.4	C	0.39	202	23.8	C	0.40	205	27.9	C	0.55	282
Tremont St SB LTR	23.2	C	0.76		23.2	C	0.76		26.1	C	0.84	
<i>Overall</i>												
<i>Tremont St / Ruggles St / Renaissance St</i>												
Renaissance St EB R	37.3	D	0.05	0	37.3	D	0.05	0	37.3	D	0.05	6
Tremont St NB TR	5.1	A	0.53	8	5.1	A	0.54	8	9.6	A	0.60	37
Tremont St SB T	3.0	A	0.40	80	3.1	A	0.41	83	3.8	A	0.47	131
<i>Overall</i>	4.9	A	0.42		5.0	A	0.42		7.6	A	0.48	
<i>Tremont St / Ruggles St / Whittier St</i>												
Ruggles St EB L	38.0	D	0.72	138	38.2	D	0.73	143	37.2	D	0.71	132
Ruggles St EB R	>80.0	F	0.12	66	>80.0	F	0.12	67	>80.0	F	0.37	156
Whittier St WB LTR	50.7	D	0.11	33	50.7	D	0.11	33	65.4	E	0.75	136
Tremont St NB L	>80.0	F	3.79	378	>80.0	F	3.84	382	>80.0	F	1.10	315
Tremont St NB T	11.6	B	0.41	191	11.8	B	0.42	197	23.0	C	0.52	421
Tremont St SB L	-	-	-	-	-	-	-	-	46.4	D	0.70	175
Tremont St SB T	19.8	B	0.71	522	20.1	C	0.72	529	28.8	C	0.83	583
Tremont St SB R	7.1	A	0.52	400	7.2	A	0.52	408	10.2	B	0.57	417
<i>Overall</i>	>80.0	F	1.14		>80.0	F	1.16		37.3	D	0.85	

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

Table G-3 cont'd: LOS Summary – Saturday Midday Peak Hour














	2016 Existing			2021 Future No-Build			2021 Future Build					
	Ave. Delay (sec)	V/C LOS	Queue Length (ft)	Ave. Delay (sec)	V/C LOS	Queue Length (ft)	Ave. Delay (sec)	V/C LOS	Queue Length (ft)			
SIGNALIZED INTERSECTIONS												
<i>Tremont St / Prentiss St</i>												
Prentiss St EB LR	52.6	D	0.51	104	52.6	D	0.52	105	52.4	D	0.51	110
Tremont St NB LT	-	-	-	-	-	-	-	-	-	-	-	-
Tremont St NB L	-	-	-	-	-	-	-	-	50.0	D	0.49	86
Tremont St NB T	14.3	B	0.59	390	14.6	B	0.61	395	56.7	E	0.92	498
Tremont St SB TR	14.1	B	0.83	530	14.5	B	0.84	542	7.9	A	0.71	85
<i>Overall</i>	<i>15.6</i>	<i>B</i>	<i>0.64</i>		<i>15.9</i>	<i>B</i>	<i>0.65</i>		<i>34.0</i>	<i>C</i>	<i>0.77</i>	
<i>Tremont St / Malcolm X Blvd / Columbus Ave</i>												
Tremont St EB LTR	58.8	E	0.87	255	60.2	E	0.89	262	>80.0	F	1.06	339
Malcolm X Blvd WB LT	>80.0	F	0.98	244	>80.0	F	0.99	248	>80.0	F	1.02	253
Malcolm X Blvd WB R	42.2	D	0.23	62	42.3	D	0.23	62	42.5	D	0.25	64
Columbus Ave NB L	55.4	E	0.63	155	55.9	E	0.63	157	55.9	E	0.63	157
Columbus Ave NB TR	43.8	D	0.73	394	44.1	D	0.74	401	46.7	D	0.81	447
Tremont St SB L	>80.0	F	1.17	227	>80.0	F	1.18	225	>80.0	F	1.33	311
Tremont St SB TR	49.1	D	0.71	364	49.5	D	0.72	371	36.8	D	0.88	458
<i>Overall</i>	<i>58.9</i>	<i>E</i>	<i>0.72</i>		<i>60.0</i>	<i>E</i>	<i>0.73</i>		<i>67.8</i>	<i>E</i>	<i>0.82</i>	
<i>Tremont St / Site Drive</i>												
Site Drive WB L									31.2	C	0.42	226
Site Drive WB R									15.3	B	0.22	93
Tremont St NB T									10.2	B	0.69	84
Tremont St NB R		Not Applicable				Not Applicable			0.3	A	0.17	0
Tremont St SB L									40.8	D	0.83	142
Tremont St SB T									28.7	C	0.65	480
<i>Overall</i>									<i>19.7</i>	<i>B</i>	<i>0.65</i>	

Abbreviations: EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, L = Left, T = Through, R = Right

2012 Existing Conditions








HCM Unsignalized Intersection Capacity Analysis
 9: Tremont Street & Site Driveway

Timing Plan: 2016 Baseline AM
 2/4/2016

							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	26	1520	278	0	973	
Future Volume (Veh/h)	0	26	1520	278	0	973	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	28	1652	302	0	1058	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			452			496	
pX, platoon unblocked	0.76						
vC, conflicting volume	2181	551			1954		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1924	551			1954		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	94			100		
cM capacity (veh/h)	45	478			295		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	28	551	551	551	302	529	529
Volume Left	0	0	0	0	0	0	0
Volume Right	28	0	0	0	302	0	0
cSH	478	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.32	0.32	0.32	0.18	0.31	0.31
Queue Length 95th (ft)	5	0	0	0	0	0	0
Control Delay (s)	13.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	13.0	0.0				0.0	
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			39.4%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	696	476	340	173	1509	131	777
v/c Ratio	1.37	1.48	0.28	1.03	1.09	1.05	0.64
Control Delay	210.0	270.9	0.6	137.2	96.7	85.0	51.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	210.0	270.9	0.6	137.2	96.7	85.0	51.4
Queue Length 50th (ft)	~435	~313	0	~167	~647	~127	268
Queue Length 95th (ft)	#530	#428	0	#322	#745	m115	m232
Internal Link Dist (ft)	381	1183			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	508	322	1232	168	1387	125	1220
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.37	1.48	0.28	1.03	1.09	1.05	0.64

Intersection Summary




















- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2016 Baseline AM

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	
Lane Configurations													
Traffic Volume (vph)	172	303	124	60	396	326	163	1352	67	4	119	577	
Future Volume (vph)	172	303	124	60	396	326	163	1352	67	4	119	577	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91	
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97	
Flt Protected		0.99			0.99	1.00	0.95	1.00			0.95	1.00	
Satd. Flow (prot)		2926			2954	1232	1577	4455			1171	3915	
Flt Permitted		0.55			0.63	1.00	0.95	1.00			0.95	1.00	
Satd. Flow (perm)		1626			1882	1232	1577	4455			1171	3915	
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	200	352	144	62	412	340	173	1438	71	4	127	614	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	696	0	0	476	340	173	1509	0	0	131	777	
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%	
Parking (#/hr)												20	
Turn Type	pm+pt	NA		Perm	NA	Free	Prot	NA		Prot	Prot	NA	
Protected Phases	3	3 4			4		5	1		5	5	1	
Permitted Phases	3 4			4		Free							
Actuated Green, G (s)		30.0			21.0	140.0	13.0	40.8			13.0	40.8	
Effective Green, g (s)		34.0			24.0	140.0	15.0	42.8			15.0	42.8	
Actuated g/C Ratio		0.24			0.17	1.00	0.11	0.31			0.11	0.31	
Clearance Time (s)					7.0		6.0	6.0			6.0	6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	2.0	
Lane Grp Cap (vph)		497			322	1232	168	1361			125	1196	
v/s Ratio Prot		c0.11					0.11	c0.34			c0.11	0.20	
v/s Ratio Perm		0.23			c0.25	c0.28							
v/c Ratio		1.40			1.48	0.28	1.03	1.11			1.05	0.65	
Uniform Delay, d1		53.0			58.0	0.0	62.5	48.6			62.5	42.1	
Progression Factor		0.87			1.00	1.00	1.00	1.00			0.76	1.15	
Incremental Delay, d2		189.2			231.3	0.6	77.5	59.9			37.8	0.3	
Delay (s)		235.3			289.3	0.6	140.0	108.5			85.5	48.8	
Level of Service		F			F	A	F	F			F	D	
Approach Delay (s)		235.3			169.0			111.8				54.1	
Approach LOS		F			F			F				D	
Intersection Summary													
HCM 2000 Control Delay			131.3									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.03										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			84.9%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													










Movement	SBR
Line Configurations	
Traffic Volume (vph)	153
Future Volume (vph)	153
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	163
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2016 Baseline AM

2/4/2016

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	606	148	123	224	1475	811	539
v/c Ratio	0.89	0.49	0.57	0.95	0.63	0.82	0.74
Control Delay	62.7	36.6	62.3	79.4	10.4	29.8	28.9
Queue Delay	2.3	0.0	0.0	44.3	0.2	5.4	0.0
Total Delay	65.0	36.6	62.3	123.6	10.6	35.2	28.9
Queue Length 50th (ft)	260	43	100	201	244	356	460
Queue Length 95th (ft)	#367	116	113	m198	m257	#570	#667
Internal Link Dist (ft)			271		416	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	695	304	354	235	2354	994	738
Starvation Cap Reductn	31	0	0	0	0	132	0
Spillback Cap Reductn	0	0	0	52	198	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.49	0.35	1.22	0.68	0.94	0.73

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2016 Baseline AM
2/4/2016




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	533	0	130	35	32	19	206	1357	0	0	779	517
Future Volume (vph)	533	0	130	35	32	19	206	1357	0	0	779	517
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91			0.95	1.00
Frbp, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	0.95
Flpb, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	1.00
Frt	1.00		0.85		0.97		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	2865		989		1676		1266	4257			2935	1268
Flt Permitted	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (perm)	2865		989		1676		1266	4257			2935	1268
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	606	0	148	50	46	27	224	1475	0	0	811	539
RTOR Reduction (vph)	0	0	121	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	606	0	27	0	115	0	224	1475	0	0	811	539
Confl. Peds. (#/hr)	8		9	9		8	20					20
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	24%	6%	67%	0%	7%	5%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		Prot	NA			NA	pm+ov
Protected Phases	3		1		4		1	6			2	3
Permitted Phases				4								2
Actuated Green, G (s)	31.2		24.0		15.4		24.0	75.4			45.4	76.6
Effective Green, g (s)	33.2		26.0		17.4		26.0	77.4			47.4	80.6
Actuated g/C Ratio	0.24		0.19		0.12		0.19	0.55			0.34	0.58
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0		2.0		2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	679		183		208		235	2353			993	766
v/s Ratio Prot	c0.21		0.03				c0.18	0.35			c0.28	0.17
v/s Ratio Perm					0.07							0.26
v/c Ratio	0.89		0.15		0.55		0.95	0.63			0.82	0.70
Uniform Delay, d1	51.7		47.7		57.6		56.4	21.4			42.3	21.2
Progression Factor	0.90		4.15		1.00		1.04	0.44			0.48	1.00
Incremental Delay, d2	13.4		0.1		1.8		19.8	0.3			7.0	2.3
Delay (s)	59.7		198.1		59.5		78.6	9.8			27.3	23.4
Level of Service	E		F		E		E	A			C	C
Approach Delay (s)		86.9			59.5			18.9			25.8	
Approach LOS		F			E			B			C	
Intersection Summary												
HCM 2000 Control Delay			35.6									D
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			140.0								16.0	
Intersection Capacity Utilization			70.6%									C
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2016 Baseline AM

3082: Tremont Street & Renaissance Park/Ruggles St

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	60	1987	1280
v/c Ratio	0.20	0.64	0.40
Control Delay	1.6	4.6	3.0
Queue Delay	0.0	0.4	1.6
Total Delay	1.6	5.0	4.5
Queue Length 50th (ft)	0	309	40
Queue Length 95th (ft)	0	8	m83
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	329	3129	3223
Starvation Cap Reductn	0	527	1680
Spillback Cap Reductn	7	151	305
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.19	0.76	0.83




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








Timing Plan: 2016 Baseline AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	43	0	0	0	0	1800	127	0	1242	0
Future Volume (vph)	0	0	43	0	0	0	0	1800	127	0	1242	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4126			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4126			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	60	0	0	0	0	1856	131	0	1280	0
RTOR Reduction (vph)	0	0	49	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	0	11	0	0	0	0	1982	0	0	1280	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			218					3123			3223	
v/s Ratio Prot			c0.01					c0.48			0.30	
v/s Ratio Perm												
v/c Ratio			0.05					0.63			0.40	
Uniform Delay, d1			46.9					7.9			5.9	
Progression Factor			1.00					0.49			0.48	
Incremental Delay, d2			0.0					0.7			0.1	
Delay (s)			46.9					4.6			2.9	
Level of Service			D					A			A	
Approach Delay (s)		46.9			0.0			4.6			2.9	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			4.7								A	
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			45.2%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	50	130	961	303	1081	1094	427
v/c Ratio	0.39	0.57	1.12	0.70	0.91	0.71	1.24dl
Control Delay	57.2	21.6	113.3	54.4	28.3	7.6	55.1
Queue Delay	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	22.2	113.3	54.4	28.3	7.6	55.1
Queue Length 50th (ft)	37	22	~516	247	342	247	180
Queue Length 95th (ft)	m46	m34	#650	336	#456	317	#318
Internal Link Dist (ft)	197			732	380		216
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	320	861	435	1183	1532	554
Starvation Cap Reductn	0	47	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.48	1.12	0.70	0.91	0.71	0.77




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Timing Plan: 2016 Baseline AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	38	108	923	211	47	365	528	963	31	321	14
Future Volume (vph)	2	38	108	923	211	47	365	528	963	31	321	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1525			2914	1532		3183	
Flt Permitted		1.00	1.00	0.95	1.00			0.60	1.00		0.57	
Satd. Flow (perm)		1626	1398	3015	1525			1794	1532		1841	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	5	45	130	961	245	58	445	636	1094	57	345	25
RTOR Reduction (vph)	0	0	120	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	50	10	961	303	0	0	1081	1094	0	424	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.0	11.0	40.0	40.0			73.0	140.0		42.0	
Effective Green, g (s)		11.0	11.0	40.0	40.0			73.0	140.0		42.0	
Actuated g/C Ratio		0.08	0.08	0.29	0.29			0.52	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		127	109	861	435			1183	1532		552	
v/s Ratio Prot		0.03		c0.32	0.20			c0.20				
v/s Ratio Perm			0.01					c0.27	c0.71		0.23	
v/c Ratio		0.39	0.09	1.12	0.70			0.91	0.71		1.24dl	
Uniform Delay, d1		61.3	59.9	50.0	44.6			30.6	0.0		44.6	
Progression Factor		0.84	1.56	1.00	1.00			0.66	1.00		1.00	
Incremental Delay, d2		0.6	0.1	67.8	3.9			10.7	2.4		9.9	
Delay (s)		52.2	93.4	117.8	48.5			31.0	2.4		54.5	
Level of Service		D	F	F	D			C	A		D	
Approach Delay (s)		82.0			101.2			16.7			54.5	
Approach LOS		F			F			B			D	

Intersection Summary




HCM 2000 Control Delay	49.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2016 Baseline AM
2/4/2016

			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	196	2105	1005
v/c Ratio	0.89	1.01	1.39dl
Control Delay	93.5	39.2	137.8
Queue Delay	0.0	0.0	0.0
Total Delay	93.5	39.2	137.8
Queue Length 50th (ft)	170	616	~355
Queue Length 95th (ft)	#231	m#752	#829
Internal Link Dist (ft)	258	709	372
Turn Bay Length (ft)			
Base Capacity (vph)	231	2079	843
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.85	1.01	1.19












Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2016 Baseline AM

2/4/2016

								
Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	123	28	1	254	1619	56	777	139
Future Volume (vph)	123	28	1	254	1619	56	777	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	11	12	11	12
Total Lost time (s)	4.0				4.0		4.0	
Lane Util. Factor	1.00				0.91		0.95	
Frt	0.98				1.00		0.98	
Flt Protected	0.96				0.99		1.00	
Satd. Flow (prot)	1501				4210		2465	
Flt Permitted	0.96				0.66		0.59	
Satd. Flow (perm)	1501				2785		1457	
Peak-hour factor, PHF	0.77	0.77	0.92	0.89	0.89	0.92	0.97	0.97
Adj. Flow (vph)	160	36	1	285	1819	61	801	143
RTOR Reduction (vph)	6	0	0	0	0	0	8	0
Lane Group Flow (vph)	190	0	0	0	2105	0	997	0
Heavy Vehicles (%)	11%	7%	2%	3%	7%	2%	13%	10%
Parking (#/hr)							20	
Turn Type	Prot		custom	pm+pt	NA	Perm	NA	
Protected Phases	5			6	1 6		1	
Permitted Phases			6	1 6		1		
Actuated Green, G (s)	19.1				91.9		76.9	
Effective Green, g (s)	20.1				93.9		77.9	
Actuated g/C Ratio	0.14				0.67		0.56	
Clearance Time (s)	5.0						5.0	
Vehicle Extension (s)	2.0						2.0	
Lane Grp Cap (vph)	215				2030		810	
v/s Ratio Prot	c0.13				c0.12			
v/s Ratio Perm					0.58		c0.68	
v/c Ratio	0.88				1.04		1.39dl	
Uniform Delay, d1	58.8				23.0		31.0	
Progression Factor	1.00				1.35		1.85	
Incremental Delay, d2	31.2				23.4		111.8	
Delay (s)	90.0				54.6		169.2	
Level of Service	F				D		F	
Approach Delay (s)	90.0				54.6		169.2	
Approach LOS	F				D		F	

Intersection Summary

HCM 2000 Control Delay	91.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.














c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

7: Tremont Street & Site Driveway

Timing Plan: 2016 Baseline PM

2/4/2016








							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	177	1299	51	0	1231	
Future Volume (Veh/h)	0	177	1299	51	0	1231	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	192	1412	55	0	1338	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			300			648	
pX, platoon unblocked	0.83	0.80			0.80		
vC, conflicting volume	2081	471			1467		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	435	0			697		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	78			100		
cM capacity (veh/h)	457	865			714		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	192	471	471	471	55	669	669
Volume Left	0	0	0	0	0	0	0
Volume Right	192	0	0	0	55	0	0
cSH	865	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.22	0.28	0.28	0.28	0.03	0.39	0.39
Queue Length 95th (ft)	21	0	0	0	0	0	0
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	10.3	0.0				0.0	
Approach LOS	B						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			42.7%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

Timing Plan: 2016 Baseline PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	766	521	320	192	1052	188	1092
v/c Ratio	1.34	1.40	0.63	0.95	0.95	1.09	1.02
Control Delay	199.3	236.6	10.8	111.6	68.8	123.1	66.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	199.3	236.6	10.8	111.6	68.8	123.1	66.9
Queue Length 50th (ft)	~474	~332	0	176	~426	~197	~453
Queue Length 95th (ft)	#608	#451	92	#309	#485	m#173	m#401
Internal Link Dist (ft)	381	1186			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	571	372	511	202	1109	172	1069
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.34	1.40	0.63	0.95	0.95	1.09	1.02

Intersection Summary



















- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2016 Baseline PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd








2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	185	359	199	78	401	294	1	164	816	89	2	180	
Future Volume (vph)	185	359	199	78	401	294	1	164	816	89	2	180	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.96			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2933			3064	1275		1577	4364			1345	
Flt Permitted		0.54			0.60	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1597			1863	1275		1577	4364			1345	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97	
Adj. Flow (vph)	191	370	205	85	436	320	1	191	949	103	2	186	
RTOR Reduction (vph)	0	0	0	0	0	256	0	0	0	0	0	0	
Lane Group Flow (vph)	0	766	0	0	521	64	0	192	1052	0	0	188	
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%	
Parking (#/hr)													
Turn Type	D.P+P	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4		4	4	4	5	5	1		5	5	
Permitted Phases	4			4		4							
Actuated Green, G (s)		35.0			25.0	25.0		16.0	32.8			16.0	
Effective Green, g (s)		39.0			28.0	28.0		18.0	34.8			18.0	
Actuated g/C Ratio		0.28			0.20	0.20		0.13	0.25			0.13	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		559			372	255		202	1084			172	
v/s Ratio Prot		c0.12						0.12	0.24			c0.14	
v/s Ratio Perm		0.26			c0.28	0.05							
v/c Ratio		1.37			1.40	0.25		0.95	0.97			1.09	
Uniform Delay, d1		50.5			56.0	47.2		60.6	52.1			61.0	
Progression Factor		1.04			1.00	1.00		1.00	1.00			1.38	
Incremental Delay, d2		174.3			195.8	0.5		48.8	21.1			51.0	
Delay (s)		227.0			251.8	47.7		109.4	73.2			135.1	
Level of Service		F			F	D		F	E			F	
Approach Delay (s)		227.0			174.1				78.8				
Approach LOS		F			F				E				
Intersection Summary													
HCM 2000 Control Delay			128.1									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			0.94										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			88.6%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													

Movement	SBT	SBR
	↓	↙
Lane Configurations	↑↑↑	
Traffic Volume (vph)	954	105
Future Volume (vph)	954	105
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.99	
Flt Protected	1.00	
Satd. Flow (prot)	4209	
Flt Permitted	1.00	
Satd. Flow (perm)	4209	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	984	108
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1092	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	32.8	
Effective Green, g (s)	34.8	
Actuated g/C Ratio	0.25	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1046	
v/s Ratio Prot	c0.26	
v/s Ratio Perm		
v/c Ratio	1.04	
Uniform Delay, d1	52.6	
Progression Factor	1.05	
Incremental Delay, d2	23.0	
Delay (s)	78.1	
Level of Service	E	
Approach Delay (s)	86.5	
Approach LOS	F	
Intersection Summary		

Queues

611: Tremont Street & Ruggles St/Whittier St

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	578	207	144	179	1291	916	565
v/c Ratio	0.81	0.59	0.49	0.93	0.58	0.88	0.77
Control Delay	50.2	39.3	52.4	104.3	29.1	52.6	28.2
Queue Delay	1.3	1.2	0.0	16.8	0.0	8.0	0.0
Total Delay	51.5	40.5	52.4	121.1	29.1	60.7	28.2
Queue Length 50th (ft)	237	73	103	168	257	~496	387
Queue Length 95th (ft)	314	135	155	m#225	m280	#635	#562
Internal Link Dist (ft)			271		568	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	750	351	374	193	2216	1039	748
Starvation Cap Reductn	55	41	0	0	0	102	0
Spillback Cap Reductn	0	0	0	15	0	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.67	0.39	1.01	0.58	0.98	0.76

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St




Timing Plan: 2016 Baseline PM
2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	509	0	182	65	19	36	159	1149	0	0	879	542
Future Volume (vph)	509	0	182	65	19	36	159	1149	0	0	879	542
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91			0.95	1.00
Frbp, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	0.94
Flpb, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	1.00
Frt	1.00		0.85		0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00		0.97		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3001		1171		1750		1287	4298			3079	1273
Flt Permitted	0.95		1.00		0.97		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3001		1171		1750		1287	4298			3079	1273
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.96	0.96	0.96
Adj. Flow (vph)	578	0	207	78	23	43	179	1291	0	0	916	565
RTOR Reduction (vph)	0	0	176	0	12	0	0	0	0	0	0	0
Lane Group Flow (vph)	578	0	31	0	132	0	179	1291	0	0	916	565
Confl. Peds. (#/hr)	13		16	16			13	23				23
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	22%	5%	0%	0%	2%	4%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		Prot	NA			NA	pm+ov
Protected Phases	3		1		4		1	6			2	3
Permitted Phases				4								2
Actuated Green, G (s)	31.4		18.9		20.4		18.9	70.2			45.3	76.7
Effective Green, g (s)	33.4		20.9		22.4		20.9	72.2			47.3	80.7
Actuated g/C Ratio	0.24		0.15		0.16		0.15	0.52			0.34	0.58
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)	3.0		2.0		2.0		2.0	2.0			2.0	3.0
Lane Grp Cap (vph)	715		174		280		192	2216			1040	770
v/s Ratio Prot	c0.19		0.03				c0.14	0.30			c0.30	0.18
v/s Ratio Perm					0.08							0.27
v/c Ratio	0.81		0.18		0.47		0.93	0.58			0.88	0.73
Uniform Delay, d1	50.3		52.0		53.4		58.9	23.5			43.7	21.8
Progression Factor	0.82		4.63		1.00		1.18	1.12			0.94	0.86
Incremental Delay, d2	6.4		0.2		0.5		33.9	0.7			10.0	3.4
Delay (s)	47.5		241.1		53.9		103.2	27.1			51.0	22.1
Level of Service	D		F		D		F	C			D	C
Approach Delay (s)		98.6			53.9			36.3			40.0	
Approach LOS		F			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			51.0									D
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			140.0									16.0
Intersection Capacity Utilization			72.3%									C
Analysis Period (min)			15									
c Critical Lane Group												

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2016 Baseline PM




















2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	128	1824	1400
v/c Ratio	0.41	0.59	0.42
Control Delay	20.2	3.9	3.2
Queue Delay	0.1	0.2	1.2
Total Delay	20.3	4.1	4.5
Queue Length 50th (ft)	26	5	61
Queue Length 95th (ft)	90	17	110
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	315	3096	3317
Starvation Cap Reductn	0	419	1600
Spillback Cap Reductn	14	81	714
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.68	0.82
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2016 Baseline PM

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	120	0	0	0	0	1537	232	0	1246	0
Future Volume (vph)	0	0	120	0	0	0	0	1537	232	0	1246	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.98			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4073			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4073			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	128	0	0	0	0	1585	239	0	1400	0
RTOR Reduction (vph)	0	0	77	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	0	51	0	0	0	0	1810	0	0	1400	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			238					3083			3317	
v/s Ratio Prot			c0.04					c0.44			0.32	
v/s Ratio Perm												
v/c Ratio			0.22					0.59			0.42	
Uniform Delay, d1			48.4					7.4			6.1	
Progression Factor			1.00					0.45			0.50	
Incremental Delay, d2			0.2					0.6			0.2	
Delay (s)			48.5					4.0			3.2	
Level of Service			D					A			A	
Approach Delay (s)		48.5			0.0			4.0			3.2	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.4								A	
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			42.4%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2016 Baseline PM

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	228	271	776	190	922	1050	610
v/c Ratio	0.95	0.66	0.94	0.47	1.00	0.68	0.94dl
Control Delay	98.6	18.2	68.8	46.2	56.0	5.5	62.2
Queue Delay	20.4	2.2	0.0	0.0	0.0	0.0	0.0
Total Delay	119.0	20.5	68.8	46.2	56.0	5.5	62.2
Queue Length 50th (ft)	168	51	351	142	-326	100	283
Queue Length 95th (ft)	#316	101	#463	208	#412	242	#409
Internal Link Dist (ft)	203			68	380		136
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	415	861	422	922	1554	670
Starvation Cap Reductn	21	59	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.76	0.90	0.45	1.00	0.68	0.91

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2016 Baseline PM




2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	8	174	225	745	106	54	220	543	924	45	473	10		
Future Volume (vph)	8	174	225	745	106	54	220	543	924	45	473	10		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12		
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0			
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95			
Frt		1.00	0.85	1.00	0.95			1.00	0.85		1.00			
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99			
Satd. Flow (prot)		1626	1398	3015	1480			2929	1554		3224			
Flt Permitted		1.00	1.00	0.95	1.00			0.58	1.00		0.58			
Satd. Flow (perm)		1626	1398	3015	1480			1709	1554		1880			
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55		
Adj. Flow (vph)	21	207	271	776	123	67	268	654	1050	83	509	18		
RTOR Reduction (vph)	0	0	206	0	0	0	0	0	0	0	1	0		
Lane Group Flow (vph)	0	228	65	776	190	0	0	922	1050	0	609	0		
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%		
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA			
Protected Phases	5	5		6	6		7	17			1			
Permitted Phases			5				17		Free	1				
Actuated Green, G (s)		20.7	20.7	38.4	38.4			64.9	140.0		49.9			
Effective Green, g (s)		20.7	20.7	38.4	38.4			64.9	140.0		49.9			
Actuated g/C Ratio		0.15	0.15	0.27	0.27			0.46	1.00		0.36			
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0			
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0			
Lane Grp Cap (vph)		240	206	826	405			922	1554		670			
v/s Ratio Prot		c0.14		c0.26	0.13			c0.11						
v/s Ratio Perm			0.05					c0.36	0.68		0.32			
v/c Ratio		0.95	0.31	0.94	0.47			1.00	0.68		0.94dl			
Uniform Delay, d1		59.1	53.3	49.7	42.3			37.5	0.0		42.9			
Progression Factor		0.91	1.11	1.00	1.00			0.82	1.00		1.00			
Incremental Delay, d2		41.5	0.3	17.9	0.3			28.0	2.1		18.4			
Delay (s)		95.2	59.5	67.5	42.6			58.8	2.1		61.3			
Level of Service		F	E	E	D			E	A		E			
Approach Delay (s)		75.8			62.6			28.6			61.3			
Approach LOS		E			E			C			E			
Intersection Summary														
HCM 2000 Control Delay			47.5									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.97											
Actuated Cycle Length (s)			140.0								16.0		Sum of lost time (s)	
Intersection Capacity Utilization			87.7%										ICU Level of Service	E
Analysis Period (min)			15											
dl Defacto Left Lane. Recode with 1 though lane as a left lane.														
c Critical Lane Group														

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2016 Baseline PM

2/4/2016











			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	350	1370	1281
v/c Ratio	0.93	0.86	1.11
Control Delay	79.6	34.8	83.6
Queue Delay	0.0	0.0	0.0
Total Delay	79.6	34.8	83.6
Queue Length 50th (ft)	284	~320	~786
Queue Length 95th (ft)	#418	m#349	#927
Internal Link Dist (ft)	258	709	220
Turn Bay Length (ft)			
Base Capacity (vph)	393	1596	1155
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.89	0.86	1.11

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.














HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2016 Baseline PM
2/4/2016








							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	151	146	106	1182	17	1130	83
Future Volume (vph)	151	146	106	1182	17	1130	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.93			1.00		0.99	
Flt Protected	0.98			1.00		1.00	
Satd. Flow (prot)	1475			4174		2668	
Flt Permitted	0.98			0.64		0.91	
Satd. Flow (perm)	1475			2673		2429	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.92	0.96	0.96
Adj. Flow (vph)	178	172	113	1257	18	1177	86
RTOR Reduction (vph)	25	0	0	0	0	3	0
Lane Group Flow (vph)	325	0	0	1370	0	1278	0
Heavy Vehicles (%)	13%	5%	4%	8%	2%	6%	11%
Parking (#/hr)						15	
Turn Type	Prot		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	32.2			73.8		63.8	
Effective Green, g (s)	33.2			75.8		64.8	
Actuated g/C Ratio	0.24			0.54		0.46	
Clearance Time (s)	5.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	349			1565		1124	
v/s Ratio Prot	c0.22			c0.07			
v/s Ratio Perm				0.41		c0.53	
v/c Ratio	0.93			0.88		1.14	
Uniform Delay, d1	52.3			28.0		37.6	
Progression Factor	1.00			1.23		0.59	
Incremental Delay, d2	30.6			2.8		69.6	
Delay (s)	82.9			37.1		91.8	
Level of Service	F			D		F	
Approach Delay (s)	82.9			37.1		91.8	
Approach LOS	F			D		F	
Intersection Summary							
HCM 2000 Control Delay			65.8		HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio			0.92				
Actuated Cycle Length (s)			140.0		Sum of lost time (s)		16.0
Intersection Capacity Utilization			95.2%		ICU Level of Service		F
Analysis Period (min)			15				
c Critical Lane Group							

HCM Unsignalized Intersection Capacity Analysis
6: Tremont Street & Site Driveway

Timing Plan: 2016 Baseline SA
2/4/2016

							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	111	1097	61	0	935	
Future Volume (Veh/h)	0	111	1097	61	0	935	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	121	1192	66	0	1016	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			302			646	
pX, platoon unblocked	0.86	0.87			0.87		
vC, conflicting volume	1700	397			1258		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	586	0			782		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	87			100		
cM capacity (veh/h)	378	945			725		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	121	397	397	397	66	508	508
Volume Left	0	0	0	0	0	0	0
Volume Right	121	0	0	0	66	0	0
cSH	945	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.13	0.23	0.23	0.23	0.04	0.30	0.30
Queue Length 95th (ft)	11	0	0	0	0	0	0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A						
Approach Delay (s)	9.4	0.0				0.0	
Approach LOS	A						
Intersection Summary							
Average Delay			0.5				
Intersection Capacity Utilization			34.7%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	504	401	287	111	858	167	764
v/c Ratio	0.85	0.98	0.61	0.63	0.70	1.17	0.68
Control Delay	54.5	88.4	11.1	67.0	45.4	144.5	49.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.5	88.4	11.1	67.0	45.4	144.5	49.8
Queue Length 50th (ft)	167	164	0	83	-304	-159	-274
Queue Length 95th (ft)	#255	#244	62	#155	#394	m#227	#364
Internal Link Dist (ft)	381	1188			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	593	410	468	177	1230	143	1127
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.98	0.61	0.63	0.70	1.17	0.68

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2016 Baseline SA

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd








2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	146	236	92	64	277	244	1	102	732	66	13	145	
Future Volume (vph)	146	236	92	64	277	244	1	102	732	66	13	145	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.97			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2938			2945	1275		1519	4315			1230	
Flt Permitted		0.59			0.75	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1766			2241	1275		1519	4315			1230	
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95	
Adj. Flow (vph)	155	251	98	75	326	287	1	110	787	71	14	153	
RTOR Reduction (vph)	0	0	0	0	0	234	0	0	0	0	0	0	
Lane Group Flow (vph)	0	504	0	0	401	53	0	111	858	0	0	167	
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%	
Parking (#/hr)													
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	3 4			4		4							
Actuated Green, G (s)		28.0			19.0	19.0		12.0	30.6			12.0	
Effective Green, g (s)		32.0			22.0	22.0		14.0	32.6			14.0	
Actuated g/C Ratio		0.27			0.18	0.18		0.12	0.27			0.12	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		578			410	233		177	1172			143	
v/s Ratio Prot		c0.08						0.07	c0.20			c0.14	
v/s Ratio Perm		0.15			c0.18	0.04							
v/c Ratio		0.87			0.98	0.23		0.63	0.73			1.17	
Uniform Delay, d1		42.0			48.8	41.7		50.5	39.7			53.0	
Progression Factor		1.13			1.00	1.00		1.00	1.00			0.65	
Incremental Delay, d2		11.3			38.2	0.5		4.9	4.1			110.1	
Delay (s)		58.8			87.0	42.2		55.4	43.8			144.5	
Level of Service		E			F	D		E	D			F	
Approach Delay (s)		58.8			68.3				45.1				
Approach LOS		E			E				D				
Intersection Summary													
HCM 2000 Control Delay			58.9									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.72										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			72.4%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

Movement	SBT	SBR
	↓	↙
Lane Configurations	↑↑↑	
Traffic Volume (vph)	550	176
Future Volume (vph)	550	176
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3956	
Flt Permitted	1.00	
Satd. Flow (perm)	3956	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	579	185
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	764	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.6	
Effective Green, g (s)	32.6	
Actuated g/C Ratio	0.27	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1074	
v/s Ratio Prot	0.19	
v/s Ratio Perm		
v/c Ratio	0.71	
Uniform Delay, d1	39.5	
Progression Factor	1.19	
Incremental Delay, d2	2.3	
Delay (s)	49.1	
Level of Service	D	
Approach Delay (s)	66.2	
Approach LOS	E	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2016 Baseline SA
2/4/2016

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	388	133	33	163	1106	869	414
v/c Ratio	0.72	0.49	0.16	3.79	0.40	0.68	0.53
Control Delay	41.1	21.8	27.3	1319.0	12.9	21.8	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Total Delay	41.1	21.8	27.3	1319.0	12.9	22.1	9.6
Queue Length 50th (ft)	89	28	11	~235	94	116	21
Queue Length 95th (ft)	138	66	33	m#378	191	#522	400
Internal Link Dist (ft)			271		566	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	583	272	423	43	2758	1280	803
Starvation Cap Reductn	0	0	0	0	0	73	5
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.49	0.08	3.79	0.40	0.72	0.52


















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2016 Baseline SA

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Traffic Volume (vph)	365	0	125	12	1	15	21	134	1051	0	14	0
Future Volume (vph)	365	0	125	12	1	15	21	134	1051	0	14	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frbp, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		1.00			0.98	1.00			
Frt	1.00		0.85		0.93			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	2918		1098		1697			1249	4257			
Flt Permitted	0.95		1.00		0.98			0.24	1.00			
Satd. Flow (perm)	2918		1098		1697			309	4257			
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.95	0.93	0.93
Adj. Flow (vph)	388	0	133	14	1	18	22	141	1106	0	15	0
RTOR Reduction (vph)	0	0	114	0	16	0	0	0	0	0	0	0
Lane Group Flow (vph)	388	0	19	0	17	0	0	163	1106	0	0	0
Confl. Peds. (#/hr)	7		6	6		7		37				
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	0%	27%	6%	0%	0%	0%
Parking (#/hr)				5								
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	20.2		15.0		8.4			15.0	73.4			
Effective Green, g (s)	22.2		17.0		10.4			17.0	75.4			
Actuated g/C Ratio	0.18		0.14		0.09			0.14	0.63			
Clearance Time (s)	6.0		6.0		6.0			6.0	6.0			
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	539		155		147			43	2674			
v/s Ratio Prot	c0.13		0.02						0.26			
v/s Ratio Perm					0.01			c0.53				
v/c Ratio	0.72		0.12		0.11			3.79	0.41			
Uniform Delay, d1	46.0		45.0		50.5			51.5	11.2			
Progression Factor	0.73		2.09		1.00			1.14	1.00			
Incremental Delay, d2	4.2		0.1		0.1			1303.3	0.4			
Delay (s)	38.0		94.1		50.7			1362.2	11.6			
Level of Service	D		F		D			F	B			
Approach Delay (s)		52.3			50.7				185.1			
Approach LOS		D			D				F			
Intersection Summary												
HCM 2000 Control Delay			91.4						HCM 2000 Level of Service	F		
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0						Sum of lost time (s)	16.0		
Intersection Capacity Utilization			79.8%						ICU Level of Service	D		
Analysis Period (min)			15									

! Phase conflict between lane groups.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2016 Baseline SA
 2/4/2016






Movement	SWT	SWR
Lane Configurations	↑↑	↑
Traffic Volume (vph)	794	385
Future Volume (vph)	794	385
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	0.91
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2936	1193
Flt Permitted	0.92	1.00
Satd. Flow (perm)	2707	1193
Peak-hour factor, PHF	0.93	0.93
Adj. Flow (vph)	854	414
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	869	414
Confl. Peds. (#/hr)		37
Heavy Vehicles (%)	7%	7%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	52.4	72.6
Effective Green, g (s)	54.4	76.6
Actuated g/C Ratio	0.45	0.64
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	1227	801
v/s Ratio Prot		0.10
v/s Ratio Perm	c0.32	0.25
v/c Ratio	0.71	0.52
Uniform Delay, d1	26.4	11.7
Progression Factor	0.63	0.56
Incremental Delay, d2	3.3	0.5
Delay (s)	19.8	7.1
Level of Service	B	A
Approach Delay (s)	15.7	
Approach LOS	B	

Intersection Summary

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2016 Baseline SA




















2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	65	1575	1205
v/c Ratio	0.18	0.53	0.40
Control Delay	1.5	5.0	3.0
Queue Delay	0.0	0.2	0.4
Total Delay	1.5	5.2	3.4
Queue Length 50th (ft)	0	105	32
Queue Length 95th (ft)	0	8	80
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	368	2958	2994
Starvation Cap Reductn	0	458	1082
Spillback Cap Reductn	4	0	176
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.18	0.63	0.63
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2016 Baseline SA

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	42	0	0	0	0	1356	93	0	1145	0
Future Volume (vph)	0	0	42	0	0	0	0	1356	93	0	1145	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4120			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4120			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	65	0	0	0	0	1474	101	0	1205	0
RTOR Reduction (vph)	0	0	51	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	14	0	0	0	0	1569	0	0	1205	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					85.0			85.0	
Effective Green, g (s)			26.0					86.0			86.0	
Actuated g/C Ratio			0.22					0.72			0.72	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			276					2952			2994	
v/s Ratio Prot			c0.01					c0.38			0.29	
v/s Ratio Perm												
v/c Ratio			0.05					0.53			0.40	
Uniform Delay, d1			37.2					7.8			6.8	
Progression Factor			1.00					0.57			0.40	
Incremental Delay, d2			0.0					0.6			0.3	
Delay (s)			37.3					5.1			3.0	
Level of Service			D					A			A	
Approach Delay (s)		37.3			0.0			5.1			3.0	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			4.9								A	
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			120.0						8.0			
Intersection Capacity Utilization			37.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2016 Baseline SA

3098: Tremont Street/Tremont St & Melnea Cass Boulevard




















2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	74	194	694	137	640	940	439
v/c Ratio	0.47	0.63	0.84	0.34	0.60	0.62	0.40
Control Delay	60.1	16.0	50.5	35.9	14.1	4.4	25.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	16.0	50.5	35.9	14.1	4.4	25.6
Queue Length 50th (ft)	56	0	260	85	79	58	113
Queue Length 95th (ft)	91	49	305	123	205	270	202
Internal Link Dist (ft)	215			623	380		183
Turn Bay Length (ft)			350				
Base Capacity (vph)	285	404	1055	517	1060	1526	1108
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.48	0.66	0.26	0.60	0.62	0.40
Intersection Summary							




HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2016 Baseline SA

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	51	161	666	76	40	128	402	827	33	326	15
Future Volume (vph)	5	51	161	666	76	40	128	402	827	33	326	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1631	1398	3015	1479			2934	1526		3175	
Flt Permitted		0.99	1.00	0.95	1.00			0.69	1.00		0.77	
Satd. Flow (perm)		1631	1398	3015	1479			2045	1526		2476	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	13	61	194	694	88	49	156	484	940	61	351	27
RTOR Reduction (vph)	0	0	175	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	74	19	694	137	0	0	640	940	0	436	0
Confl. Peds. (#/hr)									20			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.5	11.5	32.9	32.9			59.6	120.0		53.6	
Effective Green, g (s)		11.5	11.5	32.9	32.9			59.6	120.0		53.6	
Actuated g/C Ratio		0.10	0.10	0.27	0.27			0.50	1.00		0.45	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		156	133	826	405			1060	1526		1105	
v/s Ratio Prot		0.05		c0.23	0.09			0.03				
v/s Ratio Perm			0.01					0.27	c0.62		0.18	
v/c Ratio		0.47	0.14	0.84	0.34			0.60	0.62		0.39	
Uniform Delay, d1		51.4	49.7	41.1	34.8			21.7	0.0		22.3	
Progression Factor		1.00	1.00	1.00	1.00			0.51	1.00		1.00	
Incremental Delay, d2		0.8	0.2	7.4	0.2			2.3	1.7		1.1	
Delay (s)		52.2	49.9	48.5	35.0			13.3	1.7		23.4	
Level of Service		D	D	D	D			B	A		C	
Approach Delay (s)		50.5			46.3			6.4			23.4	
Approach LOS		D			D			A			C	
Intersection Summary												
HCM 2000 Control Delay			23.2			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			67.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
4023: Tremont Street & Prentiss St











			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	87	1248	1086
v/c Ratio	0.54	0.58	0.81
Control Delay	56.8	14.9	17.4
Queue Delay	0.0	0.0	0.0
Total Delay	56.8	14.9	17.4
Queue Length 50th (ft)	57	327	67
Queue Length 95th (ft)	104	m390	m#530
Internal Link Dist (ft)	258	709	222
Turn Bay Length (ft)			
Base Capacity (vph)	215	2141	1346
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.40	0.58	0.81

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St














Timing Plan: 2016 Baseline SA
2/4/2016

							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	57	18	73	1088	13	874	48
Future Volume (vph)	57	18	73	1088	13	874	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.97			1.00		0.99	
Flt Protected	0.96			1.00		1.00	
Satd. Flow (prot)	1543			4132		2602	
Flt Permitted	0.96			0.75		0.93	
Satd. Flow (perm)	1543			3103		2413	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.92	0.86	0.86
Adj. Flow (vph)	66	21	78	1170	14	1016	56
RTOR Reduction (vph)	10	0	0	0	0	3	0
Lane Group Flow (vph)	77	0	0	1248	0	1083	0
Heavy Vehicles (%)	6%	9%	7%	9%	2%	11%	8%
Parking (#/hr)						10	
Turn Type	Prot		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	10.8			75.2		64.2	
Effective Green, g (s)	11.8			77.2		65.2	
Actuated g/C Ratio	0.10			0.64		0.54	
Clearance Time (s)	5.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	151			2099		1311	
v/s Ratio Prot	c0.05			c0.06			
v/s Ratio Perm				0.32		c0.45	
v/c Ratio	0.51			0.59		0.83	
Uniform Delay, d1	51.4			12.4		22.7	
Progression Factor	1.00			1.09		0.42	
Incremental Delay, d2	1.2			0.9		4.6	
Delay (s)	52.6			14.3		14.1	
Level of Service	D			B		B	
Approach Delay (s)	52.6			14.3		14.1	
Approach LOS	D			B		B	
Intersection Summary							
HCM 2000 Control Delay			15.6		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.64				
Actuated Cycle Length (s)			120.0		Sum of lost time (s)		16.0
Intersection Capacity Utilization			70.6%		ICU Level of Service		C
Analysis Period (min)			15				
c Critical Lane Group							

2017 No Build Conditions








HCM Unsignalized Intersection Capacity Analysis
 9: Tremont Street & Site Driveway

Timing Plan: 2021 No Build AM
 2/4/2016

							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	26	1560	278	0	998	
Future Volume (Veh/h)	0	26	1560	278	0	998	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	28	1696	302	0	1085	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			271			676	
pX, platoon unblocked	0.75						
vC, conflicting volume	2238	565			1998		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1985	565			1998		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	94			100		
cM capacity (veh/h)	40	468			283		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	28	565	565	565	302	542	542
Volume Left	0	0	0	0	0	0	0
Volume Right	28	0	0	0	302	0	0
cSH	468	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.33	0.33	0.33	0.18	0.32	0.32
Queue Length 95th (ft)	5	0	0	0	0	0	0
Control Delay (s)	13.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	13.2	0.0				0.0	
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			40.1%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	719	491	351	177	1542	134	798
v/c Ratio	1.41	1.56	0.28	1.05	1.11	1.07	0.65
Control Delay	227.1	306.2	0.6	142.7	104.9	92.3	52.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	227.1	306.2	0.6	142.7	104.9	92.3	52.2
Queue Length 50th (ft)	~458	~332	0	~175	~670	~133	277
Queue Length 95th (ft)	#551	#448	0	#330	#768	m114	m232
Internal Link Dist (ft)	381	1183			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	509	314	1232	168	1387	125	1220
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.41	1.56	0.28	1.05	1.11	1.07	0.65

Intersection Summary




















- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 No Build AM

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	
Lane Configurations													
Traffic Volume (vph)	179	312	127	61	410	337	166	1381	69	4	122	595	
Future Volume (vph)	179	312	127	61	410	337	166	1381	69	4	122	595	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91	
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97	
Flt Protected		0.99			0.99	1.00	0.95	1.00			0.95	1.00	
Satd. Flow (prot)		2926			2954	1232	1577	4455			1170	3917	
Flt Permitted		0.55			0.62	1.00	0.95	1.00			0.95	1.00	
Satd. Flow (perm)		1632			1831	1232	1577	4455			1170	3917	
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	208	363	148	64	427	351	177	1469	73	4	130	633	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	719	0	0	491	351	177	1542	0	0	134	798	
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%	
Parking (#/hr)												20	
Turn Type	pm+pt	NA		Perm	NA	Free	Prot	NA		Prot	Prot	NA	
Protected Phases	3	3 4			4		5	1		5	5	1	
Permitted Phases	3 4			4		Free							
Actuated Green, G (s)		30.0			21.0	140.0	13.0	40.8			13.0	40.8	
Effective Green, g (s)		34.0			24.0	140.0	15.0	42.8			15.0	42.8	
Actuated g/C Ratio		0.24			0.17	1.00	0.11	0.31			0.11	0.31	
Clearance Time (s)					7.0		6.0	6.0			6.0	6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	2.0	
Lane Grp Cap (vph)		498			313	1232	168	1361			125	1197	
v/s Ratio Prot		c0.11					0.11	c0.35			c0.11	0.20	
v/s Ratio Perm		0.24			c0.27	c0.28							
v/c Ratio		1.44			1.57	0.28	1.05	1.13			1.07	0.67	
Uniform Delay, d1		53.0			58.0	0.0	62.5	48.6			62.5	42.4	
Progression Factor		0.92			1.00	1.00	1.00	1.00			0.76	1.16	
Incremental Delay, d2		206.3			270.9	0.6	84.3	69.5			46.0	0.3	
Delay (s)		255.0			328.9	0.6	146.8	118.1			93.6	49.5	
Level of Service		F			F	A	F	F			F	D	
Approach Delay (s)		255.0			192.0			121.1				55.9	
Approach LOS		F			F			F				E	
Intersection Summary													
HCM 2000 Control Delay			143.7									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.07										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			86.9%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													










Movement	SBR
Line Configurations	
Traffic Volume (vph)	155
Future Volume (vph)	155
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	165
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

Timing Plan: 2021 No Build AM

611: Tremont Street & Ruggles St/Whittier St

2/4/2016

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	622	150	166	227	1516	828	548
v/c Ratio	0.91	0.49	0.67	0.97	0.67	0.88	0.77
Control Delay	64.6	36.5	64.8	68.9	12.2	35.9	32.8
Queue Delay	2.9	0.0	0.0	42.4	0.1	13.7	0.0
Total Delay	67.6	36.5	64.8	111.3	12.3	49.6	32.8
Queue Length 50th (ft)	267	42	134	205	295	421	476
Queue Length 95th (ft)	#382	121	145	m194	m259	#586	#685
Internal Link Dist (ft)			271		596	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	695	305	353	235	2273	938	714
Starvation Cap Reductn	29	0	0	0	0	112	0
Spillback Cap Reductn	0	0	0	56	143	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.49	0.47	1.27	0.71	1.00	0.77

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 No Build AM

2/4/2016




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	547	0	132	42	40	34	209	1395	0	0	795	526
Future Volume (vph)	547	0	132	42	40	34	209	1395	0	0	795	526
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91			0.95	1.00
Frbp, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	0.95
Flpb, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	1.00
Frt	1.00		0.85		0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	2865		989		1654		1266	4257			2935	1270
Flt Permitted	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (perm)	2865		989		1654		1266	4257			2935	1270
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	622	0	150	60	57	49	227	1516	0	0	828	548
RTOR Reduction (vph)	0	0	122	0	12	0	0	0	0	0	0	0
Lane Group Flow (vph)	622	0	28	0	154	0	227	1516	0	0	828	548
Confl. Peds. (#/hr)	8		9	9		8	20					20
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	24%	6%	67%	0%	7%	5%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		Prot	NA			NA	pm+ov
Protected Phases	3		1		4		1	6			2	3
Permitted Phases				4								2
Actuated Green, G (s)	31.4		24.0		17.9		24.0	72.7			42.7	74.1
Effective Green, g (s)	33.4		26.0		19.9		26.0	74.7			44.7	78.1
Actuated g/C Ratio	0.24		0.19		0.14		0.19	0.53			0.32	0.56
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0		2.0		2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	683		183		235		235	2271			937	744
v/s Ratio Prot	c0.22		0.03				c0.18	0.36			c0.28	0.18
v/s Ratio Perm					0.09							0.26
v/c Ratio	0.91		0.15		0.66		0.97	0.67			0.88	0.74
Uniform Delay, d1	51.8		47.8		56.8		56.6	23.7			45.2	23.2
Progression Factor	0.89		4.10		1.00		1.03	0.48			0.49	1.02
Incremental Delay, d2	15.6		0.1		4.9		10.7	0.1			11.2	3.1
Delay (s)	62.0		195.8		61.7		68.9	11.6			33.4	26.8
Level of Service	E		F		E		E	B			C	C
Approach Delay (s)		88.0			61.7			19.0			30.8	
Approach LOS		F			E			B			C	
Intersection Summary												
HCM 2000 Control Delay			37.9									D
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			140.0							16.0		
Intersection Capacity Utilization			72.0%									C
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 No Build AM

3082: Tremont Street & Renaissance Park/Ruggles St

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	61	2056	1306
v/c Ratio	0.20	0.66	0.41
Control Delay	2.7	4.2	3.2
Queue Delay	0.0	0.5	1.9
Total Delay	2.8	4.7	5.1
Queue Length 50th (ft)	0	342	51
Queue Length 95th (ft)	0	15	m83
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	325	3123	3223
Starvation Cap Reductn	0	526	1694
Spillback Cap Reductn	8	160	358
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.19	0.79	0.85




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 No Build AM

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	44	0	0	0	0	1855	140	0	1267	0
Future Volume (vph)	0	0	44	0	0	0	0	1855	140	0	1267	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4120			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4120			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	61	0	0	0	0	1912	144	0	1306	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	11	0	0	0	0	2050	0	0	1306	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			218					3119			3223	
v/s Ratio Prot			c0.01					c0.50			0.31	
v/s Ratio Perm												
v/c Ratio			0.05					0.66			0.41	
Uniform Delay, d1			46.9					8.2			6.0	
Progression Factor			1.00					0.42			0.53	
Incremental Delay, d2			0.0					0.7			0.0	
Delay (s)			46.9					4.2			3.2	
Level of Service			D					A			A	
Approach Delay (s)		46.9			0.0			4.2			3.2	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			4.6								A	
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			46.7%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 No Build AM

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	55	133	982	313	1111	1128	443
v/c Ratio	0.43	0.57	1.14	0.72	0.95	0.74	1.50dl
Control Delay	57.8	21.5	121.9	55.7	32.7	8.6	63.7
Queue Delay	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Total Delay	57.8	22.2	121.9	55.7	32.7	8.6	63.7
Queue Length 50th (ft)	41	22	~537	257	363	281	194
Queue Length 95th (ft)	m49	m36	#670	349	#509	356	#352
Internal Link Dist (ft)	197			732	380		216
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	322	861	435	1174	1532	513
Starvation Cap Reductn	0	47	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.48	1.14	0.72	0.95	0.74	0.86

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 No Build AM

2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	42	110	943	218	49	375	543	993	37	325	14
Future Volume (vph)	2	42	110	943	218	49	375	543	993	37	325	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1524			2915	1532		3172	
Flt Permitted		1.00	1.00	0.95	1.00			0.60	1.00		0.53	
Satd. Flow (perm)		1626	1398	3015	1524			1771	1532		1709	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	5	50	133	982	253	60	457	654	1128	69	349	25
RTOR Reduction (vph)	0	0	122	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	55	11	982	313	0	0	1111	1128	0	440	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.2	11.2	40.0	40.0			72.8	140.0		41.8	
Effective Green, g (s)		11.2	11.2	40.0	40.0			72.8	140.0		41.8	
Actuated g/C Ratio		0.08	0.08	0.29	0.29			0.52	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		130	111	861	435			1174	1532		510	
v/s Ratio Prot		0.03		c0.33	0.21			c0.21				
v/s Ratio Perm			0.01					c0.28	c0.74		0.26	
v/c Ratio		0.42	0.10	1.14	0.72			0.95	0.74		1.50dl	
Uniform Delay, d1		61.3	59.7	50.0	45.0			31.8	0.0		46.4	
Progression Factor		0.84	1.57	1.00	1.00			0.67	1.00		1.00	
Incremental Delay, d2		0.6	0.1	77.1	4.7			14.2	2.7		17.4	
Delay (s)		52.0	93.6	127.1	49.7			35.4	2.7		63.8	
Level of Service		D	F	F	D			D	A		E	
Approach Delay (s)		81.4			108.4			18.9			63.8	
Approach LOS		F			F			B			E	

Intersection Summary

HCM 2000 Control Delay	54.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		




dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build AM

2/4/2016

			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	198	2155	1031
v/c Ratio	0.89	1.04	1.39dl
Control Delay	94.3	48.3	154.9
Queue Delay	0.0	0.0	0.0
Total Delay	94.3	48.3	154.9
Queue Length 50th (ft)	172	631	~403
Queue Length 95th (ft)	#235	m#761	m#860
Internal Link Dist (ft)	258	709	191
Turn Bay Length (ft)			
Base Capacity (vph)	231	2069	835
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.86	1.04	1.23












Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build AM

2/4/2016

								
Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	125	28	1	257	1660	56	800	141
Future Volume (vph)	125	28	1	257	1660	56	800	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	11	12	11	12
Total Lost time (s)	4.0				4.0			
Lane Util. Factor	1.00				0.91		0.95	
Frt	0.98				1.00		0.98	
Flt Protected	0.96				0.99		1.00	
Satd. Flow (prot)	1502				4210		2465	
Flt Permitted	0.96				0.65		0.59	
Satd. Flow (perm)	1502				2772		1447	
Peak-hour factor, PHF	0.77	0.77	0.92	0.89	0.89	0.92	0.97	0.97
Adj. Flow (vph)	162	36	1	289	1865	61	825	145
RTOR Reduction (vph)	6	0	0	0	0	0	8	0
Lane Group Flow (vph)	192	0	0	0	2155	0	1023	0
Heavy Vehicles (%)	11%	7%	2%	3%	7%	2%	13%	10%
Parking (#/hr)	20							
Turn Type	Prot		custom	pm+pt	NA	Perm	NA	
Protected Phases	5			6	1 6		1	
Permitted Phases			6	1 6		1		
Actuated Green, G (s)	19.1				91.9		76.9	
Effective Green, g (s)	20.1				93.9		77.9	
Actuated g/C Ratio	0.14				0.67		0.56	
Clearance Time (s)	5.0						5.0	
Vehicle Extension (s)	2.0						2.0	
Lane Grp Cap (vph)	215				2023		805	
v/s Ratio Prot	c0.13				c0.12			
v/s Ratio Perm					0.59		c0.71	
v/c Ratio	0.89				1.07		1.39dl	
Uniform Delay, d1	58.9				23.0		31.0	
Progression Factor	1.00				1.37		1.90	
Incremental Delay, d2	33.2				33.7		128.3	
Delay (s)	92.1				65.3		187.2	
Level of Service	F				E		F	
Approach Delay (s)	92.1				65.3		187.2	
Approach LOS	F				E		F	

Intersection Summary














HCM 2000 Control Delay	104.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: Tremont Street & Site Driveway

Timing Plan: 2021 No Build PM
2/4/2016








							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	177	1347	51	0	1265	
Future Volume (Veh/h)	0	177	1347	51	0	1265	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	192	1464	55	0	1375	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			243			704	
pX, platoon unblocked	0.83	0.78			0.78		
vC, conflicting volume	2152	488			1519		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	377	0			680		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	77			100		
cM capacity (veh/h)	493	846			709		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	192	488	488	488	55	688	688
Volume Left	0	0	0	0	0	0	0
Volume Right	192	0	0	0	55	0	0
cSH	846	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.23	0.29	0.29	0.29	0.03	0.40	0.40
Queue Length 95th (ft)	22	0	0	0	0	0	0
Control Delay (s)	10.5	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	10.5	0.0				0.0	
Approach LOS	B						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			43.7%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

Timing Plan: 2021 No Build PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	792	539	327	198	1097	193	1120
v/c Ratio	1.40	1.48	0.63	0.98	0.99	1.12	1.05
Control Delay	222.8	269.3	10.9	118.5	76.0	132.3	75.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	222.8	269.3	10.9	118.5	76.0	132.3	75.5
Queue Length 50th (ft)	~503	~355	0	182	-457	~206	~472
Queue Length 95th (ft)	#637	#475	94	#321	#515	m#170	m#398
Internal Link Dist (ft)	381	1186			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	566	364	516	202	1110	172	1069
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.40	1.48	0.63	0.98	0.99	1.12	1.05

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 No Build PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	190	374	204	79	417	301	1	169	853	90	2	185	
Future Volume (vph)	190	374	204	79	417	301	1	169	853	90	2	185	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.96			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2935			3065	1275		1577	4366			1345	
Flt Permitted		0.53			0.59	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1577			1819	1275		1577	4366			1345	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97	
Adj. Flow (vph)	196	386	210	86	453	327	1	197	992	105	2	191	
RTOR Reduction (vph)	0	0	0	0	0	262	0	0	0	0	0	0	
Lane Group Flow (vph)	0	792	0	0	539	65	0	198	1097	0	0	193	
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%	
Parking (#/hr)													
Turn Type	D.P+P	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	4			4		4							
Actuated Green, G (s)		35.0			25.0	25.0		16.0	32.8			16.0	
Effective Green, g (s)		39.0			28.0	28.0		18.0	34.8			18.0	
Actuated g/C Ratio		0.28			0.20	0.20		0.13	0.25			0.13	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		555			363	255		202	1085			172	
v/s Ratio Prot		c0.12						0.13	0.25			c0.14	
v/s Ratio Perm		0.27			c0.30	0.05							
v/c Ratio		1.43			1.48	0.26		0.98	1.01			1.12	
Uniform Delay, d1		50.5			56.0	47.2		60.8	52.6			61.0	
Progression Factor		1.07			1.00	1.00		1.00	1.00			1.37	
Incremental Delay, d2		198.1			232.4	0.5		57.3	30.1			62.5	
Delay (s)		252.3			288.4	47.8		118.1	82.7			146.3	
Level of Service		F			F	D		F	F			F	
Approach Delay (s)		252.3			197.6				88.1				
Approach LOS		F			F				F				
Intersection Summary													
HCM 2000 Control Delay			143.7									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			0.97										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			91.0%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													








Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	979	108
Future Volume (vph)	979	108
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.99	
Flt Protected	1.00	
Satd. Flow (prot)	4209	
Flt Permitted	1.00	
Satd. Flow (perm)	4209	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1009	111
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1120	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	32.8	
Effective Green, g (s)	34.8	
Actuated g/C Ratio	0.25	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1046	
v/s Ratio Prot	c0.27	
v/s Ratio Perm		
v/c Ratio	1.07	
Uniform Delay, d1	52.6	
Progression Factor	1.05	
Incremental Delay, d2	34.0	
Delay (s)	89.2	
Level of Service	F	
Approach Delay (s)	97.5	
Approach LOS	F	
Intersection Summary		

Queues

Timing Plan: 2021 No Build PM

611: Tremont Street & Ruggles St/Whittier St

2/4/2016

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	600	209	182	181	1343	940	577
v/c Ratio	0.83	0.59	0.60	0.94	0.62	0.93	0.80
Control Delay	51.2	39.2	56.3	104.1	30.2	58.5	30.9
Queue Delay	1.6	1.2	0.0	23.3	0.0	18.0	0.0
Total Delay	52.8	40.4	56.3	127.4	30.2	76.5	30.9
Queue Length 50th (ft)	245	74	134	170	268	~521	408
Queue Length 95th (ft)	325	136	193	m#216	m292	#661	#610
Internal Link Dist (ft)			271		624	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	750	353	374	193	2175	1008	736
Starvation Cap Reductn	52	41	0	0	0	94	0
Spillback Cap Reductn	0	0	0	18	0	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.67	0.49	1.03	0.62	1.03	0.79




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St




Timing Plan: 2021 No Build PM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	528	0	184	73	27	51	161	1195	0	0	902	554
Future Volume (vph)	528	0	184	73	27	51	161	1195	0	0	902	554
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91			0.95	1.00
Frbp, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	0.94
Flpb, ped/bikes	1.00		1.00		0.99		1.00	1.00			1.00	1.00
Frt	1.00		0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3001		1171		1749		1287	4298			3079	1274
Flt Permitted	0.95		1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3001		1171		1749		1287	4298			3079	1274
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.96	0.96	0.96
Adj. Flow (vph)	600	0	209	88	33	61	181	1343	0	0	940	577
RTOR Reduction (vph)	0	0	178	0	13	0	0	0	0	0	0	0
Lane Group Flow (vph)	600	0	31	0	169	0	181	1343	0	0	940	577
Confl. Peds. (#/hr)	13		16	16		13	23					23
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	22%	5%	0%	0%	2%	4%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		Prot	NA			NA	pm+ov
Protected Phases	3		1		4		1	6			2	3
Permitted Phases				4								2
Actuated Green, G (s)	31.8		19.0		21.3		19.0	68.9			43.9	75.7
Effective Green, g (s)	33.8		21.0		23.3		21.0	70.9			45.9	79.7
Actuated g/C Ratio	0.24		0.15		0.17		0.15	0.51			0.33	0.57
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)	3.0		2.0		2.0		2.0	2.0			2.0	3.0
Lane Grp Cap (vph)	724		175		291		193	2176			1009	761
v/s Ratio Prot	c0.20		0.03				c0.14	0.31			c0.31	0.18
v/s Ratio Perm					0.10							0.27
v/c Ratio	0.83		0.18		0.58		0.94	0.62			0.93	0.76
Uniform Delay, d1	50.4		52.0		53.8		58.9	24.8			45.5	22.8
Progression Factor	0.82		4.67		1.00		1.18	1.11			0.93	0.90
Incremental Delay, d2	7.4		0.2		1.7		33.1	0.8			15.0	4.0
Delay (s)	48.5		242.9		55.6		102.7	28.4			57.4	24.5
Level of Service	D		F		E		F	C			E	C
Approach Delay (s)		98.7			55.6			37.2			44.9	
Approach LOS		F			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			53.3									D
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			140.0							16.0		
Intersection Capacity Utilization			74.6%									D
Analysis Period (min)			15									
c Critical Lane Group												

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 No Build PM
 2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	130	1908	1437
v/c Ratio	0.42	0.62	0.43
Control Delay	22.7	3.7	3.3
Queue Delay	0.2	0.2	2.1
Total Delay	22.9	3.9	5.4
Queue Length 50th (ft)	33	9	77
Queue Length 95th (ft)	98	29	m99
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	310	3085	3317
Starvation Cap Reductn	0	414	1675
Spillback Cap Reductn	13	91	718
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.44	0.71	0.88




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 No Build PM

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	122	0	0	0	0	1584	267	0	1279	0
Future Volume (vph)	0	0	122	0	0	0	0	1584	267	0	1279	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.98			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4055			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4055			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	130	0	0	0	0	1633	275	0	1437	0
RTOR Reduction (vph)	0	0	72	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	0	58	0	0	0	0	1891	0	0	1437	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			238					3070			3317	
v/s Ratio Prot			c0.05					c0.47			0.33	
v/s Ratio Perm												
v/c Ratio			0.25					0.62			0.43	
Uniform Delay, d1			48.6					7.7			6.1	
Progression Factor			1.00					0.40			0.52	
Incremental Delay, d2			0.2					0.7			0.1	
Delay (s)			48.8					3.8			3.3	
Level of Service			D					A			A	
Approach Delay (s)		48.8			0.0			3.8			3.3	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.3								A	
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			44.3%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 No Build PM

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	251	280	797	200	947	1083	659
v/c Ratio	1.03	0.68	0.95	0.49	1.06	0.70	1.57dl
Control Delay	117.5	19.4	70.4	46.5	74.0	6.0	118.6
Queue Delay	23.4	2.2	0.0	0.0	0.0	0.0	0.0
Total Delay	140.9	21.6	70.4	46.5	74.0	6.0	118.6
Queue Length 50th (ft)	~204	53	364	151	~386	98	~370
Queue Length 95th (ft)	#359	100	#485	219	#462	279	#498
Internal Link Dist (ft)	203			68	380		136
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	412	861	423	892	1554	585
Starvation Cap Reductn	20	51	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.13	0.78	0.93	0.47	1.06	0.70	1.13

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 No Build PM




2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	193	232	765	113	56	227	556	953	67	481	10
Future Volume (vph)	8	193	232	765	113	56	227	556	953	67	481	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1482			2928	1554		3193	
Flt Permitted		1.00	1.00	0.95	1.00			0.56	1.00		0.52	
Satd. Flow (perm)		1626	1398	3015	1482			1651	1554		1670	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	230	280	797	131	69	277	670	1083	124	517	18
RTOR Reduction (vph)	0	0	202	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	251	78	797	200	0	0	947	1083	0	658	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		21.0	21.0	39.0	39.0			64.0	140.0		49.0	
Effective Green, g (s)		21.0	21.0	39.0	39.0			64.0	140.0		49.0	
Actuated g/C Ratio		0.15	0.15	0.28	0.28			0.46	1.00		0.35	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		243	209	839	412			891	1554		584	
v/s Ratio Prot		c0.15		c0.26	0.13			c0.11				
v/s Ratio Perm			0.06					0.37	0.70		c0.39	
v/c Ratio		1.03	0.37	0.95	0.49			1.06	0.70		1.57dl	
Uniform Delay, d1		59.5	53.6	49.5	42.1			38.0	0.0		45.5	
Progression Factor		0.91	0.99	1.00	1.00			0.83	1.00		1.00	
Incremental Delay, d2		64.8	0.4	19.5	0.3			46.6	2.3		77.1	
Delay (s)		119.2	53.4	69.0	42.5			78.0	2.3		122.6	
Level of Service		F	D	E	D			E	A		F	
Approach Delay (s)		84.5			63.7			37.6			122.6	
Approach LOS		F			E			D			F	
Intersection Summary												
HCM 2000 Control Delay			63.0			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			91.1%			ICU Level of Service			F			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build PM

2/4/2016











			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	354	1421	1316
v/c Ratio	0.94	0.90	1.15
Control Delay	80.3	36.0	97.4
Queue Delay	0.0	0.0	0.0
Total Delay	80.3	36.0	97.4
Queue Length 50th (ft)	289	~362	~823
Queue Length 95th (ft)	#425	m#358	m#931
Internal Link Dist (ft)	258	709	163
Turn Bay Length (ft)			
Base Capacity (vph)	393	1583	1148
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.90	0.90	1.15

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.














HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build PM
2/4/2016

							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	153	148	107	1229	17	1162	84
Future Volume (vph)	153	148	107	1229	17	1162	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.93			1.00		0.99	
Flt Protected	0.98			1.00		1.00	
Satd. Flow (prot)	1475			4174		2668	
Flt Permitted	0.98			0.63		0.91	
Satd. Flow (perm)	1475			2656		2425	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.92	0.96	0.96
Adj. Flow (vph)	180	174	114	1307	18	1210	88
RTOR Reduction (vph)	25	0	0	0	0	3	0
Lane Group Flow (vph)	329	0	0	1421	0	1313	0
Heavy Vehicles (%)	13%	5%	4%	8%	2%	6%	11%
Parking (#/hr)						15	
Turn Type	Prot		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	32.4			73.6		63.6	
Effective Green, g (s)	33.4			75.6		64.6	
Actuated g/C Ratio	0.24			0.54		0.46	
Clearance Time (s)	5.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	351			1553		1118	
v/s Ratio Prot	c0.22			c0.07			
v/s Ratio Perm				0.42		c0.54	
v/c Ratio	0.94			0.92		1.17	
Uniform Delay, d1	52.3			29.3		37.7	
Progression Factor	1.00			1.23		0.57	
Incremental Delay, d2	31.5			3.4		84.7	
Delay (s)	83.8			39.5		106.2	
Level of Service	F			D		F	
Approach Delay (s)	83.8			39.5		106.2	
Approach LOS	F			D		F	
Intersection Summary							
HCM 2000 Control Delay			73.0		HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio			0.94				
Actuated Cycle Length (s)			140.0		Sum of lost time (s)		16.0
Intersection Capacity Utilization			97.5%		ICU Level of Service		F
Analysis Period (min)			15				
c Critical Lane Group							








HCM Unsignalized Intersection Capacity Analysis
6: Tremont Street & Site Driveway

Timing Plan: 2021 No Build SA
2/2/2016

							
Movement	NWL	NWR	NET	NER	SWL	SWT	
Lane Configurations			  			 	
Traffic Volume (veh/h)	0	111	1111	61	1	947	
Future Volume (Veh/h)	0	111	1111	61	1	947	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	121	1208	66	1	1029	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			273			675	
pX, platoon unblocked	0.86	0.87			0.87		
vC, conflicting volume	1724	403			1274		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	574	0			778		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	87			100		
cM capacity (veh/h)	383	940			723		
Direction, Lane #	NW 1	NE 1	NE 2	NE 3	NE 4	SW 1	SW 2
Volume Total	121	403	403	403	66	344	686
Volume Left	0	0	0	0	0	1	0
Volume Right	121	0	0	0	66	0	0
cSH	940	1700	1700	1700	1700	723	1700
Volume to Capacity	0.13	0.24	0.24	0.24	0.04	0.00	0.40
Queue Length 95th (ft)	11	0	0	0	0	0	0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					A	
Approach Delay (s)	9.4	0.0				0.0	
Approach LOS	A						
Intersection Summary							
Average Delay			0.5				
Intersection Capacity Utilization			36.7%		ICU Level of Service		A
Analysis Period (min)			15				

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	510	405	291	112	869	169	773
v/c Ratio	0.86	0.99	0.62	0.63	0.71	1.18	0.69
Control Delay	55.6	91.4	11.1	67.4	45.6	148.5	49.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	91.4	11.1	67.4	45.6	148.5	49.9
Queue Length 50th (ft)	171	166	0	84	-311	-161	-279
Queue Length 95th (ft)	#262	#248	62	#157	#401	m#225	#371
Internal Link Dist (ft)	381	1188			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	591	409	471	177	1230	143	1127
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.99	0.62	0.63	0.71	1.18	0.69

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 No Build SA

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd








2/2/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	148	239	93	65	280	247	1	103	741	67	13	147	
Future Volume (vph)	148	239	93	65	280	247	1	103	741	67	13	147	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.97			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2938			2945	1275		1519	4315			1230	
Flt Permitted		0.59			0.75	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1757			2235	1275		1519	4315			1230	
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95	
Adj. Flow (vph)	157	254	99	76	329	291	1	111	797	72	14	155	
RTOR Reduction (vph)	0	0	0	0	0	238	0	0	0	0	0	0	
Lane Group Flow (vph)	0	510	0	0	405	53	0	112	869	0	0	169	
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%	
Parking (#/hr)													
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	3 4			4		4							
Actuated Green, G (s)		28.0			19.0	19.0		12.0	30.6			12.0	
Effective Green, g (s)		32.0			22.0	22.0		14.0	32.6			14.0	
Actuated g/C Ratio		0.27			0.18	0.18		0.12	0.27			0.12	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		576			409	233		177	1172			143	
v/s Ratio Prot		c0.08						0.07	c0.20			c0.14	
v/s Ratio Perm		0.15			c0.18	0.04							
v/c Ratio		0.89			0.99	0.23		0.63	0.74			1.18	
Uniform Delay, d1		42.2			48.9	41.8		50.5	39.9			53.0	
Progression Factor		1.13			1.00	1.00		1.00	1.00			0.65	
Incremental Delay, d2		12.6			41.8	0.5		5.3	4.2			114.4	
Delay (s)		60.2			90.7	42.3		55.9	44.1			148.7	
Level of Service		E			F	D		E	D			F	
Approach Delay (s)		60.2			70.4				45.5				
Approach LOS		E			E				D				
Intersection Summary													
HCM 2000 Control Delay			60.0									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			73.2%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	557	178
Future Volume (vph)	557	178
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3956	
Flt Permitted	1.00	
Satd. Flow (perm)	3956	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	586	187
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	773	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.6	
Effective Green, g (s)	32.6	
Actuated g/C Ratio	0.27	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1074	
v/s Ratio Prot	0.20	
v/s Ratio Perm		
v/c Ratio	0.72	
Uniform Delay, d1	39.6	
Progression Factor	1.19	
Incremental Delay, d2	2.4	
Delay (s)	49.5	
Level of Service	D	
Approach Delay (s)	67.3	
Approach LOS	E	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 No Build SA
2/2/2016


















							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	394	135	33	165	1120	880	419
v/c Ratio	0.73	0.50	0.16	3.84	0.41	0.69	0.53
Control Delay	41.4	22.1	27.3	1339.4	13.1	22.1	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Total Delay	41.4	22.1	27.3	1339.4	13.1	22.3	9.8
Queue Length 50th (ft)	91	29	11	~239	98	117	21
Queue Length 95th (ft)	143	67	33	#382	197	#529	408
Internal Link Dist (ft)			271		595	238	
Turn Bay Length (ft)				200			
Base Capacity (vph)	583	272	423	43	2755	1278	802
Starvation Cap Reductn	0	0	0	0	0	68	4
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.50	0.08	3.84	0.41	0.73	0.53

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

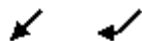
HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 No Build SA
2/2/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL	
Lane Configurations													
Traffic Volume (vph)	370	0	127	12	1	15	21	136	1064	0	14	0	
Future Volume (vph)	370	0	127	12	1	15	21	136	1064	0	14	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12	
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0				
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91				
Frbp, ped/bikes	1.00		1.00		0.99			1.00	1.00				
Flpb, ped/bikes	1.00		1.00		1.00			0.98	1.00				
Frt	1.00		0.85		0.93			1.00	1.00				
Flt Protected	0.95		1.00		0.98			0.95	1.00				
Satd. Flow (prot)	2918		1098		1697			1249	4257				
Flt Permitted	0.95		1.00		0.98			0.24	1.00				
Satd. Flow (perm)	2918		1098		1697			309	4257				
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.95	0.93	0.93	
Adj. Flow (vph)	394	0	135	14	1	18	22	143	1120	0	15	0	
RTOR Reduction (vph)	0	0	116	0	16	0	0	0	0	0	0	0	
Lane Group Flow (vph)	394	0	19	0	17	0	0	165	1120	0	0	0	
Confl. Peds. (#/hr)	7		6	6		7		37					
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	0%	27%	6%	0%	0%	0%	
Parking (#/hr)				5									
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm		
Protected Phases	3		1!		4			1	6				
Permitted Phases				4			1!				2		
Actuated Green, G (s)	20.3		15.0		8.4			15.0	73.3				
Effective Green, g (s)	22.3		17.0		10.4			17.0	75.3				
Actuated g/C Ratio	0.19		0.14		0.09			0.14	0.63				
Clearance Time (s)	6.0		6.0		6.0			6.0	6.0				
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0				
Lane Grp Cap (vph)	542		155		147			43	2671				
v/s Ratio Prot	c0.14		0.02						0.26				
v/s Ratio Perm					0.01			c0.53					
v/c Ratio	0.73		0.12		0.11			3.84	0.42				
Uniform Delay, d1	46.0		45.0		50.5			51.5	11.3				
Progression Factor	0.73		2.04		1.00			1.15	1.01				
Incremental Delay, d2	4.5		0.1		0.1			1323.9	0.4				
Delay (s)	38.2		91.9		50.7			1382.9	11.8				
Level of Service	D		F		D			F	B				
Approach Delay (s)		51.9			50.7				187.9				
Approach LOS		D			D				F				
Intersection Summary													
HCM 2000 Control Delay			92.6									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.16										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			80.5%									ICU Level of Service	D
Analysis Period (min)			15										
! Phase conflict between lane groups.													
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
 611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 No Build SA
 2/2/2016






Movement	SWT	SWR
Lane Configurations	↑↑	↑
Traffic Volume (vph)	804	390
Future Volume (vph)	804	390
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frbp, ped/bikes	1.00	0.91
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2936	1193
Flt Permitted	0.92	1.00
Satd. Flow (perm)	2706	1193
Peak-hour factor, PHF	0.93	0.93
Adj. Flow (vph)	865	419
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	880	419
Confl. Peds. (#/hr)		37
Heavy Vehicles (%)	7%	7%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	52.3	72.6
Effective Green, g (s)	54.3	76.6
Actuated g/C Ratio	0.45	0.64
Clearance Time (s)	6.0	6.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	1224	801
v/s Ratio Prot		0.10
v/s Ratio Perm	c0.33	0.25
v/c Ratio	0.72	0.52
Uniform Delay, d1	26.7	11.8
Progression Factor	0.63	0.56
Incremental Delay, d2	3.4	0.6
Delay (s)	20.1	7.2
Level of Service	C	A
Approach Delay (s)	16.0	
Approach LOS	B	

Intersection Summary

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 No Build SA




















2/2/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	66	1594	1220
v/c Ratio	0.18	0.54	0.41
Control Delay	2.0	5.1	3.1
Queue Delay	0.0	0.2	0.4
Total Delay	2.0	5.3	3.5
Queue Length 50th (ft)	0	110	33
Queue Length 95th (ft)	0	8	83
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	366	2958	2994
Starvation Cap Reductn	0	449	1078
Spillback Cap Reductn	4	0	185
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.18	0.64	0.64
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 No Build SA

2/2/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	43	0	0	0	0	1373	94	0	1159	0
Future Volume (vph)	0	0	43	0	0	0	0	1373	94	0	1159	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4120			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4120			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	0	0	0	0	1492	102	0	1220	0
RTOR Reduction (vph)	0	0	52	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	14	0	0	0	0	1588	0	0	1220	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					85.0			85.0	
Effective Green, g (s)			26.0					86.0			86.0	
Actuated g/C Ratio			0.22					0.72			0.72	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			276					2952			2994	
v/s Ratio Prot			c0.01					c0.39			0.29	
v/s Ratio Perm												
v/c Ratio			0.05					0.54			0.41	
Uniform Delay, d1			37.2					7.8			6.8	
Progression Factor			1.00					0.57			0.40	
Incremental Delay, d2			0.0					0.6			0.3	
Delay (s)			37.3					5.1			3.1	
Level of Service			D					A			A	
Approach Delay (s)		37.3			0.0			5.1			3.1	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.0								A	
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			120.0						8.0			
Intersection Capacity Utilization			38.2%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 No Build SA

3098: Tremont Street/Tremont St & Melnea Cass Boulevard




















2/2/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	75	196	702	141	649	951	443
v/c Ratio	0.48	0.63	0.84	0.34	0.62	0.62	0.41
Control Delay	60.3	15.9	50.0	35.7	14.8	4.6	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	15.9	50.0	35.7	14.8	4.6	26.1
Queue Length 50th (ft)	57	0	263	87	83	66	115
Queue Length 95th (ft)	91	49	308	126	213	273	205
Internal Link Dist (ft)	215			623	380		183
Turn Bay Length (ft)			350				
Base Capacity (vph)	285	406	1055	517	1047	1526	1092
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.48	0.67	0.27	0.62	0.62	0.41
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 No Build SA




2/2/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	5	52	163	674	77	41	130	407	837	33	330	15	
Future Volume (vph)	5	52	163	674	77	41	130	407	837	33	330	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12	
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0		
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95		
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00		
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99		
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99		
Satd. Flow (prot)		1631	1398	3015	1478			2934	1526		3177		
Flt Permitted		0.99	1.00	0.95	1.00			0.69	1.00		0.77		
Satd. Flow (perm)		1631	1398	3015	1478			2036	1526		2464		
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55	
Adj. Flow (vph)	13	62	196	702	90	51	159	490	951	61	355	27	
RTOR Reduction (vph)	0	0	177	0	0	0	0	0	0	0	3	0	
Lane Group Flow (vph)	0	75	19	702	141	0	0	649	951	0	440	0	
Confl. Peds. (#/hr)									20				
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%	
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA		
Protected Phases	5	5		6	6		7	17			1		
Permitted Phases			5				17		Free	1			
Actuated Green, G (s)		11.5	11.5	33.4	33.4			59.1	120.0		53.1		
Effective Green, g (s)		11.5	11.5	33.4	33.4			59.1	120.0		53.1		
Actuated g/C Ratio		0.10	0.10	0.28	0.28			0.49	1.00		0.44		
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0		
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0		
Lane Grp Cap (vph)		156	133	839	411			1047	1526		1090		
v/s Ratio Prot		0.05		c0.23	0.10			0.03					
v/s Ratio Perm			0.01					0.27	c0.62		0.18		
v/c Ratio		0.48	0.14	0.84	0.34			0.62	0.62		0.40		
Uniform Delay, d1		51.4	49.7	40.7	34.5			22.2	0.0		22.7		
Progression Factor		1.00	1.00	1.00	1.00			0.52	1.00		1.00		
Incremental Delay, d2		0.9	0.2	7.0	0.2			2.4	1.7		1.1		
Delay (s)		52.3	49.9	47.7	34.7			13.9	1.7		23.8		
Level of Service		D	D	D	C			B	A		C		
Approach Delay (s)		50.6			45.5			6.7			23.8		
Approach LOS		D			D			A			C		
Intersection Summary													
HCM 2000 Control Delay			23.2									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			68.1%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build SA

2/2/2016











			
Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	88	1265	1100
v/c Ratio	0.54	0.60	0.82
Control Delay	57.0	15.2	18.0
Queue Delay	0.0	0.0	0.0
Total Delay	57.0	15.2	18.0
Queue Length 50th (ft)	58	332	68
Queue Length 95th (ft)	105	m395	m#542
Internal Link Dist (ft)	258	709	193
Turn Bay Length (ft)			
Base Capacity (vph)	215	2124	1343
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.60	0.82

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2021 No Build SA
2/2/2016







							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	58	18	74	1102	13	885	49
Future Volume (vph)	58	18	74	1102	13	885	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.97			1.00		0.99	
Flt Protected	0.96			1.00		1.00	
Satd. Flow (prot)	1544			4132		2602	
Flt Permitted	0.96			0.74		0.93	
Satd. Flow (perm)	1544			3077		2412	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.92	0.86	0.86
Adj. Flow (vph)	67	21	80	1185	14	1029	57
RTOR Reduction (vph)	10	0	0	0	0	3	0
Lane Group Flow (vph)	78	0	0	1265	0	1097	0
Heavy Vehicles (%)	6%	9%	7%	9%	2%	11%	8%
Parking (#/hr)						10	
Turn Type	Prot		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	10.8			75.2		64.2	
Effective Green, g (s)	11.8			77.2		65.2	
Actuated g/C Ratio	0.10			0.64		0.54	
Clearance Time (s)	5.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	151			2085		1310	
v/s Ratio Prot	c0.05			c0.06			
v/s Ratio Perm				0.33		c0.45	
v/c Ratio	0.52			0.61		0.84	
Uniform Delay, d1	51.4			12.5		23.0	
Progression Factor	1.00			1.09		0.42	
Incremental Delay, d2	1.2			0.9		4.9	
Delay (s)	52.6			14.6		14.5	
Level of Service	D			B		B	
Approach Delay (s)	52.6			14.6		14.5	
Approach LOS	D			B		B	
Intersection Summary							
HCM 2000 Control Delay			15.9		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.65				
Actuated Cycle Length (s)			120.0		Sum of lost time (s)		16.0
Intersection Capacity Utilization			71.3%		ICU Level of Service		C
Analysis Period (min)			15				
c Critical Lane Group							

2017 Build Conditions

Queues
9: Tremont Street & Site Dr

Timing Plan: 2021 Build AM

2/4/2016













						
Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Group Flow (vph)	42	61	1863	207	141	1020
v/c Ratio	0.09	0.09	0.85	0.23	0.80	0.86
Control Delay	36.8	5.2	9.7	0.6	49.6	65.5
Queue Delay	0.0	0.0	10.1	2.1	0.0	0.0
Total Delay	36.8	5.2	19.8	2.7	49.6	65.5
Queue Length 50th (ft)	28	1	87	3	117	511
Queue Length 95th (ft)	59	26	m110	m2	m137	m550
Internal Link Dist (ft)	481		136			652
Turn Bay Length (ft)				100	250	
Base Capacity (vph)	466	703	2202	890	212	1183
Starvation Cap Reductn	0	0	339	542	0	0
Spillback Cap Reductn	33	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.09	1.00	0.59	0.67	0.86

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.








HCM Signalized Intersection Capacity Analysis
 9: Tremont Street & Site Dr

Timing Plan: 2021 Build AM
 2/4/2016

						
Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	39	56	1714	190	130	938
Future Volume (vph)	39	56	1714	190	130	938
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1593	1425	4577	1425	1486	3185
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1593	1425	4577	1425	1486	3185
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	61	1863	207	141	1020
RTOR Reduction (vph)	0	35	0	34	0	0
Lane Group Flow (vph)	42	26	1863	173	141	1020
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	41.0	57.6	67.4	79.4	16.6	52.0
Effective Green, g (s)	41.0	57.6	67.4	79.4	16.6	52.0
Actuated g/C Ratio	0.29	0.41	0.48	0.57	0.12	0.37
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	2.0
Lane Grp Cap (vph)	466	637	2203	859	176	1183
v/s Ratio Prot	c0.03	0.00	c0.41	c0.02	c0.09	0.32
v/s Ratio Perm		0.01		0.10		
v/c Ratio	0.09	0.04	0.85	0.20	0.80	0.86
Uniform Delay, d1	36.0	24.7	31.8	14.8	60.1	40.7
Progression Factor	1.00	1.00	0.24	0.05	0.51	1.48
Incremental Delay, d2	0.4	0.0	1.5	0.2	12.9	4.9
Delay (s)	36.3	24.7	9.2	0.9	43.5	65.1
Level of Service	D	C	A	A	D	E
Approach Delay (s)	29.4		8.4			62.5
Approach LOS	C		A			E
Intersection Summary						
HCM 2000 Control Delay			27.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			60.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	764	491	364	177	1588	139	830
v/c Ratio	1.53dl	1.66	0.30	1.05	1.14	1.11	0.68
Control Delay	261.9	346.5	0.6	142.7	117.1	137.4	58.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	261.9	346.5	0.6	142.7	117.1	137.4	58.2
Queue Length 50th (ft)	~503	~341	0	~175	~702	~147	293
Queue Length 95th (ft)	m#577	#457	0	#330	#799	m#217	342
Internal Link Dist (ft)	381	1183			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	513	296	1232	168	1387	125	1217
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.49	1.66	0.30	1.05	1.14	1.11	0.68

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build AM

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	218	312	127	61	410	349	166	1424	69	4	127	611
Future Volume (vph)	218	312	127	61	410	349	166	1424	69	4	127	611
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.98			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2922			2954	1232	1577	4456			1170	3911
Flt Permitted		0.56			0.58	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1655			1729	1232	1577	4456			1170	3911
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	253	363	148	64	427	364	177	1515	73	4	135	650
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	764	0	0	491	364	177	1588	0	0	139	830
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Free	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4		5	1		5	5	1
Permitted Phases	3 4			4		Free						
Actuated Green, G (s)		30.0			21.0	140.0	13.0	40.8			13.0	40.8
Effective Green, g (s)		34.0			24.0	140.0	15.0	42.8			15.0	42.8
Actuated g/C Ratio		0.24			0.17	1.00	0.11	0.31			0.11	0.31
Clearance Time (s)					7.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)					2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		501			296	1232	168	1362			125	1195
v/s Ratio Prot		c0.12					0.11	c0.36			c0.12	0.21
v/s Ratio Perm		0.25			c0.28	c0.30						
v/c Ratio		1.53dl			1.66	0.30	1.05	1.17			1.11	0.69
Uniform Delay, d1		53.0			58.0	0.0	62.5	48.6			62.5	42.8
Progression Factor		1.06			1.00	1.00	1.00	1.00			0.64	1.25
Incremental Delay, d2		241.6			311.0	0.6	84.3	83.0			97.7	2.2
Delay (s)		297.6			369.0	0.6	146.8	131.6			138.0	55.6
Level of Service		F			F	A	F	F			F	E
Approach Delay (s)		297.6			212.2			133.1				67.4
Approach LOS		F			F			F				E

Intersection Summary

HCM 2000 Control Delay	162.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.









c Critical Lane Group



Movement	SBR
Line Configurations	
Traffic Volume (vph)	169
Future Volume (vph)	169
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build AM
2/4/2016

								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	626	185	203	241	1706	55	855	548
v/c Ratio	0.92	0.52	0.74	1.03	0.93	0.52	0.96	0.79
Control Delay	71.5	26.1	66.3	86.1	41.6	102.8	56.1	35.8
Queue Delay	16.9	0.0	2.8	27.4	0.0	0.0	29.1	0.0
Total Delay	88.4	26.1	69.1	113.5	41.6	102.8	85.2	35.8
Queue Length 50th (ft)	310	36	161	~219	606	49	434	439
Queue Length 95th (ft)	#389	156	172	m#312	#776	88	#635	#629
Internal Link Dist (ft)		324	271		652		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	695	360	355	235	1828	117	894	696
Starvation Cap Reductn	77	0	0	0	0	0	92	0
Spillback Cap Reductn	17	0	74	45	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.51	0.72	1.27	0.93	0.47	1.07	0.79




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	551	15	148	42	45	55	222	1554	16	1	52	821
Future Volume (vph)	551	15	148	42	45	55	222	1554	16	1	52	821
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0			5.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91			1.00	0.95
Frbp, ped/bikes	1.00	0.98			0.99		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.86			0.95		1.00	1.00			1.00	1.00
Flt Protected	0.95	1.00			0.99		0.95	1.00			0.95	1.00
Satd. Flow (prot)	2865	1011			1636		1266	4227			1570	2935
Flt Permitted	0.95	1.00			0.99		0.95	1.00			0.95	1.00
Satd. Flow (perm)	2865	1011			1636		1266	4227			1570	2935
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	626	17	168	60	64	79	241	1689	17	1	54	855
RTOR Reduction (vph)	0	130	0	0	18	0	0	1	0	0	0	0
Lane Group Flow (vph)	626	55	0	0	185	0	241	1705	0	0	55	855
Confl. Peds. (#/hr)	8		9	9		8	20					
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	24%	6%	67%	0%	0%	7%
Parking (#/hr)				15		0						
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	Prot	NA
Protected Phases	3	3		4	4		1	6		5	5	2
Permitted Phases												
Actuated Green, G (s)	31.4	31.4			19.9		24.0	57.6			8.1	40.7
Effective Green, g (s)	33.4	31.4			21.9		26.0	59.6			8.1	42.7
Actuated g/C Ratio	0.24	0.22			0.16		0.19	0.43			0.06	0.31
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0			5.0	6.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			3.0	2.0
Lane Grp Cap (vph)	683	226			255		235	1799			90	895
v/s Ratio Prot	c0.22	0.05			c0.11		c0.19	c0.40			0.04	0.29
v/s Ratio Perm												
v/c Ratio	0.92	0.24			0.73		1.03	0.95			0.61	0.96
Uniform Delay, d1	51.9	44.5			56.2		57.0	38.7			64.4	47.7
Progression Factor	1.02	2.41			1.00		0.59	0.89			1.37	0.71
Incremental Delay, d2	16.3	0.2			8.4		50.4	7.6			10.8	20.0
Delay (s)	69.4	107.4			64.6		84.0	42.1			99.1	54.1
Level of Service	E	F			E		F	D			F	D
Approach Delay (s)		78.1			64.6			47.3				46.5
Approach LOS		E			E			D				D
Intersection Summary												
HCM 2000 Control Delay			53.5				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			83.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												






Movement	SWR
Lane Configurations	
Traffic Volume (vph)	526
Future Volume (vph)	526
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.95
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1272
Flt Permitted	1.00
Satd. Flow (perm)	1272
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	548
RTOR Reduction (vph)	0
Lane Group Flow (vph)	548
Confl. Peds. (#/hr)	20
Heavy Vehicles (%)	5%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	72.1
Effective Green, g (s)	76.1
Actuated g/C Ratio	0.54
Clearance Time (s)	6.0
Vehicle Extension (s)	2.0
Lane Grp Cap (vph)	727
v/s Ratio Prot	0.18
v/s Ratio Perm	0.25
v/c Ratio	0.75
Uniform Delay, d1	24.7
Progression Factor	1.04
Incremental Delay, d2	3.7
Delay (s)	29.4
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build AM

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	61	2237	1388
v/c Ratio	0.21	0.73	0.43
Control Delay	5.2	5.3	3.9
Queue Delay	0.0	0.7	2.9
Total Delay	5.3	6.0	6.8
Queue Length 50th (ft)	0	72	64
Queue Length 95th (ft)	2	92	m89
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	313	3075	3223
Starvation Cap Reductn	0	458	1684
Spillback Cap Reductn	12	98	621
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.85	0.90




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








Timing Plan: 2021 Build AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Future Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4048			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4048			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	61	0	0	0	0	1961	276	0	1388	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	0	11	0	0	0	0	2225	0	0	1388	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			218					3064			3223	
v/s Ratio Prot			c0.01					c0.55			0.33	
v/s Ratio Perm												
v/c Ratio			0.05					0.73			0.43	
Uniform Delay, d1			46.9					9.2			6.1	
Progression Factor			1.00					0.51			0.62	
Incremental Delay, d2			0.0					0.6			0.0	
Delay (s)			46.9					5.3			3.8	
Level of Service			D					A			A	
Approach Delay (s)		46.9			0.0			5.3			3.8	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.4								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			50.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	53	135	1015	313	1151	1147	495
v/c Ratio	0.41	0.57	1.18	0.72	0.99	0.75	1.33dl
Control Delay	57.6	21.6	136.1	55.7	37.3	9.7	73.8
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	22.3	136.1	55.7	37.3	9.7	73.8
Queue Length 50th (ft)	39	23	~569	257	196	590	224
Queue Length 95th (ft)	m48	m38	#703	349	#448	733	#403
Internal Link Dist (ft)	197			732	380		216
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	324	861	435	1158	1532	528
Starvation Cap Reductn	0	48	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.49	1.18	0.72	0.99	0.75	0.94




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 Build AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Future Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1524			2916	1532		3169	
Flt Permitted		1.00	1.00	0.95	1.00			0.58	1.00		0.55	
Satd. Flow (perm)		1626	1398	3015	1524			1714	1532		1753	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	5	48	135	1015	253	60	459	692	1147	61	398	36
RTOR Reduction (vph)	0	0	124	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	53	11	1015	313	0	0	1151	1147	0	491	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Effective Green, g (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Actuated g/C Ratio		0.08	0.08	0.29	0.29			0.52	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		128	110	861	435			1158	1532		524	
v/s Ratio Prot		0.03		c0.34	0.21			c0.22				
v/s Ratio Perm			0.01					c0.30	c0.75		0.28	
v/c Ratio		0.41	0.10	1.18	0.72			0.99	0.75		1.33dl	
Uniform Delay, d1		61.4	59.8	50.0	45.0			33.3	0.0		47.8	
Progression Factor		0.84	1.57	1.00	1.00			0.49	1.00		1.00	
Incremental Delay, d2		0.6	0.1	92.5	4.7			22.0	2.7		26.6	
Delay (s)		52.2	94.2	142.5	49.7			38.2	2.7		74.4	
Level of Service		D	F	F	D			D	A		E	
Approach Delay (s)		82.4			120.6			20.5			74.4	
Approach LOS		F			F			C			E	





Intersection Summary

HCM 2000 Control Delay	60.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Queues
4023: Tremont Street & Prentiss St














				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	198	290	1972	1006
v/c Ratio	0.73	0.84	0.96	0.81
Control Delay	68.5	54.4	36.5	9.6
Queue Delay	0.0	0.0	6.2	11.5
Total Delay	68.5	54.4	42.7	21.1
Queue Length 50th (ft)	166	167	692	95
Queue Length 95th (ft)	213	m158	m612	96
Internal Link Dist (ft)	258		709	136
Turn Bay Length (ft)		150		
Base Capacity (vph)	273	346	2059	1236
Starvation Cap Reductn	0	0	0	220
Spillback Cap Reductn	0	0	86	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.73	0.84	1.00	0.99

Intersection Summary







m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build AM
2/4/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	125	28	258	1755	835	141
Future Volume (vph)	125	28	258	1755	835	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1502		1472	4217	2457	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1502		1472	4217	2457	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.97	0.97
Adj. Flow (vph)	162	36	290	1972	861	145
RTOR Reduction (vph)	6	0	0	0	9	0
Lane Group Flow (vph)	192	0	290	1972	998	0
Heavy Vehicles (%)	11%	7%	3%	7%	13%	10%
Parking (#/hr)					20	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	24.0		32.0	67.4	69.0	
Effective Green, g (s)	25.0		33.0	68.4	70.0	
Actuated g/C Ratio	0.18		0.24	0.49	0.50	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	268		346	2060	1228	
v/s Ratio Prot	c0.13		c0.20	c0.47	c0.41	
v/s Ratio Perm						
v/c Ratio	0.72		0.84	0.96	0.81	
Uniform Delay, d1	54.2		51.0	34.4	29.5	
Progression Factor	1.00		0.93	0.92	0.22	
Incremental Delay, d2	7.4		6.5	4.2	3.2	
Delay (s)	61.6		53.8	35.8	9.6	
Level of Service	E		D	D	A	
Approach Delay (s)	61.6			38.1	9.6	
Approach LOS	E			D	A	
Intersection Summary						
HCM 2000 Control Delay			31.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			66.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues
7: Tremont Street & Site Dr

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Group Flow (vph)	197	235	1472	137	163	1332
v/c Ratio	0.30	0.29	0.92	0.18	0.86	1.06
Control Delay	28.5	12.3	22.3	3.2	50.0	77.5
Queue Delay	0.9	0.0	22.5	0.6	0.0	14.6
Total Delay	29.4	12.3	44.8	3.8	50.0	92.2
Queue Length 50th (ft)	118	78	111	10	117	~712
Queue Length 95th (ft)	181	128	m#126	m13	m129	m#644
Internal Link Dist (ft)	432		138			650
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	649	836	1592	775	209	1251
Starvation Cap Reductn	0	0	181	390	0	0
Spillback Cap Reductn	242	0	0	0	0	103
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.28	1.04	0.36	0.78	1.16

Intersection Summary













- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Tremont Street & Site Dr

Timing Plan: 2021 Build PM

2/4/2016

						
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	181	216	1354	126	150	1225
Future Volume (vph)	181	216	1354	126	150	1225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	1378	4577	1425	1540	3185
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	1378	4577	1425	1540	3185
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	235	1472	137	163	1332
RTOR Reduction (vph)	0	21	0	25	0	0
Lane Group Flow (vph)	197	214	1472	112	163	1332
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	59.0	76.3	48.7	73.7	17.3	55.0
Effective Green, g (s)	59.0	76.3	48.7	73.7	17.3	55.0
Actuated g/C Ratio	0.42	0.54	0.35	0.53	0.12	0.39
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	3.0
Lane Grp Cap (vph)	649	800	1592	750	190	1251
v/s Ratio Prot	c0.13	0.03	0.32	0.03	c0.11	c0.42
v/s Ratio Perm		0.12		0.05		
v/c Ratio	0.30	0.27	0.92	0.15	0.86	1.06
Uniform Delay, d1	26.9	17.0	43.9	17.0	60.1	42.5
Progression Factor	1.00	1.00	0.38	0.53	0.53	1.01
Incremental Delay, d2	0.3	0.1	4.2	0.0	13.1	36.3
Delay (s)	27.1	17.0	21.1	9.1	44.9	79.3
Level of Service	C	B	C	A	D	E
Approach Delay (s)	21.6		20.0			75.6
Approach LOS	C		C			E
Intersection Summary						
HCM 2000 Control Delay			43.7		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

	→	←	↖	↗	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	840	539	342	198	1134	211	1266
v/c Ratio	1.47	1.56	0.65	0.98	1.02	1.23	1.19
Control Delay	252.4	301.7	11.0	118.5	83.3	166.4	136.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	252.4	301.7	11.0	118.5	83.3	166.4	136.4
Queue Length 50th (ft)	~552	~364	0	182	~482	~239	~583
Queue Length 95th (ft)	#686	#484	96	#321	#539	m#262	m#636
Internal Link Dist (ft)	381	1186			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	571	346	528	202	1110	172	1063
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.47	1.56	0.65	0.98	1.02	1.23	1.19

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016









Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203
Future Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.96			1.00	0.85		1.00	0.99			1.00
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95
Satd. Flow (prot)		2936			3065	1275		1577	4369			1345
Flt Permitted		0.54			0.56	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1601			1731	1275		1577	4369			1345
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97
Adj. Flow (vph)	244	386	210	86	453	342	1	197	1029	105	2	209
RTOR Reduction (vph)	0	0	0	0	0	274	0	0	0	0	0	0
Lane Group Flow (vph)	0	840	0	0	539	68	0	198	1134	0	0	211
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%
Parking (#/hr)												
Turn Type	D.P+P	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	4			4		4						
Actuated Green, G (s)		35.0			25.0	25.0		16.0	32.8			16.0
Effective Green, g (s)		39.0			28.0	28.0		18.0	34.8			18.0
Actuated g/C Ratio		0.28			0.20	0.20		0.13	0.25			0.13
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		560			346	255		202	1086			172
v/s Ratio Prot		c0.13						0.13	0.26			c0.16
v/s Ratio Perm		0.29			c0.31	0.05						
v/c Ratio		1.50			1.56	0.27		0.98	1.04			1.23
Uniform Delay, d1		50.5			56.0	47.3		60.8	52.6			61.0
Progression Factor		0.96			1.00	1.00		1.00	1.00			0.97
Incremental Delay, d2		232.0			264.8	0.6		57.3	39.6			118.3
Delay (s)		280.6			320.8	47.9		118.1	92.2			177.4
Level of Service		F			F	D		F	F			F
Approach Delay (s)		280.6			214.9				96.0			
Approach LOS		F			F				F			
Intersection Summary												
HCM 2000 Control Delay			174.9				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)				21.0	
Intersection Capacity Utilization			95.2%				ICU Level of Service				F	
Analysis Period (min)			15									
c Critical Lane Group												

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	1050	178
Future Volume (vph)	1050	178
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.98	
Flt Protected	1.00	
Satd. Flow (prot)	4181	
Flt Permitted	1.00	
Satd. Flow (perm)	4181	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1082	184
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1266	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	32.8	
Effective Green, g (s)	34.8	
Actuated g/C Ratio	0.25	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1039	
v/s Ratio Prot	c0.30	
v/s Ratio Perm		
v/c Ratio	1.22	
Uniform Delay, d1	52.6	
Progression Factor	1.11	
Incremental Delay, d2	101.4	
Delay (s)	159.7	
Level of Service	F	
Approach Delay (s)	162.2	
Approach LOS	F	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build PM

2/4/2016

								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	586	282	295	228	1477	110	1005	577
v/c Ratio	0.83	0.62	0.84	1.00	0.88	1.20	1.15	0.87
Control Delay	52.9	16.8	68.9	73.6	49.5	215.8	110.3	40.9
Queue Delay	1.5	1.3	0.1	0.0	0.0	0.0	0.4	10.6
Total Delay	54.4	18.0	68.9	73.6	49.5	215.8	110.7	51.5
Queue Length 50th (ft)	274	111	227	213	520	~124	~599	496
Queue Length 95th (ft)	332	192	302	m#270	m#579	#254	#736	#716
Internal Link Dist (ft)		324	271		650		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	728	463	387	229	1677	92	874	673
Starvation Cap Reductn	45	60	0	0	0	0	59	0
Spillback Cap Reductn	0	0	1	0	0	0	0	81
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.70	0.76	1.00	0.88	1.20	1.23	0.97





















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St




Timing Plan: 2021 Build PM

2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations													
Traffic Volume (vph)	516	26	222	73	45	127	203	1264	51	106	965	554	
Future Volume (vph)	516	26	222	73	45	127	203	1264	51	106	965	554	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11	
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0		6.0	4.0	4.0	
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91		1.00	0.95	1.00	
Frbp, ped/bikes	1.00	0.97			0.98		1.00	1.00		1.00	1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.87			0.93		1.00	0.99		1.00	1.00	0.85	
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3001	1178			1736		1287	4281		1624	3079	1278	
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3001	1178			1736		1287	4281		1624	3079	1278	
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.96	0.96	0.96	
Adj. Flow (vph)	586	30	252	88	54	153	228	1420	57	110	1005	577	
RTOR Reduction (vph)	0	196	0	0	28	0	0	3	0	0	0	0	
Lane Group Flow (vph)	586	86	0	0	267	0	228	1474	0	110	1005	577	
Confl. Peds. (#/hr)	13		16	16		13	23					23	
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	22%	5%	0%	0%	2%	4%	
Parking (#/hr)				15		0							
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pm+ov	
Protected Phases	3	3		4	4		1	6		5	2	3	
Permitted Phases												2	
Actuated Green, G (s)	31.2	31.2			24.1		23.0	52.7		8.0	37.7	68.9	
Effective Green, g (s)	33.2	31.2			26.1		25.0	54.7		8.0	39.7	72.9	
Actuated g/C Ratio	0.24	0.22			0.19		0.18	0.39		0.06	0.28	0.52	
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	3.0	
Lane Grp Cap (vph)	711	262			323		229	1672		92	873	701	
v/s Ratio Prot	0.20	0.07			c0.15		c0.18	0.34		0.07	c0.33	c0.19	
v/s Ratio Perm												0.26	
v/c Ratio	0.82	0.33			0.83		1.00	0.88		1.20	1.15	0.82	
Uniform Delay, d1	50.6	45.6			54.8		57.4	39.6		66.0	50.1	28.1	
Progression Factor	0.85	1.36			1.00		0.50	1.13		1.30	0.61	0.94	
Incremental Delay, d2	7.2	0.7			14.9		41.4	3.9		150.2	79.9	6.9	
Delay (s)	50.0	62.5			69.7		69.9	48.9		235.9	110.3	33.3	
Level of Service	D	E			E		E	D		F	F	C	
Approach Delay (s)		54.1			69.7			51.7			92.3		
Approach LOS		D			E			D			F		
Intersection Summary													
HCM 2000 Control Delay			68.4									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.01										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	20.0
Intersection Capacity Utilization			93.9%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build PM
 2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	130	2038	1627
v/c Ratio	0.45	0.66	0.49
Control Delay	32.0	2.0	5.5
Queue Delay	0.1	0.4	1.8
Total Delay	32.1	2.4	7.2
Queue Length 50th (ft)	54	42	131
Queue Length 95th (ft)	123	44	m124
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	289	3096	3317
Starvation Cap Reductn	0	496	1451
Spillback Cap Reductn	8	181	648
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.46	0.78	0.87




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build PM

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1448	0
Future Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1448	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.98			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4071			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4071			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	130	0	0	0	0	1769	269	0	1627	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	0	80	0	0	0	0	2023	0	0	1627	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			238					3082			3317	
v/s Ratio Prot			c0.06					c0.50			0.37	
v/s Ratio Perm												
v/c Ratio			0.33					0.66			0.49	
Uniform Delay, d1			49.5					8.2			6.6	
Progression Factor			1.00					0.17			0.82	
Incremental Delay, d2			0.3					0.6			0.0	
Delay (s)			49.8					2.0			5.4	
Level of Service			D					A			A	
Approach Delay (s)		49.8			0.0			2.0			5.4	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.1								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			47.0%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 Build PM

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	238	293	863	200	1049	1139	728
v/c Ratio	0.98	0.75	1.00	0.47	1.22	0.73	1.69dl
Control Delay	102.6	25.5	80.8	45.8	131.0	9.6	158.7
Queue Delay	27.1	3.4	0.0	0.0	0.0	0.0	0.0
Total Delay	129.7	28.9	80.8	45.8	131.0	9.6	158.7
Queue Length 50th (ft)	191	66	~408	151	-548	432	-432
Queue Length 95th (ft)	#332	107	#551	219	#608	502	#563
Internal Link Dist (ft)	203			68	380		136
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	389	861	423	862	1554	590
Starvation Cap Reductn	21	41	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.84	1.00	0.47	1.22	0.73	1.23





















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.





HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 Build PM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	182	243	828	113	56	228	640	1002	49	576	10
Future Volume (vph)	8	182	243	828	113	56	228	640	1002	49	576	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1482			2932	1554		3239	
Flt Permitted		1.00	1.00	0.95	1.00			0.54	1.00		0.53	
Satd. Flow (perm)		1626	1398	3015	1482			1597	1554		1717	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	217	293	862	131	69	278	771	1139	91	619	18
RTOR Reduction (vph)	0	0	180	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	238	113	863	200	0	0	1049	1139	0	727	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Effective Green, g (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Actuated g/C Ratio		0.15	0.15	0.29	0.29			0.45	1.00		0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		243	209	861	423			861	1554		588	
v/s Ratio Prot		c0.15		c0.29	0.13			c0.13				
v/s Ratio Perm			0.08					0.42	0.73		c0.42	
v/c Ratio		0.98	0.54	1.00	0.47			1.22	0.73		1.69dl	
Uniform Delay, d1		59.3	55.0	50.0	41.3			38.5	0.0		46.0	
Progression Factor		0.87	0.79	1.00	1.00			0.69	1.00		1.00	
Incremental Delay, d2		49.4	1.3	31.2	0.3			107.4	2.7		120.3	
Delay (s)		100.7	44.9	81.2	41.6			134.0	2.7		166.3	
Level of Service		F	D	F	D			F	A		F	
Approach Delay (s)		69.9			73.8			65.6			166.3	
Approach LOS		E			E			E			F	
Intersection Summary												
HCM 2000 Control Delay			84.3			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			97.4%			ICU Level of Service			F			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Queues
4023: Tremont Street & Prentiss St

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	354	114	1405	1463
v/c Ratio	1.04	0.92	0.95	0.93
Control Delay	106.9	84.0	20.9	22.5
Queue Delay	1.0	0.0	25.2	22.2
Total Delay	107.9	84.0	46.2	44.6
Queue Length 50th (ft)	~322	107	151	242
Queue Length 95th (ft)	#476	m113	m153	m210
Internal Link Dist (ft)	258		709	138
Turn Bay Length (ft)		150		
Base Capacity (vph)	341	124	1483	1567
Starvation Cap Reductn	0	0	0	165
Spillback Cap Reductn	1	0	150	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.04	0.92	1.05	1.04

Intersection Summary














- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4023: Tremont Street & Prentiss St







Timing Plan: 2021 Build PM

2/4/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	153	148	107	1321	1320	84
Future Volume (vph)	153	148	107	1321	1320	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.93		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1475		1458	4178	2672	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1475		1458	4178	2672	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	180	174	114	1405	1375	88
RTOR Reduction (vph)	25	0	0	0	3	0
Lane Group Flow (vph)	329	0	114	1405	1460	0
Heavy Vehicles (%)	13%	5%	4%	8%	6%	11%
Parking (#/hr)					15	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	29.0		11.0	48.7	80.0	
Effective Green, g (s)	30.0		12.0	49.7	82.0	
Actuated g/C Ratio	0.21		0.09	0.36	0.59	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	316		124	1483	1565	
v/s Ratio Prot	c0.22		c0.08	0.34	c0.55	
v/s Ratio Perm						
v/c Ratio	1.04		0.92	0.95	0.93	
Uniform Delay, d1	55.0		63.5	43.9	26.5	
Progression Factor	1.00		1.18	0.40	0.90	
Incremental Delay, d2	61.6		9.8	1.8	3.7	
Delay (s)	116.6		84.8	19.4	27.6	
Level of Service	F		F	B	C	
Approach Delay (s)	116.6			24.3	27.6	
Approach LOS	F			C	C	
Intersection Summary						
HCM 2000 Control Delay			35.5		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues
6: Tremont Street

Timing Plan: 2021 Build SAT
2/4/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	257	222	1230	212	240	959
v/c Ratio	0.42	0.25	0.69	0.21	0.83	0.65
Control Delay	31.7	9.5	10.5	0.3	45.1	29.1
Queue Delay	0.0	0.0	1.6	1.4	0.0	0.0
Total Delay	31.7	9.5	12.1	1.7	45.1	29.1
Queue Length 50th (ft)	149	57	54	0	129	406
Queue Length 95th (ft)	226	93	m84	m0	m142	480
Internal Link Dist (ft)	281		152			637
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	613	942	1771	1019	342	1474
Starvation Cap Reductn	0	0	345	624	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.24	0.86	0.54	0.70	0.65

Intersection Summary

















m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

6: Tremont Street

Timing Plan: 2021 Build SAT

2/4/2016








						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			  			  
Traffic Volume (vph)	236	204	1132	195	221	882
Future Volume (vph)	236	204	1132	195	221	882
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1711	1531	5085	1583	1711	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1711	1531	5085	1583	1711	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	257	222	1230	212	240	959
RTOR Reduction (vph)	0	28	0	51	0	0
Lane Group Flow (vph)	257	194	1230	161	240	959
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	43.0	63.2	41.8	68.8	20.2	50.0
Effective Green, g (s)	43.0	63.2	41.8	68.8	20.2	50.0
Actuated g/C Ratio	0.36	0.53	0.35	0.57	0.17	0.42
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	613	870	1771	973	288	1474
v/s Ratio Prot	c0.15	0.04	c0.24	0.04	c0.14	0.27
v/s Ratio Perm		0.09		0.06		
v/c Ratio	0.42	0.22	0.69	0.17	0.83	0.65
Uniform Delay, d1	29.1	15.2	33.6	12.1	48.3	28.0
Progression Factor	1.00	1.00	0.27	0.01	0.60	0.98
Incremental Delay, d2	2.1	0.0	1.0	0.2	11.6	1.4
Delay (s)	31.2	15.3	10.2	0.3	40.8	28.7
Level of Service	C	B	B	A	D	C
Approach Delay (s)	23.8		8.7			31.2
Approach LOS	C		A			C

Intersection Summary

HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	586	405	314	112	945	190	937
v/c Ratio	1.06dl	1.02	0.64	0.63	0.77	1.33	0.84
Control Delay	79.8	98.3	11.3	67.4	47.1	219.2	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	98.3	11.3	67.4	47.1	219.2	40.3
Queue Length 50th (ft)	~205	~170	0	84	~356	~186	~366
Queue Length 95th (ft)	#339	#253	64	#157	#447	m#311	#458
Internal Link Dist (ft)	381	1188			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	580	398	490	177	1231	143	1121
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	1.02	0.64	0.63	0.77	1.33	0.84

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build SAT

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd









2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Future Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.97			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2925			2945	1275		1519	4319			1227	
Flt Permitted		0.57			0.73	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1704			2175	1275		1519	4319			1227	
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95	
Adj. Flow (vph)	233	254	99	76	329	314	1	111	873	72	14	176	
RTOR Reduction (vph)	0	0	0	0	0	256	0	0	0	0	0	0	
Lane Group Flow (vph)	0	586	0	0	405	58	0	112	945	0	0	190	
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%	
Parking (#/hr)													
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	3 4			4		4							
Actuated Green, G (s)		28.0			19.0	19.0		12.0	30.6			12.0	
Effective Green, g (s)		32.0			22.0	22.0		14.0	32.6			14.0	
Actuated g/C Ratio		0.27			0.18	0.18		0.12	0.27			0.12	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		566			398	233		177	1173			143	
v/s Ratio Prot		c0.09						0.07	0.22			c0.15	
v/s Ratio Perm		0.18			c0.19	0.05							
v/c Ratio		1.06dl			1.02	0.25		0.63	0.81			1.33	
Uniform Delay, d1		44.0			49.0	41.9		50.5	40.7			53.0	
Progression Factor		1.12			1.00	1.00		1.00	1.00			1.03	
Incremental Delay, d2		43.0			49.6	0.6		5.3	6.0			177.1	
Delay (s)		92.5			98.6	42.5		55.9	46.7			231.8	
Level of Service		F			F	D		E	D			F	
Approach Delay (s)		92.5			74.1				47.7				
Approach LOS		F			E				D				
Intersection Summary													
HCM 2000 Control Delay			67.8									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			79.6%									ICU Level of Service	D
Analysis Period (min)			15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane.													
c Critical Lane Group													

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	635	256
Future Volume (vph)	635	256
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3935	
Flt Permitted	1.00	
Satd. Flow (perm)	3935	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	668	269
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	937	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.6	
Effective Green, g (s)	32.6	
Actuated g/C Ratio	0.27	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1069	
v/s Ratio Prot	c0.24	
v/s Ratio Perm		
v/c Ratio	0.88	
Uniform Delay, d1	41.8	
Progression Factor	0.71	
Incremental Delay, d2	7.3	
Delay (s)	36.8	
Level of Service	D	
Approach Delay (s)	69.7	
Approach LOS	E	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build SAT
2/4/2016




















								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	385	227	163	193	1265	92	970	419
v/c Ratio	0.71	0.72	0.80	1.10	0.52	0.70	0.83	0.60
Control Delay	40.1	33.3	61.7	119.8	25.2	53.6	31.5	13.4
Queue Delay	0.0	1.5	0.0	0.0	0.1	0.0	0.9	0.0
Total Delay	40.1	34.8	61.7	119.8	25.3	53.6	32.4	13.4
Queue Length 50th (ft)	88	76	92	~177	365	41	332	24
Queue Length 95th (ft)	132	156	136	m#315	421	#175	#583	417
Internal Link Dist (ft)		324	271		637		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	583	409	320	175	2441	131	1173	719
Starvation Cap Reductn	0	69	0	0	0	0	58	2
Spillback Cap Reductn	0	0	2	0	278	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.67	0.51	1.10	0.58	0.70	0.87	0.58

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build SAT
2/4/2016




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	362	25	188	12	21	103	183	1170	31	14	72	902
Future Volume (vph)	362	25	188	12	21	103	183	1170	31	14	72	902
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0			6.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91			1.00	0.95
Frbp, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.87			0.90		1.00	1.00			1.00	1.00
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	2918	1130			1671		1236	4247			1570	2935
Flt Permitted	0.95	1.00			0.71		0.95	1.00			0.21	1.00
Satd. Flow (perm)	2918	1130			1184		1236	4247			344	2935
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	385	27	200	14	25	124	193	1232	33	15	77	970
RTOR Reduction (vph)	0	175	0	0	39	0	0	2	0	0	0	0
Lane Group Flow (vph)	385	52	0	0	124	0	193	1263	0	0	92	970
Confl. Peds. (#/hr)	7		6	6		7	37					
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	27%	6%	0%	0%	0%	7%
Parking (#/hr)				5								
Turn Type	Prot	NA		Perm	NA		Prot	NA		Perm	Perm	NA
Protected Phases	3	4			4		1	6				2
Permitted Phases				4						2	2	
Actuated Green, G (s)	20.2	14.8			14.8		15.0	67.0			46.0	46.0
Effective Green, g (s)	22.2	14.8			16.8		17.0	69.0			46.0	48.0
Actuated g/C Ratio	0.18	0.12			0.14		0.14	0.58			0.38	0.40
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)	3.0	2.0			2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	539	139			165		175	2442			131	1174
v/s Ratio Prot	c0.13	0.05					c0.16	0.30				c0.33
v/s Ratio Perm					c0.11						0.27	
v/c Ratio	0.71	0.37			0.75		1.10	0.52			0.70	0.83
Uniform Delay, d1	45.9	48.3			49.6		51.5	15.4			31.2	32.3
Progression Factor	0.72	2.31			1.00		0.50	1.45			0.69	0.70
Incremental Delay, d2	4.0	0.5			15.8		90.5	0.6			24.8	6.1
Delay (s)	37.2	112.1			65.4		116.3	23.0			46.4	28.8
Level of Service	D	F			E		F	C			D	C
Approach Delay (s)		65.0			65.4			35.3				24.6
Approach LOS		E			E			D				C
Intersection Summary												
HCM 2000 Control Delay			37.3									D
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0						18.0			
Intersection Capacity Utilization			82.2%									E
Analysis Period (min)			15									
c Critical Lane Group												



Movement	SWR
Lane Configurations	7
Traffic Volume (vph)	390
Future Volume (vph)	390
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.91
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1198
Flt Permitted	1.00
Satd. Flow (perm)	1198
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	419
RTOR Reduction (vph)	0
Lane Group Flow (vph)	419
Confl. Peds. (#/hr)	37
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	66.2
Effective Green, g (s)	70.2
Actuated g/C Ratio	0.59
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	740
v/s Ratio Prot	0.10
v/s Ratio Perm	0.25
v/c Ratio	0.57
Uniform Delay, d1	15.5
Progression Factor	0.60
Incremental Delay, d2	0.9
Delay (s)	10.2
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	




















Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build SAT
 2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	66	1788	1400
v/c Ratio	0.19	0.61	0.47
Control Delay	7.0	9.6	3.8
Queue Delay	0.0	0.2	0.5
Total Delay	7.0	9.7	4.3
Queue Length 50th (ft)	0	401	47
Queue Length 95th (ft)	6	37	131
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	339	2954	2994
Starvation Cap Reductn	0	360	996
Spillback Cap Reductn	6	0	338
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.69	0.70
Intersection Summary			








HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build SAT
 2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Future Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4109			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4109			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	0	0	0	0	1652	136	0	1400	0
RTOR Reduction (vph)	0	0	52	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	14	0	0	0	0	1780	0	0	1400	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					85.0			85.0	
Effective Green, g (s)			26.0					86.0			86.0	
Actuated g/C Ratio			0.22					0.72			0.72	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			276					2944			2994	
v/s Ratio Prot			c0.01					c0.43			0.34	
v/s Ratio Perm												
v/c Ratio			0.05					0.60			0.47	
Uniform Delay, d1			37.2					8.5			7.2	
Progression Factor			1.00					1.03			0.46	
Incremental Delay, d2			0.0					0.8			0.4	
Delay (s)			37.3					9.6			3.8	
Level of Service			D					A			A	
Approach Delay (s)		37.3			0.0			9.6			3.8	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.6								A	
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			120.0						8.0			
Intersection Capacity Utilization			41.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	75	196	758	141	761	1013	568
v/c Ratio	0.48	0.70	0.86	0.32	0.79	0.66	0.55
Control Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Length 50th (ft)	57	25	284	85	246	221	165
Queue Length 95th (ft)	91	76	333	124	#342	678	282
Internal Link Dist (ft)	215			623	380		183
Turn Bay Length (ft)			350				
Base Capacity (vph)	285	378	1055	517	966	1526	1030
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.52	0.72	0.27	0.79	0.66	0.55





















Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard





Timing Plan: 2021 Build SAT

2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Future Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12	
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0		
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95		
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00		
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99		
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99		
Satd. Flow (prot)		1631	1398	3015	1478			2938	1526		3217		
Flt Permitted		0.99	1.00	0.95	1.00			0.65	1.00		0.75		
Satd. Flow (perm)		1631	1398	3015	1478			1920	1526		2410		
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55	
Adj. Flow (vph)	13	62	196	758	90	51	159	602	1012	61	480	27	
RTOR Reduction (vph)	0	0	146	0	0	0	0	0	0	0	2	0	
Lane Group Flow (vph)	0	75	50	758	141	0	0	761	1013	0	566	0	
Confl. Peds. (#/hr)									20				
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%	
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA		
Protected Phases	5	5		6	6		7	17			1		
Permitted Phases			5				17		Free	1			
Actuated Green, G (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Effective Green, g (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Actuated g/C Ratio		0.10	0.10	0.29	0.29			0.48	1.00		0.43		
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0		
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0		
Lane Grp Cap (vph)		156	133	886	434			966	1526		1028		
v/s Ratio Prot		0.05		c0.25	0.10			0.04					
v/s Ratio Perm			0.04					c0.34	c0.66		0.23		
v/c Ratio		0.48	0.37	0.86	0.32			0.79	0.66		0.55		
Uniform Delay, d1		51.4	50.9	39.9	33.1			26.3	0.0		25.8		
Progression Factor		1.00	1.00	1.00	1.00			0.74	1.00		1.00		
Incremental Delay, d2		0.9	0.6	7.8	0.2			5.4	1.9		2.1		
Delay (s)		52.3	51.5	47.8	33.2			24.8	1.9		27.9		
Level of Service		D	D	D	C			C	A		C		
Approach Delay (s)		51.7			45.5			11.7			27.9		
Approach LOS		D			D			B			C		
Intersection Summary													
HCM 2000 Control Delay			26.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			74.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build SAT
2/4/2016

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	88	80	1359	1288
v/c Ratio	0.54	0.49	0.92	0.72
Control Delay	58.5	50.7	56.7	8.1
Queue Delay	0.0	0.0	0.3	1.7
Total Delay	58.5	50.7	57.0	9.7
Queue Length 50th (ft)	58	65	399	123
Queue Length 95th (ft)	110	m86	m#498	85
Internal Link Dist (ft)	258		709	152
Turn Bay Length (ft)		150		
Base Capacity (vph)	163	164	1476	1801
Starvation Cap Reductn	0	0	0	326
Spillback Cap Reductn	0	0	9	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.54	0.49	0.93	0.87

Intersection Summary














- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build SAT

2/4/2016







						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	58	18	74	1264	1059	49
Future Volume (vph)	58	18	74	1264	1059	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1544		1518	4140	2603	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1544		1518	4140	2603	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.86	0.86
Adj. Flow (vph)	67	21	80	1359	1231	57
RTOR Reduction (vph)	9	0	0	0	2	0
Lane Group Flow (vph)	79	0	80	1359	1286	0
Heavy Vehicles (%)	6%	9%	7%	9%	11%	8%
Parking (#/hr)					10	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	11.0		12.0	41.8	82.0	
Effective Green, g (s)	12.0		13.0	42.8	83.0	
Actuated g/C Ratio	0.10		0.11	0.36	0.69	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	3.0		
Lane Grp Cap (vph)	154		164	1476	1800	
v/s Ratio Prot	c0.05		c0.05	c0.33	c0.49	
v/s Ratio Perm						
v/c Ratio	0.51		0.49	0.92	0.71	
Uniform Delay, d1	51.2		50.4	37.0	11.3	
Progression Factor	1.00		0.87	1.34	0.52	
Incremental Delay, d2	1.2		6.3	7.3	2.0	
Delay (s)	52.4		50.0	56.7	7.9	
Level of Service	D		D	E	A	
Approach Delay (s)	52.4			56.3	7.9	
Approach LOS	D			E	A	
Intersection Summary						
HCM 2000 Control Delay			34.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			57.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

2017 Build Conditions – Malcolm X Concurrent Pedestrian Phase

Queues
9: Tremont Street & Site Dr

Timing Plan: 2021 Build AM

2/4/2016

						
Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Group Flow (vph)	42	61	1879	207	141	1020
v/c Ratio	0.09	0.09	0.71	0.20	0.89	0.73
Control Delay	38.1	17.7	5.3	0.4	67.3	57.6
Queue Delay	0.0	0.0	2.3	1.8	0.0	3.7
Total Delay	38.1	17.7	7.6	2.3	67.3	61.2
Queue Length 50th (ft)	28	21	58	2	110	501
Queue Length 95th (ft)	60	52	105	m2	m#135	m535
Internal Link Dist (ft)	481		136			652
Turn Bay Length (ft)				100	220	
Base Capacity (vph)	493	657	2665	1054	164	1390
Starvation Cap Reductn	0	0	620	692	0	0
Spillback Cap Reductn	16	0	0	0	0	277
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.09	0.92	0.57	0.86	0.92

Intersection Summary

















- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Tremont Street & Site Dr








Timing Plan: 2021 Build AM

2/4/2016

						
Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations			  			  
Traffic Volume (vph)	39	56	1729	190	130	938
Future Volume (vph)	39	56	1729	190	130	938
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	5085	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	5085	1583	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	61	1879	207	141	1020
RTOR Reduction (vph)	0	14	0	36	0	0
Lane Group Flow (vph)	42	47	1879	171	141	1020
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	39.0	51.6	73.4	85.4	12.6	55.0
Effective Green, g (s)	39.0	51.6	73.4	85.4	12.6	55.0
Actuated g/C Ratio	0.28	0.37	0.52	0.61	0.09	0.39
Clearance Time (s)		5.0	5.0	5.0	5.0	4.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	2.0
Lane Grp Cap (vph)	493	639	2665	1022	159	1390
v/s Ratio Prot	c0.02	0.01	c0.37	c0.01	c0.08	c0.29
v/s Ratio Perm		0.02		0.09		
v/c Ratio	0.09	0.07	0.71	0.17	0.89	0.73
Uniform Delay, d1	37.3	28.7	25.1	11.9	63.0	36.3
Progression Factor	1.00	1.00	0.18	0.04	0.55	1.52
Incremental Delay, d2	0.3	0.0	0.7	0.2	25.9	2.0
Delay (s)	37.7	28.7	5.3	0.7	60.3	57.0
Level of Service	D	C	A	A	E	E
Approach Delay (s)	32.4		4.8			57.4
Approach LOS	C		A			E
Intersection Summary						
HCM 2000 Control Delay			23.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	23.0
Intersection Capacity Utilization			56.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	764	491	364	177	1604	139	830
v/c Ratio	1.07	1.00	0.30	0.98	0.84	1.05	0.50
Control Delay	92.1	94.6	0.6	123.9	40.7	114.5	52.8
Queue Delay	11.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	103.6	94.6	0.6	123.9	40.7	114.5	52.8
Queue Length 50th (ft)	~334	~237	0	163	472	~139	288
Queue Length 95th (ft)	m#419	#360	0	#319	539	m#211	336
Internal Link Dist (ft)	381	1183			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	713	490	1232	180	1909	133	1675
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	33	0	33	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.12	1.00	0.30	0.98	0.84	1.05	0.50

Intersection Summary




















- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build AM

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	218	312	127	61	410	349	166	1439	69	4	127	611
Future Volume (vph)	218	312	127	61	410	349	166	1439	69	4	127	611
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.98			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2922			2954	1232	1577	4456			1170	3911
Flt Permitted		0.56			0.72	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1658			2147	1232	1577	4456			1170	3911
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	253	363	148	64	427	364	177	1531	73	4	135	650
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	764	0	0	491	364	177	1604	0	0	139	830
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Free	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4		5	1		5	5	1
Permitted Phases	3 4			4		Free						
Actuated Green, G (s)		43.0			29.0	140.0	14.0	58.0			14.0	58.0
Effective Green, g (s)		47.0			32.0	140.0	16.0	60.0			16.0	60.0
Actuated g/C Ratio		0.34			0.23	1.00	0.11	0.43			0.11	0.43
Clearance Time (s)					7.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)					2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		701			490	1232	180	1909			133	1676
v/s Ratio Prot		c0.12					0.11	c0.36			c0.12	0.21
v/s Ratio Perm		c0.24			0.23	0.30						
v/c Ratio		1.09			1.00	0.30	0.98	0.84			1.05	0.50
Uniform Delay, d1		46.5			54.0	0.0	61.9	35.7			62.0	29.0
Progression Factor		1.21			1.00	1.00	1.00	1.00			0.58	1.78
Incremental Delay, d2		52.9			41.2	0.6	61.7	4.7			76.5	0.7
Delay (s)		109.0			95.2	0.6	123.5	40.4			112.3	52.4
Level of Service		F			F	A	F	D			F	D
Approach Delay (s)		109.0			54.9			48.6				61.0
Approach LOS		F			D			D				E
Intersection Summary												
HCM 2000 Control Delay			63.2				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			89.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												











Movement	SBR
Line Configurations	
Traffic Volume (vph)	169
Future Volume (vph)	169
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build AM

2/4/2016

								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	626	185	203	241	1706	55	855	548
v/c Ratio	0.92	0.52	0.74	1.03	0.93	0.52	0.96	0.79
Control Delay	71.5	26.1	66.3	91.8	47.2	102.8	56.1	35.8
Queue Delay	16.9	0.0	2.8	27.4	0.0	0.0	29.1	0.0
Total Delay	88.4	26.1	69.1	119.2	47.2	102.8	85.2	35.8
Queue Length 50th (ft)	310	36	161	~218	606	49	434	439
Queue Length 95th (ft)	#389	156	172	#401	#776	88	#635	#629
Internal Link Dist (ft)		324	271		652		238	
Turn Bay Length (ft)				280		100		
Base Capacity (vph)	695	360	355	235	1828	117	894	696
Starvation Cap Reductn	77	0	0	0	0	0	92	0
Spillback Cap Reductn	17	0	74	45	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.51	0.72	1.27	0.93	0.47	1.07	0.79




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	551	15	148	42	45	55	222	1554	16	1	52	821
Future Volume (vph)	551	15	148	42	45	55	222	1554	16	1	52	821
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0			5.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91			1.00	0.95
Frbp, ped/bikes	1.00	0.98			0.99		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.86			0.95		1.00	1.00			1.00	1.00
Flt Protected	0.95	1.00			0.99		0.95	1.00			0.95	1.00
Satd. Flow (prot)	2865	1011			1636		1266	4227			1570	2935
Flt Permitted	0.95	1.00			0.99		0.95	1.00			0.95	1.00
Satd. Flow (perm)	2865	1011			1636		1266	4227			1570	2935
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	626	17	168	60	64	79	241	1689	17	1	54	855
RTOR Reduction (vph)	0	130	0	0	18	0	0	1	0	0	0	0
Lane Group Flow (vph)	626	55	0	0	185	0	241	1705	0	0	55	855
Confl. Peds. (#/hr)	8		9	9		8	20					
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	24%	6%	67%	0%	0%	7%
Parking (#/hr)				15		0						
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	Prot	NA
Protected Phases	3	3		4	4		1	6		5	5	2
Permitted Phases												
Actuated Green, G (s)	31.4	31.4			19.9		24.0	57.6			8.1	40.7
Effective Green, g (s)	33.4	31.4			21.9		26.0	59.6			8.1	42.7
Actuated g/C Ratio	0.24	0.22			0.16		0.19	0.43			0.06	0.31
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0			5.0	6.0
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			3.0	2.0
Lane Grp Cap (vph)	683	226			255		235	1799			90	895
v/s Ratio Prot	c0.22	0.05			c0.11		c0.19	c0.40			0.04	0.29
v/s Ratio Perm												
v/c Ratio	0.92	0.24			0.73		1.03	0.95			0.61	0.96
Uniform Delay, d1	51.9	44.5			56.2		57.0	38.7			64.4	47.7
Progression Factor	1.02	2.41			1.00		0.58	1.01			1.37	0.71
Incremental Delay, d2	16.3	0.2			8.4		56.5	9.4			10.8	20.0
Delay (s)	69.4	107.4			64.6		89.7	48.5			99.1	54.1
Level of Service	E	F			E		F	D			F	D
Approach Delay (s)		78.1			64.6			53.6				46.5
Approach LOS		E			E			D				D
Intersection Summary												
HCM 2000 Control Delay			56.2				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			83.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												






Movement	SWR
Lane Configurations	7
Traffic Volume (vph)	526
Future Volume (vph)	526
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.95
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1272
Flt Permitted	1.00
Satd. Flow (perm)	1272
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	548
RTOR Reduction (vph)	0
Lane Group Flow (vph)	548
Confl. Peds. (#/hr)	20
Heavy Vehicles (%)	5%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	72.1
Effective Green, g (s)	76.1
Actuated g/C Ratio	0.54
Clearance Time (s)	6.0
Vehicle Extension (s)	2.0
Lane Grp Cap (vph)	727
v/s Ratio Prot	0.18
v/s Ratio Perm	0.25
v/c Ratio	0.75
Uniform Delay, d1	24.7
Progression Factor	1.04
Incremental Delay, d2	3.7
Delay (s)	29.4
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

Timing Plan: 2021 Build AM

3082: Tremont Street & Renaissance Park/Ruggles St

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	61	2237	1388
v/c Ratio	0.21	0.73	0.43
Control Delay	5.2	5.3	3.9
Queue Delay	0.0	0.7	2.9
Total Delay	5.3	6.0	6.8
Queue Length 50th (ft)	0	72	64
Queue Length 95th (ft)	2	92	m89
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	313	3075	3223
Starvation Cap Reductn	0	458	1684
Spillback Cap Reductn	12	98	621
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.85	0.90




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build AM

2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Future Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4048			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4048			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	61	0	0	0	0	1961	276	0	1388	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	0	11	0	0	0	0	2225	0	0	1388	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			218					3064			3223	
v/s Ratio Prot			c0.01					c0.55			0.33	
v/s Ratio Perm												
v/c Ratio			0.05					0.73			0.43	
Uniform Delay, d1			46.9					9.2			6.1	
Progression Factor			1.00					0.51			0.62	
Incremental Delay, d2			0.0					0.6			0.0	
Delay (s)			46.9					5.3			3.8	
Level of Service			D					A			A	
Approach Delay (s)		46.9			0.0			5.3			3.8	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.5								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			50.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 Build AM

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

2/4/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	53	135	1015	313	1151	1147	495
v/c Ratio	0.41	0.57	1.18	0.72	0.99	0.75	1.33dl
Control Delay	57.6	21.6	136.1	55.7	37.3	9.7	73.8
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	22.3	136.1	55.7	37.3	9.7	73.8
Queue Length 50th (ft)	39	23	~569	257	196	590	224
Queue Length 95th (ft)	m48	m38	#703	349	#448	733	#403
Internal Link Dist (ft)	197			732	380		216
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	324	861	435	1158	1532	528
Starvation Cap Reductn	0	48	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.49	1.18	0.72	0.99	0.75	0.94





















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 Build AM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Future Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1524			2916	1532		3169	
Flt Permitted		1.00	1.00	0.95	1.00			0.58	1.00		0.55	
Satd. Flow (perm)		1626	1398	3015	1524			1714	1532		1753	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	5	48	135	1015	253	60	459	692	1147	61	398	36
RTOR Reduction (vph)	0	0	124	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	53	11	1015	313	0	0	1151	1147	0	491	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Effective Green, g (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Actuated g/C Ratio		0.08	0.08	0.29	0.29			0.52	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		128	110	861	435			1158	1532		524	
v/s Ratio Prot		0.03		c0.34	0.21			c0.22				
v/s Ratio Perm			0.01					c0.30	c0.75		0.28	
v/c Ratio		0.41	0.10	1.18	0.72			0.99	0.75		1.33dl	
Uniform Delay, d1		61.4	59.8	50.0	45.0			33.3	0.0		47.8	
Progression Factor		0.84	1.57	1.00	1.00			0.49	1.00		1.00	
Incremental Delay, d2		0.6	0.1	92.5	4.7			22.0	2.7		26.6	
Delay (s)		52.2	94.2	142.5	49.7			38.2	2.7		74.4	
Level of Service		D	F	F	D			D	A		E	
Approach Delay (s)		82.4			120.6			20.5			74.4	
Approach LOS		F			F			C			E	





Intersection Summary

HCM 2000 Control Delay	60.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Queues
4023: Tremont Street & Prentiss St

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	198	290	1989	1006
v/c Ratio	0.79	0.84	0.89	0.78
Control Delay	76.0	67.7	25.1	10.8
Queue Delay	0.0	0.0	0.5	4.9
Total Delay	76.0	67.7	25.7	15.6
Queue Length 50th (ft)	169	201	653	136
Queue Length 95th (ft)	217	m288	m694	129
Internal Link Dist (ft)	258		709	136
Turn Bay Length (ft)		150		
Base Capacity (vph)	252	346	2240	1289
Starvation Cap Reductn	0	0	57	218
Spillback Cap Reductn	0	0	32	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.79	0.84	0.91	0.94














Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St







Timing Plan: 2021 Build AM

2/4/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	125	28	258	1770	835	141
Future Volume (vph)	125	28	258	1770	835	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	3.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1502		1472	4217	2457	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1502		1472	4217	2457	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.97	0.97
Adj. Flow (vph)	162	36	290	1989	861	145
RTOR Reduction (vph)	6	0	0	0	9	0
Lane Group Flow (vph)	192	0	290	1989	997	0
Heavy Vehicles (%)	11%	7%	3%	7%	13%	10%
Parking (#/hr)					20	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	22.0		32.0	73.4	71.0	
Effective Green, g (s)	23.0		33.0	74.4	72.0	
Actuated g/C Ratio	0.16		0.24	0.53	0.51	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	246		346	2241	1263	
v/s Ratio Prot	c0.13		c0.20	c0.47	c0.41	
v/s Ratio Perm						
v/c Ratio	0.78		0.84	0.89	0.79	
Uniform Delay, d1	56.1		51.0	29.1	27.8	
Progression Factor	1.00		1.03	0.71	0.28	
Incremental Delay, d2	13.7		14.9	3.9	3.6	
Delay (s)	69.8		67.3	24.6	11.2	
Level of Service	E		E	C	B	
Approach Delay (s)	69.8			30.0	11.2	
Approach LOS	E			C	B	
Intersection Summary						
HCM 2000 Control Delay			26.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	20.0
Intersection Capacity Utilization			66.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues
7: Tremont Street & Site Dr

Timing Plan: 2021 Build PM
2/4/2016

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Group Flow (vph)	197	235	1472	137	163	1332
v/c Ratio	0.30	0.29	0.92	0.18	0.86	1.06
Control Delay	28.5	12.3	22.1	3.1	50.0	77.5
Queue Delay	0.9	0.0	22.5	0.6	0.0	14.6
Total Delay	29.4	12.3	44.7	3.7	50.0	92.1
Queue Length 50th (ft)	118	78	111	10	117	~712
Queue Length 95th (ft)	181	128	m#126	m13	m129	m#644
Internal Link Dist (ft)	432		138			650
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	649	836	1592	775	209	1251
Starvation Cap Reductn	0	0	181	390	0	0
Spillback Cap Reductn	242	0	0	0	0	103
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.28	1.04	0.36	0.78	1.16

Intersection Summary













- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Tremont Street & Site Dr








Timing Plan: 2021 Build PM

2/4/2016

						
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	181	216	1354	126	150	1225
Future Volume (vph)	181	216	1354	126	150	1225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	1378	4577	1425	1540	3185
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	1378	4577	1425	1540	3185
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	235	1472	137	163	1332
RTOR Reduction (vph)	0	21	0	25	0	0
Lane Group Flow (vph)	197	214	1472	112	163	1332
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	59.0	76.3	48.7	73.7	17.3	55.0
Effective Green, g (s)	59.0	76.3	48.7	73.7	17.3	55.0
Actuated g/C Ratio	0.42	0.54	0.35	0.53	0.12	0.39
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	3.0
Lane Grp Cap (vph)	649	800	1592	750	190	1251
v/s Ratio Prot	c0.13	0.03	0.32	0.03	c0.11	c0.42
v/s Ratio Perm		0.12		0.05		
v/c Ratio	0.30	0.27	0.92	0.15	0.86	1.06
Uniform Delay, d1	26.9	17.0	43.9	17.0	60.1	42.5
Progression Factor	1.00	1.00	0.38	0.53	0.53	1.01
Incremental Delay, d2	0.3	0.1	4.2	0.0	13.1	36.3
Delay (s)	27.1	17.0	20.9	9.0	44.8	79.3
Level of Service	C	B	C	A	D	E
Approach Delay (s)	21.6		19.9			75.5
Approach LOS	C		B			E
Intersection Summary						
HCM 2000 Control Delay			43.6		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	840	539	342	198	1134	211	1266
v/c Ratio	1.06	1.07	0.27	0.80	0.74	1.00	0.87
Control Delay	81.5	107.9	0.5	80.6	43.6	90.9	49.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.5	107.9	0.5	80.6	43.6	90.9	49.0
Queue Length 50th (ft)	~301	~284	0	176	331	186	339
Queue Length 95th (ft)	#528	#404	0	#278	364	m#220	m374
Internal Link Dist (ft)	381	1186			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	791	506	1275	247	1528	211	1463
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	1.07	0.27	0.80	0.74	1.00	0.87

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build PM

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd









2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203	
Future Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	1.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.96			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2936			3065	1275		1577	4369			1345	
Flt Permitted		0.56			0.65	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1658			2023	1275		1577	4369			1345	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97	
Adj. Flow (vph)	244	386	210	86	453	342	1	197	1029	105	2	209	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	840	0	0	539	342	0	198	1134	0	0	211	
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%	
Parking (#/hr)													
Turn Type	D.P+P	NA		Perm	NA	Free	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	4			4		Free							
Actuated Green, G (s)		48.0			32.0	140.0		20.0	47.0			20.0	
Effective Green, g (s)		52.0			35.0	140.0		22.0	49.0			22.0	
Actuated g/C Ratio		0.37			0.25	1.00		0.16	0.35			0.16	
Clearance Time (s)					7.0			6.0	6.0			6.0	
Vehicle Extension (s)					3.0			2.0	2.0			2.0	
Lane Grp Cap (vph)		780			505	1275		247	1529			211	
v/s Ratio Prot		c0.14						0.13	0.26			c0.16	
v/s Ratio Perm		0.26			c0.27	0.27							
v/c Ratio		1.08			1.07	0.27		0.80	0.74			1.00	
Uniform Delay, d1		44.0			52.5	0.0		56.9	39.9			59.0	
Progression Factor		0.97			1.00	1.00		1.00	1.00			0.94	
Incremental Delay, d2		51.1			59.2	0.5		16.0	3.3			35.7	
Delay (s)		93.6			111.7	0.5		72.9	43.2			91.1	
Level of Service		F			F	A		E	D			F	
Approach Delay (s)		93.6			68.5				47.6				
Approach LOS		F			E				D				
Intersection Summary													
HCM 2000 Control Delay			62.5									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.02										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			92.5%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	1050	178
Future Volume (vph)	1050	178
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.98	
Flt Protected	1.00	
Satd. Flow (prot)	4181	
Flt Permitted	1.00	
Satd. Flow (perm)	4181	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1082	184
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1266	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	47.0	
Effective Green, g (s)	49.0	
Actuated g/C Ratio	0.35	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1463	
v/s Ratio Prot	c0.30	
v/s Ratio Perm		
v/c Ratio	0.87	
Uniform Delay, d1	42.4	
Progression Factor	1.09	
Incremental Delay, d2	2.5	
Delay (s)	48.7	
Level of Service	D	
Approach Delay (s)	54.7	
Approach LOS	D	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build PM
2/4/2016

								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	586	282	295	228	1477	110	1005	577
v/c Ratio	0.83	0.62	0.84	1.00	0.88	1.20	1.15	0.87
Control Delay	52.9	16.8	68.9	73.8	49.8	215.8	110.6	40.9
Queue Delay	1.5	1.3	0.1	0.0	0.0	0.0	0.4	10.6
Total Delay	54.4	18.0	68.9	73.8	49.8	215.8	111.0	51.5
Queue Length 50th (ft)	274	111	227	213	520	~124	~599	504
Queue Length 95th (ft)	332	192	302	m#270	m#579	#254	#736	#716
Internal Link Dist (ft)		324	271		650		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	728	463	387	229	1677	92	874	673
Starvation Cap Reductn	45	60	0	0	0	0	59	0
Spillback Cap Reductn	0	0	1	0	0	0	0	81
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.70	0.76	1.00	0.88	1.20	1.23	0.97

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build PM




2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	516	26	222	73	45	127	203	1264	51	106	965	554
Future Volume (vph)	516	26	222	73	45	127	203	1264	51	106	965	554
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0		6.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91		1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.97			0.98		1.00	1.00		1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.87			0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3001	1178			1736		1287	4281		1624	3079	1278
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3001	1178			1736		1287	4281		1624	3079	1278
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.96	0.96	0.96
Adj. Flow (vph)	586	30	252	88	54	153	228	1420	57	110	1005	577
RTOR Reduction (vph)	0	196	0	0	28	0	0	3	0	0	0	0
Lane Group Flow (vph)	586	86	0	0	267	0	228	1474	0	110	1005	577
Confl. Peds. (#/hr)	13		16	16		13	23					23
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	22%	5%	0%	0%	2%	4%
Parking (#/hr)				15		0						
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	3	3		4	4		1	6		5	2	3
Permitted Phases												2
Actuated Green, G (s)	31.2	31.2			24.1		23.0	52.7		8.0	37.7	68.9
Effective Green, g (s)	33.2	31.2			26.1		25.0	54.7		8.0	39.7	72.9
Actuated g/C Ratio	0.24	0.22			0.19		0.18	0.39		0.06	0.28	0.52
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	3.0
Lane Grp Cap (vph)	711	262			323		229	1672		92	873	701
v/s Ratio Prot	0.20	0.07			c0.15		c0.18	0.34		0.07	c0.33	c0.19
v/s Ratio Perm												0.26
v/c Ratio	0.82	0.33			0.83		1.00	0.88		1.20	1.15	0.82
Uniform Delay, d1	50.6	45.6			54.8		57.4	39.6		66.0	50.1	28.1
Progression Factor	0.85	1.36			1.00		0.50	1.14		1.30	0.61	0.94
Incremental Delay, d2	7.2	0.7			14.9		41.4	3.9		150.2	79.9	6.9
Delay (s)	50.0	62.5			69.7		70.2	49.2		235.9	110.7	33.3
Level of Service	D	E			E		E	D		F	F	C
Approach Delay (s)		54.1			69.7			52.0			92.4	
Approach LOS		D			E			D			F	
Intersection Summary												
HCM 2000 Control Delay			68.6				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			93.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build PM

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	130	2038	1627
v/c Ratio	0.45	0.66	0.49
Control Delay	32.0	2.0	5.8
Queue Delay	0.1	0.4	1.6
Total Delay	32.1	2.4	7.4
Queue Length 50th (ft)	54	42	142
Queue Length 95th (ft)	123	44	m128
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	289	3096	3317
Starvation Cap Reductn	0	496	1431
Spillback Cap Reductn	8	219	661
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.46	0.78	0.86




















Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








Timing Plan: 2021 Build PM

2/4/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1448	0
Future Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1448	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.98			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4071			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4071			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	130	0	0	0	0	1769	269	0	1627	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	0	80	0	0	0	0	2023	0	0	1627	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			238					3082			3317	
v/s Ratio Prot			c0.06					c0.50			0.37	
v/s Ratio Perm												
v/c Ratio			0.33					0.66			0.49	
Uniform Delay, d1			49.5					8.2			6.6	
Progression Factor			1.00					0.17			0.87	
Incremental Delay, d2			0.3					0.6			0.0	
Delay (s)			49.8					2.0			5.7	
Level of Service			D					A			A	
Approach Delay (s)		49.8			0.0			2.0			5.7	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.2								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			47.0%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	238	293	863	200	1049	1139	728
v/c Ratio	0.98	0.75	1.00	0.47	1.22	0.73	1.69dl
Control Delay	102.0	25.9	80.8	45.8	132.0	9.6	158.7
Queue Delay	28.8	3.7	0.0	0.0	0.0	0.0	0.0
Total Delay	130.8	29.5	80.8	45.8	132.0	9.6	158.7
Queue Length 50th (ft)	203	66	~408	151	-564	432	-432
Queue Length 95th (ft)	#337	107	#551	219	#617	502	#563
Internal Link Dist (ft)	203			68	380		136
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	389	861	423	862	1554	590
Starvation Cap Reductn	22	43	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.85	1.00	0.47	1.22	0.73	1.23

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Timing Plan: 2021 Build PM





2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	182	243	828	113	56	228	640	1002	49	576	10
Future Volume (vph)	8	182	243	828	113	56	228	640	1002	49	576	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1482			2932	1554		3239	
Flt Permitted		1.00	1.00	0.95	1.00			0.54	1.00		0.53	
Satd. Flow (perm)		1626	1398	3015	1482			1597	1554		1717	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	217	293	862	131	69	278	771	1139	91	619	18
RTOR Reduction (vph)	0	0	180	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	238	113	863	200	0	0	1049	1139	0	727	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Effective Green, g (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Actuated g/C Ratio		0.15	0.15	0.29	0.29			0.45	1.00		0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		243	209	861	423			861	1554		588	
v/s Ratio Prot		c0.15		c0.29	0.13			c0.13				
v/s Ratio Perm			0.08					0.42	0.73		c0.42	
v/c Ratio		0.98	0.54	1.00	0.47			1.22	0.73		1.69dl	
Uniform Delay, d1		59.3	55.0	50.0	41.3			38.5	0.0		46.0	
Progression Factor		0.85	0.81	1.00	1.00			0.74	1.00		1.00	
Incremental Delay, d2		49.4	1.3	31.2	0.3			107.4	2.7		120.3	
Delay (s)		100.0	46.0	81.2	41.6			135.7	2.7		166.3	
Level of Service		F	D	F	D			F	A		F	
Approach Delay (s)		70.2			73.8			66.5			166.3	
Approach LOS		E			E			E			F	
Intersection Summary												
HCM 2000 Control Delay			84.7			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			97.4%			ICU Level of Service			F			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build PM

2/4/2016

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	354	114	1405	1463
v/c Ratio	1.04	0.92	0.95	0.93
Control Delay	106.9	128.3	35.6	22.4
Queue Delay	2.0	0.0	25.2	22.2
Total Delay	108.9	128.3	60.8	44.6
Queue Length 50th (ft)	~322	110	471	242
Queue Length 95th (ft)	#476	m#174	m#546	m210
Internal Link Dist (ft)	258		709	138
Turn Bay Length (ft)		150		
Base Capacity (vph)	341	124	1483	1567
Starvation Cap Reductn	0	0	0	165
Spillback Cap Reductn	2	0	150	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.04	0.92	1.05	1.04

Intersection Summary














- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build PM







2/4/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	153	148	107	1321	1320	84
Future Volume (vph)	153	148	107	1321	1320	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.93		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1475		1458	4178	2672	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1475		1458	4178	2672	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	180	174	114	1405	1375	88
RTOR Reduction (vph)	25	0	0	0	3	0
Lane Group Flow (vph)	329	0	114	1405	1460	0
Heavy Vehicles (%)	13%	5%	4%	8%	6%	11%
Parking (#/hr)					15	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	29.0		11.0	48.7	80.0	
Effective Green, g (s)	30.0		12.0	49.7	82.0	
Actuated g/C Ratio	0.21		0.09	0.36	0.59	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	316		124	1483	1565	
v/s Ratio Prot	c0.22		c0.08	0.34	c0.55	
v/s Ratio Perm						
v/c Ratio	1.04		0.92	0.95	0.93	
Uniform Delay, d1	55.0		63.5	43.9	26.5	
Progression Factor	1.00		1.29	0.54	0.90	
Incremental Delay, d2	61.6		44.5	10.7	3.7	
Delay (s)	116.6		126.3	34.3	27.6	
Level of Service	F		F	C	C	
Approach Delay (s)	116.6			41.2	27.6	
Approach LOS	F			D	C	
Intersection Summary						
HCM 2000 Control Delay			43.2		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues
6: Tremont Street

Timing Plan: 2021 Build SAT

2/4/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	257	222	1230	212	240	959
v/c Ratio	0.42	0.25	0.69	0.21	0.83	0.65
Control Delay	31.7	9.5	11.2	0.3	45.1	29.1
Queue Delay	0.0	0.0	1.6	1.4	0.0	0.0
Total Delay	31.7	9.5	12.8	1.7	45.1	29.1
Queue Length 50th (ft)	149	57	54	0	129	406
Queue Length 95th (ft)	226	93	m84	m0	m142	480
Internal Link Dist (ft)	281		152			637
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	613	942	1771	1019	342	1474
Starvation Cap Reductn	0	0	345	624	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.24	0.86	0.54	0.70	0.65

Intersection Summary













m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

6: Tremont Street

Timing Plan: 2021 Build SAT

2/4/2016








						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	236	204	1132	195	221	882
Future Volume (vph)	236	204	1132	195	221	882
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1711	1531	5085	1583	1711	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1711	1531	5085	1583	1711	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	257	222	1230	212	240	959
RTOR Reduction (vph)	0	28	0	51	0	0
Lane Group Flow (vph)	257	194	1230	161	240	959
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	43.0	63.2	41.8	68.8	20.2	50.0
Effective Green, g (s)	43.0	63.2	41.8	68.8	20.2	50.0
Actuated g/C Ratio	0.36	0.53	0.35	0.57	0.17	0.42
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	613	870	1771	973	288	1474
v/s Ratio Prot	c0.15	0.04	c0.24	0.04	c0.14	0.27
v/s Ratio Perm		0.09		0.06		
v/c Ratio	0.42	0.22	0.69	0.17	0.83	0.65
Uniform Delay, d1	29.1	15.2	33.6	12.1	48.3	28.0
Progression Factor	1.00	1.00	0.30	0.01	0.60	0.98
Incremental Delay, d2	2.1	0.0	1.0	0.2	11.6	1.4
Delay (s)	31.2	15.3	10.9	0.3	40.8	28.7
Level of Service	C	B	B	A	D	C
Approach Delay (s)	23.8		9.3			31.2
Approach LOS	C		A			C

Intersection Summary

HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	586	405	314	112	945	190	937
v/c Ratio	0.84	0.87	0.60	0.42	0.60	0.88	0.65
Control Delay	31.5	64.7	9.7	49.0	33.0	71.2	49.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	64.7	9.7	49.0	33.0	71.2	49.1
Queue Length 50th (ft)	113	160	0	77	218	156	224
Queue Length 95th (ft)	#212	#223	61	135	266	m#255	271
Internal Link Dist (ft)	381	1188			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	699	469	522	278	1580	224	1439
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.86	0.60	0.40	0.60	0.85	0.65

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

Timing Plan: 2021 Build SAT

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd









2/4/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Future Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.97			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2925			2945	1275		1519	4319			1227	
Flt Permitted		0.59			0.73	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1764			2167	1275		1519	4319			1227	
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95	
Adj. Flow (vph)	233	254	99	76	329	314	1	111	873	72	14	176	
RTOR Reduction (vph)	0	0	0	0	0	246	0	0	0	0	0	0	
Lane Group Flow (vph)	0	586	0	0	405	68	0	112	945	0	0	190	
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%	
Parking (#/hr)													
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	3 4			4		4							
Actuated Green, G (s)		34.0			23.0	23.0		19.1	41.9			19.1	
Effective Green, g (s)		38.0			26.0	26.0		21.1	43.9			21.1	
Actuated g/C Ratio		0.32			0.22	0.22		0.18	0.37			0.18	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		684			469	276		267	1580			215	
v/s Ratio Prot		c0.09						0.07	0.22			c0.15	
v/s Ratio Perm		0.18			c0.19	0.05							
v/c Ratio		0.86			0.86	0.25		0.42	0.60			0.88	
Uniform Delay, d1		38.4			45.3	38.9		44.0	30.9			48.3	
Progression Factor		0.64			1.00	1.00		1.00	1.00			0.87	
Incremental Delay, d2		8.0			15.1	0.5		0.4	1.7			23.6	
Delay (s)		32.7			60.4	39.4		44.4	32.6			65.6	
Level of Service		C			E	D		D	C			E	
Approach Delay (s)		32.7			51.2				33.8				
Approach LOS		C			D				C				
Intersection Summary													
HCM 2000 Control Delay			42.9									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			79.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	635	256
Future Volume (vph)	635	256
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3935	
Flt Permitted	1.00	
Satd. Flow (perm)	3935	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	668	269
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	937	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	41.9	
Effective Green, g (s)	43.9	
Actuated g/C Ratio	0.37	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1439	
v/s Ratio Prot	c0.24	
v/s Ratio Perm		
v/c Ratio	0.65	
Uniform Delay, d1	31.7	
Progression Factor	1.48	
Incremental Delay, d2	1.6	
Delay (s)	48.3	
Level of Service	D	
Approach Delay (s)	51.3	
Approach LOS	D	
Intersection Summary		

Queues
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build SAT
2/4/2016

								
Lane Group	EBL	EBT	WBT	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	385	227	163	193	1265	92	970	419
v/c Ratio	0.71	0.72	0.80	1.10	0.52	0.70	0.83	0.60
Control Delay	40.1	33.3	61.7	120.2	25.4	53.6	31.5	13.4
Queue Delay	0.0	1.5	0.0	0.0	0.1	0.0	0.9	0.0
Total Delay	40.1	34.8	61.7	120.2	25.5	53.6	32.4	13.4
Queue Length 50th (ft)	88	76	92	~177	365	41	332	24
Queue Length 95th (ft)	132	156	136	m#315	421	#175	#583	417
Internal Link Dist (ft)		324	271		637		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	583	409	320	175	2441	131	1173	719
Starvation Cap Reductn	0	69	0	0	0	0	58	2
Spillback Cap Reductn	0	0	2	0	278	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.67	0.51	1.10	0.58	0.70	0.87	0.58




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Timing Plan: 2021 Build SAT

2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT	
Lane Configurations													
Traffic Volume (vph)	362	25	188	12	21	103	183	1170	31	14	72	902	
Future Volume (vph)	362	25	188	12	21	103	183	1170	31	14	72	902	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11	
Total Lost time (s)	4.0	6.0			4.0		4.0	4.0			6.0	4.0	
Lane Util. Factor	0.97	1.00			1.00		1.00	0.91			1.00	0.95	
Frbp, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	1.00	
Frt	1.00	0.87			0.90		1.00	1.00			1.00	1.00	
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.95	1.00	
Satd. Flow (prot)	2918	1130			1671		1236	4247			1570	2935	
Flt Permitted	0.95	1.00			0.71		0.95	1.00			0.21	1.00	
Satd. Flow (perm)	2918	1130			1184		1236	4247			344	2935	
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93	
Adj. Flow (vph)	385	27	200	14	25	124	193	1232	33	15	77	970	
RTOR Reduction (vph)	0	175	0	0	39	0	0	2	0	0	0	0	
Lane Group Flow (vph)	385	52	0	0	124	0	193	1263	0	0	92	970	
Confl. Peds. (#/hr)	7		6	6		7	37						
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	27%	6%	0%	0%	0%	7%	
Parking (#/hr)				5									
Turn Type	Prot	NA		Perm	NA		Prot	NA		Perm	Perm	NA	
Protected Phases	3	4			4		1	6				2	
Permitted Phases				4						2	2		
Actuated Green, G (s)	20.2	14.8			14.8		15.0	67.0			46.0	46.0	
Effective Green, g (s)	22.2	14.8			16.8		17.0	69.0			46.0	48.0	
Actuated g/C Ratio	0.18	0.12			0.14		0.14	0.58			0.38	0.40	
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0			6.0	6.0	
Vehicle Extension (s)	3.0	2.0			2.0		2.0	2.0			2.0	2.0	
Lane Grp Cap (vph)	539	139			165		175	2442			131	1174	
v/s Ratio Prot	c0.13	0.05					c0.16	0.30				c0.33	
v/s Ratio Perm					c0.11						0.27		
v/c Ratio	0.71	0.37			0.75		1.10	0.52			0.70	0.83	
Uniform Delay, d1	45.9	48.3			49.6		51.5	15.4			31.2	32.3	
Progression Factor	0.72	2.31			1.00		0.51	1.46			0.69	0.70	
Incremental Delay, d2	4.0	0.5			15.8		90.5	0.6			24.8	6.1	
Delay (s)	37.2	112.1			65.4		117.0	23.2			46.4	28.8	
Level of Service	D	F			E		F	C			D	C	
Approach Delay (s)		65.0			65.4			35.6				24.6	
Approach LOS		E			E			D				C	
Intersection Summary													
HCM 2000 Control Delay			37.4									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			82.2%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													






Movement	SWR
Lane Configurations	7
Traffic Volume (vph)	390
Future Volume (vph)	390
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.91
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1198
Flt Permitted	1.00
Satd. Flow (perm)	1198
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	419
RTOR Reduction (vph)	0
Lane Group Flow (vph)	419
Confl. Peds. (#/hr)	37
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	66.2
Effective Green, g (s)	70.2
Actuated g/C Ratio	0.59
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	740
v/s Ratio Prot	0.10
v/s Ratio Perm	0.25
v/c Ratio	0.57
Uniform Delay, d1	15.5
Progression Factor	0.60
Incremental Delay, d2	0.9
Delay (s)	10.2
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues
 3082: Tremont Street & Renaissance Park/Ruggles St




















Timing Plan: 2021 Build SAT

2/4/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	66	1788	1400
v/c Ratio	0.19	0.61	0.47
Control Delay	7.0	9.6	3.8
Queue Delay	0.0	0.2	0.5
Total Delay	7.0	9.7	4.3
Queue Length 50th (ft)	0	401	47
Queue Length 95th (ft)	6	37	131
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	339	2954	2994
Starvation Cap Reductn	0	360	996
Spillback Cap Reductn	6	0	338
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.69	0.70
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St

Timing Plan: 2021 Build SAT
 2/4/2016








												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Future Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4109			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4109			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	0	0	0	0	1652	136	0	1400	0
RTOR Reduction (vph)	0	0	52	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	14	0	0	0	0	1780	0	0	1400	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					85.0			85.0	
Effective Green, g (s)			26.0					86.0			86.0	
Actuated g/C Ratio			0.22					0.72			0.72	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			276					2944			2994	
v/s Ratio Prot			c0.01					c0.43			0.34	
v/s Ratio Perm												
v/c Ratio			0.05					0.60			0.47	
Uniform Delay, d1			37.2					8.5			7.2	
Progression Factor			1.00					1.03			0.46	
Incremental Delay, d2			0.0					0.8			0.4	
Delay (s)			37.3					9.6			3.8	
Level of Service			D					A			A	
Approach Delay (s)		37.3			0.0			9.6			3.8	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			7.6								A	
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			120.0						8.0			
Intersection Capacity Utilization			41.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

Timing Plan: 2021 Build SAT

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/4/2016





















							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	75	196	758	141	761	1013	568
v/c Ratio	0.48	0.70	0.86	0.32	0.79	0.66	0.55
Control Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Length 50th (ft)	57	25	284	85	246	221	165
Queue Length 95th (ft)	91	76	333	124	#342	678	282
Internal Link Dist (ft)	215			623	380		183
Turn Bay Length (ft)			350				
Base Capacity (vph)	285	378	1055	517	966	1526	1030
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.52	0.72	0.27	0.79	0.66	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard





Timing Plan: 2021 Build SAT
 2/4/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Future Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12	
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0		
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95		
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00		
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99		
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99		
Satd. Flow (prot)		1631	1398	3015	1478			2938	1526		3217		
Flt Permitted		0.99	1.00	0.95	1.00			0.65	1.00		0.75		
Satd. Flow (perm)		1631	1398	3015	1478			1920	1526		2410		
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55	
Adj. Flow (vph)	13	62	196	758	90	51	159	602	1012	61	480	27	
RTOR Reduction (vph)	0	0	146	0	0	0	0	0	0	0	2	0	
Lane Group Flow (vph)	0	75	50	758	141	0	0	761	1013	0	566	0	
Confl. Peds. (#/hr)									20				
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%	
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA		
Protected Phases	5	5		6	6		7	17			1		
Permitted Phases			5				17		Free	1			
Actuated Green, G (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Effective Green, g (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Actuated g/C Ratio		0.10	0.10	0.29	0.29			0.48	1.00		0.43		
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0		
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0		
Lane Grp Cap (vph)		156	133	886	434			966	1526		1028		
v/s Ratio Prot		0.05		c0.25	0.10			0.04					
v/s Ratio Perm			0.04					c0.34	c0.66		0.23		
v/c Ratio		0.48	0.37	0.86	0.32			0.79	0.66		0.55		
Uniform Delay, d1		51.4	50.9	39.9	33.1			26.3	0.0		25.8		
Progression Factor		1.00	1.00	1.00	1.00			0.74	1.00		1.00		
Incremental Delay, d2		0.9	0.6	7.8	0.2			5.4	1.9		2.1		
Delay (s)		52.3	51.5	47.8	33.2			24.8	1.9		27.9		
Level of Service		D	D	D	C			C	A		C		
Approach Delay (s)		51.7			45.5			11.7			27.9		
Approach LOS		D			D			B			C		
Intersection Summary													
HCM 2000 Control Delay			26.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			74.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

Queues
4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build SAT

2/4/2016














				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	88	80	1359	1288
v/c Ratio	0.54	0.49	0.92	0.72
Control Delay	58.5	76.2	35.6	8.1
Queue Delay	0.0	0.0	0.3	1.7
Total Delay	58.5	76.2	35.9	9.7
Queue Length 50th (ft)	58	65	381	123
Queue Length 95th (ft)	110	m105	#506	85
Internal Link Dist (ft)	258		709	152
Turn Bay Length (ft)		150		
Base Capacity (vph)	163	164	1476	1801
Starvation Cap Reductn	0	0	0	326
Spillback Cap Reductn	0	0	9	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.54	0.49	0.93	0.87

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4023: Tremont Street & Prentiss St

Timing Plan: 2021 Build SAT
2/4/2016







						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	58	18	74	1264	1059	49
Future Volume (vph)	58	18	74	1264	1059	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1544		1518	4140	2603	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1544		1518	4140	2603	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.86	0.86
Adj. Flow (vph)	67	21	80	1359	1231	57
RTOR Reduction (vph)	9	0	0	0	2	0
Lane Group Flow (vph)	79	0	80	1359	1286	0
Heavy Vehicles (%)	6%	9%	7%	9%	11%	8%
Parking (#/hr)					10	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	11.0		12.0	41.8	82.0	
Effective Green, g (s)	12.0		13.0	42.8	83.0	
Actuated g/C Ratio	0.10		0.11	0.36	0.69	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	3.0		
Lane Grp Cap (vph)	154		164	1476	1800	
v/s Ratio Prot	c0.05		c0.05	c0.33	c0.49	
v/s Ratio Perm						
v/c Ratio	0.51		0.49	0.92	0.71	
Uniform Delay, d1	51.2		50.4	37.0	11.3	
Progression Factor	1.00		1.33	0.68	0.52	
Incremental Delay, d2	1.2		7.8	8.8	2.0	
Delay (s)	52.4		75.1	33.8	7.9	
Level of Service	D		E	C	A	
Approach Delay (s)	52.4			36.1	7.9	
Approach LOS	D			D	A	
Intersection Summary						
HCM 2000 Control Delay			23.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			57.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

2017 Build Conditions – Whittier Street One-Way Analysis

Queues

9: Tremont Street & Site Dr

2/6/2016

						
Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Group Flow (vph)	42	61	1829	240	189	1020
v/c Ratio	0.09	0.09	0.86	0.28	0.93	0.86
Control Delay	36.8	5.2	10.6	0.6	62.6	65.1
Queue Delay	0.0	0.0	21.9	2.6	0.0	0.0
Total Delay	36.8	5.2	32.5	3.2	62.6	65.1
Queue Length 50th (ft)	28	1	103	4	169	511
Queue Length 95th (ft)	59	26	m104	m1	m#207	m532
Internal Link Dist (ft)	481		136			652
Turn Bay Length (ft)				100	250	
Base Capacity (vph)	466	703	2116	870	212	1183
Starvation Cap Reductn	0	0	355	508	0	0
Spillback Cap Reductn	34	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.09	1.04	0.66	0.89	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Tremont Street & Site Dr








2/6/2016

						
Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	39	56	1683	221	174	938
Future Volume (vph)	39	56	1683	221	174	938
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1593	1425	4577	1425	1486	3185
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1593	1425	4577	1425	1486	3185
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	61	1829	240	189	1020
RTOR Reduction (vph)	0	34	0	42	0	0
Lane Group Flow (vph)	42	27	1829	198	189	1020
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	41.0	60.3	64.7	76.7	19.3	52.0
Effective Green, g (s)	41.0	60.3	64.7	76.7	19.3	52.0
Actuated g/C Ratio	0.29	0.43	0.46	0.55	0.14	0.37
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	2.0
Lane Grp Cap (vph)	466	664	2115	831	204	1183
v/s Ratio Prot	c0.03	0.01	c0.40	c0.02	c0.13	0.32
v/s Ratio Perm		0.01		0.12		
v/c Ratio	0.09	0.04	0.86	0.24	0.93	0.86
Uniform Delay, d1	36.0	23.1	33.7	16.5	59.6	40.7
Progression Factor	1.00	1.00	0.26	0.04	0.51	1.48
Incremental Delay, d2	0.4	0.0	1.5	0.2	27.3	4.6
Delay (s)	36.3	23.1	10.4	0.8	57.7	64.7
Level of Service	D	C	B	A	E	E
Approach Delay (s)	28.5		9.3			63.6
Approach LOS	C		A			E
Intersection Summary						
HCM 2000 Control Delay			29.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			62.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	764	491	364	177	1588	139	830
v/c Ratio	1.53dl	1.66	0.30	1.05	1.14	1.11	0.68
Control Delay	261.9	346.5	0.6	142.7	117.1	137.4	58.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	261.9	346.5	0.6	142.7	117.1	137.4	58.2
Queue Length 50th (ft)	~503	~341	0	~175	~702	~147	293
Queue Length 95th (ft)	m#577	#457	0	#330	#799	m#217	342
Internal Link Dist (ft)	381	1183			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	513	296	1232	168	1387	125	1217
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.49	1.66	0.30	1.05	1.14	1.11	0.68


























Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations		 			 			  				  
Traffic Volume (vph)	218	312	127	61	410	349	166	1424	69	4	127	611
Future Volume (vph)	218	312	127	61	410	349	166	1424	69	4	127	611
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.98			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2922			2954	1232	1577	4456			1170	3911
Flt Permitted		0.56			0.58	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1655			1729	1232	1577	4456			1170	3911
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	253	363	148	64	427	364	177	1515	73	4	135	650
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	764	0	0	491	364	177	1588	0	0	139	830
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Free	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4		5	1		5	5	1
Permitted Phases	3 4			4		Free						
Actuated Green, G (s)		30.0			21.0	140.0	13.0	40.8			13.0	40.8
Effective Green, g (s)		34.0			24.0	140.0	15.0	42.8			15.0	42.8
Actuated g/C Ratio		0.24			0.17	1.00	0.11	0.31			0.11	0.31
Clearance Time (s)					7.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)					2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		501			296	1232	168	1362			125	1195
v/s Ratio Prot		c0.12					0.11	c0.36			c0.12	0.21
v/s Ratio Perm		0.25			c0.28	c0.30						
v/c Ratio		1.53dl			1.66	0.30	1.05	1.17			1.11	0.69
Uniform Delay, d1		53.0			58.0	0.0	62.5	48.6			62.5	42.8
Progression Factor		1.06			1.00	1.00	1.00	1.00			0.65	1.25
Incremental Delay, d2		241.6			311.0	0.6	84.3	83.0			97.7	2.2
Delay (s)		297.6			369.0	0.6	146.8	131.6			138.0	55.6
Level of Service		F			F	A	F	F			F	E
Approach Delay (s)		297.6			212.2			133.1				67.4
Approach LOS		F			F			F				E

Intersection Summary

HCM 2000 Control Delay	162.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016











Movement	SBR
Line Configurations	
Traffic Volume (vph)	169
Future Volume (vph)	169
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

611: Tremont Street & Ruggles St/Whittier St

2/6/2016




















								
Lane Group	EBL	EBR	WBT	NEL	NET	SWU	SWT	SWR
Lane Group Flow (vph)	626	182	203	241	1689	1	889	548
v/c Ratio	0.92	0.49	0.74	1.03	0.79	0.01	0.99	0.79
Control Delay	71.5	24.1	66.3	87.0	25.5	110.0	64.2	35.8
Queue Delay	16.9	0.0	2.8	27.4	0.0	0.0	33.0	0.0
Total Delay	88.4	24.1	69.1	114.4	25.5	110.0	97.2	35.8
Queue Length 50th (ft)	310	35	161	~218	596	1	-458	440
Queue Length 95th (ft)	#388	149	172	m#304	#718	m1	#671	#632
Internal Link Dist (ft)			271		652		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	695	372	355	235	2141	139	894	696
Starvation Cap Reductn	77	0	0	0	0	0	80	0
Spillback Cap Reductn	0	0	74	45	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.49	0.72	1.27	0.79	0.01	1.09	0.79

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 611: Tremont Street & Ruggles St/Whittier St

2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	551	0	160	42	45	55	222	1554	0	1	0	853
Future Volume (vph)	551	0	160	42	45	55	222	1554	0	1	0	853
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0		3.0		4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91		1.00		0.95
Frbp, ped/bikes	1.00		0.98		0.99		1.00	1.00		1.00		1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00		1.00
Frt	1.00		0.85		0.95		1.00	1.00		1.00		1.00
Flt Protected	0.95		1.00		0.99		0.95	1.00		0.95		1.00
Satd. Flow (prot)	2865		967		1636		1266	4257		1624		2935
Flt Permitted	0.95		1.00		0.99		0.95	1.00		0.95		1.00
Satd. Flow (perm)	2865		967		1636		1266	4257		1624		2935
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	626	0	182	60	64	79	241	1689	0	1	0	889
RTOR Reduction (vph)	0	0	139	0	18	0	0	0	0	0	0	0
Lane Group Flow (vph)	626	0	43	0	185	0	241	1689	0	1	0	889
Confl. Peds. (#/hr)	8		9	9		8	20					
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	24%	6%	67%	0%	0%	7%
Parking (#/hr)				15		0						
Turn Type	Prot		Perm	Split	NA		Prot	NA		Prot		NA
Protected Phases	3			4	4		1	6		5		2
Permitted Phases			3									
Actuated Green, G (s)	31.4		31.4		19.9		24.0	64.5		1.2		40.7
Effective Green, g (s)	33.4		33.4		21.9		26.0	66.5		3.2		42.7
Actuated g/C Ratio	0.24		0.24		0.16		0.19	0.48		0.02		0.31
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0		5.0		6.0
Vehicle Extension (s)	2.0		2.0		2.0		2.0	2.0		3.0		2.0
Lane Grp Cap (vph)	683		230		255		235	2022		37		895
v/s Ratio Prot	c0.22				c0.11		c0.19	0.40		0.00		c0.30
v/s Ratio Perm			0.04									
v/c Ratio	0.92		0.19		0.73		1.03	0.84		0.03		0.99
Uniform Delay, d1	51.9		42.5		56.2		57.0	32.0		66.9		48.5
Progression Factor	1.02		3.26		1.00		0.62	0.77		1.75		0.72
Incremental Delay, d2	16.3		0.1		8.4		49.8	2.4		0.3		27.3
Delay (s)	69.4		138.6		64.6		85.2	27.0		117.3		62.1
Level of Service	E		F		E		F	C		F		E
Approach Delay (s)		85.0			64.6			34.3				49.7
Approach LOS		F			E			C				D
Intersection Summary												
HCM 2000 Control Delay			50.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			140.0		Sum of lost time (s)					16.0		
Intersection Capacity Utilization			74.2%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

611: Tremont Street & Ruggles St/Whittier St

2/6/2016






Movement	SWR
Lane Configurations	
Traffic Volume (vph)	526
Future Volume (vph)	526
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.95
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1272
Flt Permitted	1.00
Satd. Flow (perm)	1272
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	548
RTOR Reduction (vph)	0
Lane Group Flow (vph)	548
Confl. Peds. (#/hr)	20
Heavy Vehicles (%)	5%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	72.1
Effective Green, g (s)	76.1
Actuated g/C Ratio	0.54
Clearance Time (s)	6.0
Vehicle Extension (s)	2.0
Lane Grp Cap (vph)	727
v/s Ratio Prot	0.18
v/s Ratio Perm	0.25
v/c Ratio	0.75
Uniform Delay, d1	24.7
Progression Factor	1.04
Incremental Delay, d2	3.7
Delay (s)	29.3
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

3082: Tremont Street & Renaissance Park/Ruggles St

2/6/2016




















			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	61	2237	1388
v/c Ratio	0.21	0.73	0.43
Control Delay	5.2	4.7	3.9
Queue Delay	0.0	0.5	2.9
Total Delay	5.3	5.2	6.8
Queue Length 50th (ft)	0	72	64
Queue Length 95th (ft)	2	92	m89
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	313	3075	3223
Starvation Cap Reductn	0	398	1684
Spillback Cap Reductn	12	230	640
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.84	0.90

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Future Volume (vph)	0	0	44	0	0	0	0	1902	268	0	1346	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4048			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4048			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	61	0	0	0	0	1961	276	0	1388	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	0	11	0	0	0	0	2225	0	0	1388	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			218					3064			3223	
v/s Ratio Prot			c0.01					c0.55			0.33	
v/s Ratio Perm												
v/c Ratio			0.05					0.73			0.43	
Uniform Delay, d1			46.9					9.2			6.1	
Progression Factor			1.00					0.42			0.62	
Incremental Delay, d2			0.0					0.9			0.0	
Delay (s)			46.9					4.7			3.8	
Level of Service			D					A			A	
Approach Delay (s)		46.9			0.0			4.7			3.8	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.1								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			50.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

2/6/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	53	135	1015	313	1151	1147	495
v/c Ratio	0.41	0.57	1.18	0.72	0.99	0.75	1.33dl
Control Delay	57.6	21.6	136.1	55.7	41.5	9.5	73.8
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	22.3	136.1	55.7	41.5	9.5	73.8
Queue Length 50th (ft)	39	23	~569	257	474	769	224
Queue Length 95th (ft)	m48	m38	#703	349	#447	703	#403
Internal Link Dist (ft)	197			732	380		216
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	324	861	435	1158	1532	528
Starvation Cap Reductn	0	48	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.49	1.18	0.72	0.99	0.75	0.94




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

3098: Tremont Street /Tremont St & Melnea Cass Boulevard

2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Future Volume (vph)	2	40	112	974	218	49	376	574	1009	33	370	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.97			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1524			2916	1532		3169	
Flt Permitted		1.00	1.00	0.95	1.00			0.58	1.00		0.55	
Satd. Flow (perm)		1626	1398	3015	1524			1714	1532		1753	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	5	48	135	1015	253	60	459	692	1147	61	398	36
RTOR Reduction (vph)	0	0	124	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	53	11	1015	313	0	0	1151	1147	0	491	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Effective Green, g (s)		11.1	11.1	40.0	40.0			72.9	140.0		41.9	
Actuated g/C Ratio		0.08	0.08	0.29	0.29			0.52	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		128	110	861	435			1158	1532		524	
v/s Ratio Prot		0.03		c0.34	0.21			c0.22				
v/s Ratio Perm			0.01					c0.30	c0.75		0.28	
v/c Ratio		0.41	0.10	1.18	0.72			0.99	0.75		1.33dl	
Uniform Delay, d1		61.4	59.8	50.0	45.0			33.3	0.0		47.8	
Progression Factor		0.84	1.57	1.00	1.00			0.67	1.00		1.00	
Incremental Delay, d2		0.6	0.1	92.5	4.7			22.0	2.7		26.6	
Delay (s)		52.2	94.2	142.5	49.7			44.3	2.7		74.4	
Level of Service		D	F	F	D			D	A		E	
Approach Delay (s)		82.4			120.6			23.5			74.4	
Approach LOS		F			F			C			E	

Intersection Summary

HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		





dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Queues

4023: Tremont Street & Prentiss St

2/6/2016

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	198	290	1972	1006
v/c Ratio	0.73	0.84	1.00	0.81
Control Delay	68.5	54.4	44.1	9.6
Queue Delay	0.0	0.0	20.5	11.5
Total Delay	68.5	54.4	64.6	21.1
Queue Length 50th (ft)	166	167	~702	95
Queue Length 95th (ft)	213	m158	m612	96
Internal Link Dist (ft)	258		709	136
Turn Bay Length (ft)		150		
Base Capacity (vph)	273	346	1979	1236
Starvation Cap Reductn	0	0	0	220
Spillback Cap Reductn	0	0	116	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.73	0.84	1.06	0.99











Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4023: Tremont Street & Prentiss St







2/6/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	125	28	258	1755	835	141
Future Volume (vph)	125	28	258	1755	835	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1502		1472	4217	2457	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1502		1472	4217	2457	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.97	0.97
Adj. Flow (vph)	162	36	290	1972	861	145
RTOR Reduction (vph)	6	0	0	0	9	0
Lane Group Flow (vph)	192	0	290	1972	998	0
Heavy Vehicles (%)	11%	7%	3%	7%	13%	10%
Parking (#/hr)					20	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	24.0		32.0	64.7	69.0	
Effective Green, g (s)	25.0		33.0	65.7	70.0	
Actuated g/C Ratio	0.18		0.24	0.47	0.50	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	268		346	1978	1228	
v/s Ratio Prot	c0.13		c0.20	c0.47	c0.41	
v/s Ratio Perm						
v/c Ratio	0.72		0.84	1.00	0.81	
Uniform Delay, d1	54.2		51.0	37.1	29.5	
Progression Factor	1.00		0.93	0.93	0.22	
Incremental Delay, d2	7.4		6.5	9.7	3.2	
Delay (s)	61.6		53.8	44.1	9.6	
Level of Service	E		D	D	A	
Approach Delay (s)	61.6			45.3	9.6	
Approach LOS	E			D	A	
Intersection Summary						
HCM 2000 Control Delay			35.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			66.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: Tremont Street & Site Dr

2/6/2016

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Group Flow (vph)	197	235	1458	170	233	1332
v/c Ratio	0.30	0.28	0.95	0.22	1.11	1.06
Control Delay	28.5	11.9	23.8	3.1	104.0	76.4
Queue Delay	0.9	0.0	38.8	0.8	0.0	14.6
Total Delay	29.4	11.9	62.6	3.9	104.0	91.1
Queue Length 50th (ft)	118	78	113	13	~238	~712
Queue Length 95th (ft)	181	128	m122	m16	m#240	m612
Internal Link Dist (ft)	432		138			650
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	649	836	1536	765	209	1251
Starvation Cap Reductn	0	0	196	370	0	0
Spillback Cap Reductn	242	0	0	0	0	102
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.28	1.09	0.43	1.11	1.16
















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Tremont Street & Site Dr








2/6/2016

						
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations			  			 
Traffic Volume (vph)	181	216	1341	156	214	1225
Future Volume (vph)	181	216	1341	156	214	1225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	1378	4577	1425	1540	3185
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	1378	4577	1425	1540	3185
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	235	1458	170	233	1332
RTOR Reduction (vph)	0	21	0	33	0	0
Lane Group Flow (vph)	197	214	1458	137	233	1332
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	59.0	78.0	47.0	72.0	19.0	55.0
Effective Green, g (s)	59.0	78.0	47.0	72.0	19.0	55.0
Actuated g/C Ratio	0.42	0.56	0.34	0.51	0.14	0.39
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0	3.0	2.0	3.0
Lane Grp Cap (vph)	649	816	1536	732	209	1251
v/s Ratio Prot	c0.13	0.04	0.32	0.03	c0.15	c0.42
v/s Ratio Perm		0.12		0.06		
v/c Ratio	0.30	0.26	0.95	0.19	1.11	1.06
Uniform Delay, d1	26.9	16.1	45.3	18.3	60.5	42.5
Progression Factor	1.00	1.00	0.39	0.51	0.53	1.01
Incremental Delay, d2	0.3	0.1	5.3	0.0	71.0	35.3
Delay (s)	27.1	16.1	22.8	9.4	103.0	78.2
Level of Service	C	B	C	A	F	E
Approach Delay (s)	21.2		21.4			81.9
Approach LOS	C		C			F
Intersection Summary						
HCM 2000 Control Delay			47.5		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.78			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			65.6%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	840	539	342	198	1134	211	1266
v/c Ratio	1.47	1.56	0.65	0.98	1.02	1.23	1.19
Control Delay	252.4	301.7	11.0	118.5	83.3	166.4	136.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	252.4	301.7	11.0	118.5	83.3	166.4	136.4
Queue Length 50th (ft)	~552	~364	0	182	~482	~239	~583
Queue Length 95th (ft)	#686	#484	96	#321	#539	m#262	m#636
Internal Link Dist (ft)	381	1186			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	571	346	528	202	1110	172	1063
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.47	1.56	0.65	0.98	1.02	1.23	1.19



















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203	
Future Volume (vph)	237	374	204	79	417	315	1	169	885	90	2	203	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.96			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2936			3065	1275		1577	4369			1345	
Flt Permitted		0.54			0.56	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1601			1731	1275		1577	4369			1345	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97	
Adj. Flow (vph)	244	386	210	86	453	342	1	197	1029	105	2	209	
RTOR Reduction (vph)	0	0	0	0	0	274	0	0	0	0	0	0	
Lane Group Flow (vph)	0	840	0	0	539	68	0	198	1134	0	0	211	
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%	
Parking (#/hr)													
Turn Type	D.P+P	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4		4	4	4	5	5	1		5	5	
Permitted Phases	4			4		4							
Actuated Green, G (s)		35.0			25.0	25.0		16.0	32.8			16.0	
Effective Green, g (s)		39.0			28.0	28.0		18.0	34.8			18.0	
Actuated g/C Ratio		0.28			0.20	0.20		0.13	0.25			0.13	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		560			346	255		202	1086			172	
v/s Ratio Prot		c0.13						0.13	0.26			c0.16	
v/s Ratio Perm		0.29			c0.31	0.05							
v/c Ratio		1.50			1.56	0.27		0.98	1.04			1.23	
Uniform Delay, d1		50.5			56.0	47.3		60.8	52.6			61.0	
Progression Factor		0.96			1.00	1.00		1.00	1.00			0.97	
Incremental Delay, d2		232.0			264.8	0.6		57.3	39.6			118.3	
Delay (s)		280.6			320.8	47.9		118.1	92.2			177.5	
Level of Service		F			F	D		F	F			F	
Approach Delay (s)		280.6			214.9				96.0				
Approach LOS		F			F				F				
Intersection Summary													
HCM 2000 Control Delay			174.9									HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.06										
Actuated Cycle Length (s)			140.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			95.2%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd








2/6/2016

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	1050	178
Future Volume (vph)	1050	178
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.98	
Flt Protected	1.00	
Satd. Flow (prot)	4181	
Flt Permitted	1.00	
Satd. Flow (perm)	4181	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1082	184
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1266	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	32.8	
Effective Green, g (s)	34.8	
Actuated g/C Ratio	0.25	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1039	
v/s Ratio Prot	c0.30	
v/s Ratio Perm		
v/c Ratio	1.22	
Uniform Delay, d1	52.6	
Progression Factor	1.11	
Incremental Delay, d2	101.4	
Delay (s)	159.7	
Level of Service	F	
Approach Delay (s)	162.2	
Approach LOS	F	
Intersection Summary		

Queues

611: Tremont Street & Ruggles St/Whittier St

2/6/2016

							
Lane Group	EBL	EBR	WBT	NEL	NET	SWT	SWR
Lane Group Flow (vph)	586	272	295	228	1420	1054	577
v/c Ratio	0.83	0.57	0.84	1.00	0.85	1.21	0.87
Control Delay	52.9	14.8	68.9	71.7	47.0	132.7	41.0
Queue Delay	1.5	1.0	0.1	0.0	0.0	0.3	10.6
Total Delay	54.4	15.8	68.9	71.7	47.0	133.0	51.6
Queue Length 50th (ft)	274	103	227	212	500	~648	495
Queue Length 95th (ft)	332	181	302	m#261	m531	#787	#717
Internal Link Dist (ft)			271		650	238	
Turn Bay Length (ft)				280			
Base Capacity (vph)	728	481	387	229	1680	874	673
Starvation Cap Reductn	45	67	0	0	0	47	0
Spillback Cap Reductn	0	0	1	0	0	0	81
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.66	0.76	1.00	0.85	1.27	0.97




















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

611: Tremont Street & Ruggles St/Whittier St

2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	516	0	239	73	45	127	203	1264	0	0	0	1012
Future Volume (vph)	516	0	239	73	45	127	203	1264	0	0	0	1012
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	12	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0				4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91				0.95
Frbp, ped/bikes	1.00		0.97		0.98		1.00	1.00				1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00				1.00
Frt	1.00		0.85		0.93		1.00	1.00				1.00
Flt Protected	0.95		1.00		0.99		0.95	1.00				1.00
Satd. Flow (prot)	3001		1134		1736		1287	4298				3079
Flt Permitted	0.95		1.00		0.99		0.95	1.00				1.00
Satd. Flow (perm)	3001		1134		1736		1287	4298				3079
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.96	0.96	0.96
Adj. Flow (vph)	586	0	272	88	54	153	228	1420	0	0	0	1054
RTOR Reduction (vph)	0	0	207	0	28	0	0	0	0	0	0	0
Lane Group Flow (vph)	586	0	65	0	267	0	228	1420	0	0	0	1054
Confl. Peds. (#/hr)	13		16	16		13	23					
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	22%	5%	0%	0%	0%	2%
Parking (#/hr)				15		0						
Turn Type	Prot		Perm	Split	NA		Prot	NA		custom		NA
Protected Phases	3			4	4		1	6				2
Permitted Phases			3							5		
Actuated Green, G (s)	31.2		31.2		24.1		23.0	52.7				37.7
Effective Green, g (s)	33.2		33.2		26.1		25.0	54.7				39.7
Actuated g/C Ratio	0.24		0.24		0.19		0.18	0.39				0.28
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0				6.0
Vehicle Extension (s)	3.0		3.0		2.0		2.0	2.0				2.0
Lane Grp Cap (vph)	711		268		323		229	1679				873
v/s Ratio Prot	0.20				c0.15		c0.18	0.33				c0.34
v/s Ratio Perm			0.06									
v/c Ratio	0.82		0.24		0.83		1.00	0.85				1.21
Uniform Delay, d1	50.6		43.2		54.8		57.4	38.8				50.1
Progression Factor	0.85		2.05		1.00		0.48	1.11				0.61
Incremental Delay, d2	7.2		0.4		14.9		40.1	2.8				103.1
Delay (s)	50.0		88.9		69.7		68.0	46.0				133.5
Level of Service	D		F		E		E	D				F
Approach Delay (s)		62.3			69.7			49.0				98.1
Approach LOS		E			E			D				F
Intersection Summary												
HCM 2000 Control Delay			71.0									E
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			140.0							18.0		
Intersection Capacity Utilization			91.8%									F
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

611: Tremont Street & Ruggles St/Whittier St

2/6/2016






Movement	SWR
Lane Configurations	7
Traffic Volume (vph)	554
Future Volume (vph)	554
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.95
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1278
Flt Permitted	1.00
Satd. Flow (perm)	1278
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	577
RTOR Reduction (vph)	0
Lane Group Flow (vph)	577
Confl. Peds. (#/hr)	23
Heavy Vehicles (%)	4%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	68.9
Effective Green, g (s)	72.9
Actuated g/C Ratio	0.52
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	701
v/s Ratio Prot	0.19
v/s Ratio Perm	0.26
v/c Ratio	0.82
Uniform Delay, d1	28.1
Progression Factor	0.94
Incremental Delay, d2	7.0
Delay (s)	33.4
Level of Service	C
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

3082: Tremont Street & Renaissance Park/Ruggles St

2/6/2016




















			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	130	2038	1561
v/c Ratio	0.44	0.66	0.47
Control Delay	29.1	2.1	5.5
Queue Delay	0.1	0.3	1.8
Total Delay	29.3	2.5	7.2
Queue Length 50th (ft)	47	41	125
Queue Length 95th (ft)	115	43	m110
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	295	3096	3317
Starvation Cap Reductn	0	445	1521
Spillback Cap Reductn	10	181	678
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.46	0.77	0.87

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								  			  	
Traffic Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1389	0
Future Volume (vph)	0	0	122	0	0	0	0	1716	261	0	1389	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					0.98			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.98			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4071			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4071			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	130	0	0	0	0	1769	269	0	1561	0
RTOR Reduction (vph)	0	0	57	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	0	73	0	0	0	0	2023	0	0	1561	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					105.0			105.0	
Effective Green, g (s)			26.0					106.0			106.0	
Actuated g/C Ratio			0.19					0.76			0.76	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			238					3082			3317	
v/s Ratio Prot			c0.06					c0.50			0.36	
v/s Ratio Perm												
v/c Ratio			0.31					0.66			0.47	
Uniform Delay, d1			49.2					8.2			6.4	
Progression Factor			1.00					0.19			0.84	
Incremental Delay, d2			0.3					0.6			0.0	
Delay (s)			49.5					2.2			5.4	
Level of Service			D					A			A	
Approach Delay (s)		49.5			0.0			2.2			5.4	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.2								A	
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			140.0						8.0			
Intersection Capacity Utilization			47.0%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/6/2016





















							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	238	293	863	200	1049	1139	837
v/c Ratio	0.98	0.75	1.00	0.47	1.26	0.73	3.70dl
Control Delay	102.6	25.5	80.8	45.8	150.5	9.9	265.7
Queue Delay	27.1	3.4	0.0	0.0	0.0	0.0	0.0
Total Delay	129.7	28.9	80.8	45.8	150.5	9.9	265.7
Queue Length 50th (ft)	191	66	~408	151	-576	456	~556
Queue Length 95th (ft)	#332	107	#551	219	#634	502	#691
Internal Link Dist (ft)	203			68	380		136
Turn Bay Length (ft)			350				
Base Capacity (vph)	243	389	861	423	831	1554	560
Starvation Cap Reductn	21	41	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.84	1.00	0.47	1.26	0.73	1.49

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
 3098: Tremont Street/Tremont St & Melnea Cass Boulevard





2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	182	243	828	113	56	228	640	1002	108	576	10
Future Volume (vph)	8	182	243	828	113	56	228	640	1002	108	576	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1482			2932	1554		3167	
Flt Permitted		1.00	1.00	0.95	1.00			0.51	1.00		0.51	
Satd. Flow (perm)		1626	1398	3015	1482			1510	1554		1630	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	217	293	862	131	69	278	771	1139	200	619	18
RTOR Reduction (vph)	0	0	180	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	238	113	863	200	0	0	1049	1139	0	836	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	17			1	
Permitted Phases			5				17		Free	1		
Actuated Green, G (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Effective Green, g (s)		21.0	21.0	40.0	40.0			63.0	140.0		48.0	
Actuated g/C Ratio		0.15	0.15	0.29	0.29			0.45	1.00		0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		243	209	861	423			831	1554		558	
v/s Ratio Prot		c0.15		c0.29	0.13			c0.14				
v/s Ratio Perm			0.08					0.43	0.73		c0.51	
v/c Ratio		0.98	0.54	1.00	0.47			1.26	0.73		3.70dl	
Uniform Delay, d1		59.3	55.0	50.0	41.3			38.5	0.0		46.0	
Progression Factor		0.87	0.79	1.00	1.00			0.70	1.00		1.00	
Incremental Delay, d2		49.4	1.3	31.2	0.3			126.4	2.7		233.3	
Delay (s)		100.7	44.9	81.2	41.6			153.2	2.7		279.3	
Level of Service		F	D	F	D			F	A		F	
Approach Delay (s)		69.9			73.8			74.9			279.3	
Approach LOS		E			E			E			F	
Intersection Summary												
HCM 2000 Control Delay			111.1			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.22									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			99.3%			ICU Level of Service			F			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Queues

4023: Tremont Street & Prentiss St

2/6/2016

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	354	114	1405	1463
v/c Ratio	1.04	0.92	0.98	0.93
Control Delay	106.9	84.0	24.0	22.5
Queue Delay	2.0	0.0	38.9	22.2
Total Delay	108.9	84.0	62.9	44.6
Queue Length 50th (ft)	~322	107	151	242
Queue Length 95th (ft)	#476	m113	m153	m210
Internal Link Dist (ft)	258		709	138
Turn Bay Length (ft)		150		
Base Capacity (vph)	341	124	1432	1567
Starvation Cap Reductn	0	0	0	165
Spillback Cap Reductn	2	0	152	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.04	0.92	1.10	1.04














Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis







4023: Tremont Street & Prentiss St

2/6/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				  	 	
Traffic Volume (vph)	153	148	107	1321	1320	84
Future Volume (vph)	153	148	107	1321	1320	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	10	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.93		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1475		1458	4178	2672	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1475		1458	4178	2672	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	180	174	114	1405	1375	88
RTOR Reduction (vph)	25	0	0	0	3	0
Lane Group Flow (vph)	329	0	114	1405	1460	0
Heavy Vehicles (%)	13%	5%	4%	8%	6%	11%
Parking (#/hr)					15	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	29.0		11.0	47.0	80.0	
Effective Green, g (s)	30.0		12.0	48.0	82.0	
Actuated g/C Ratio	0.21		0.09	0.34	0.59	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	2.0		
Lane Grp Cap (vph)	316		124	1432	1565	
v/s Ratio Prot	c0.22		c0.08	0.34	c0.55	
v/s Ratio Perm						
v/c Ratio	1.04		0.92	0.98	0.93	
Uniform Delay, d1	55.0		63.5	45.6	26.5	
Progression Factor	1.00		1.18	0.41	0.90	
Incremental Delay, d2	61.6		9.8	4.0	3.7	
Delay (s)	116.6		84.8	22.5	27.6	
Level of Service	F		F	C	C	
Approach Delay (s)	116.6			27.2	27.6	
Approach LOS	F			C	C	
Intersection Summary						
HCM 2000 Control Delay			36.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Queues
6: Tremont Street

2/6/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	257	222	1197	246	346	959
v/c Ratio	0.42	0.24	0.74	0.25	1.01	0.65
Control Delay	31.7	8.7	12.8	0.2	71.0	28.1
Queue Delay	0.0	0.0	4.8	2.2	0.0	0.0
Total Delay	31.7	8.7	17.6	2.4	71.0	28.1
Queue Length 50th (ft)	149	53	75	0	-227	404
Queue Length 95th (ft)	226	93	m75	m0	m#357	m465
Internal Link Dist (ft)	281		152			637
Turn Bay Length (ft)				80	250	
Base Capacity (vph)	613	942	1610	983	342	1474
Starvation Cap Reductn	0	0	341	593	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.24	0.94	0.63	1.01	0.65













Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

6: Tremont Street








2/6/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	236	204	1101	226	318	882
Future Volume (vph)	236	204	1101	226	318	882
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	11	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1711	1531	5085	1583	1711	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1711	1531	5085	1583	1711	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	257	222	1197	246	346	959
RTOR Reduction (vph)	0	27	0	66	0	0
Lane Group Flow (vph)	257	196	1197	180	346	959
Turn Type	Prot	pm+ov	NA	custom	Prot	NA
Protected Phases	9 14	5	6	9	5	2
Permitted Phases		14		6		
Actuated Green, G (s)	43.0	67.0	38.0	65.0	24.0	50.0
Effective Green, g (s)	43.0	67.0	38.0	65.0	24.0	50.0
Actuated g/C Ratio	0.36	0.56	0.32	0.54	0.20	0.42
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)		2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	613	918	1610	923	342	1474
v/s Ratio Prot	c0.15	0.04	c0.24	0.04	c0.20	0.27
v/s Ratio Perm		0.09		0.07		
v/c Ratio	0.42	0.21	0.74	0.20	1.01	0.65
Uniform Delay, d1	29.1	13.3	36.6	14.1	48.0	28.0
Progression Factor	1.00	1.00	0.32	0.01	0.60	0.95
Incremental Delay, d2	2.1	0.0	0.9	0.1	39.3	1.3
Delay (s)	31.2	13.3	12.7	0.3	68.3	27.7
Level of Service	C	B	B	A	E	C
Approach Delay (s)	22.9		10.6			38.5
Approach LOS	C		B			D
Intersection Summary						
HCM 2000 Control Delay			23.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	22.0
Intersection Capacity Utilization			64.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

							
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	586	405	314	112	945	190	937
v/c Ratio	1.06dl	1.02	0.64	0.63	0.77	1.33	0.84
Control Delay	79.8	98.3	11.3	67.4	47.1	219.2	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	98.3	11.3	67.4	47.1	219.2	40.4
Queue Length 50th (ft)	~205	~170	0	84	~356	~187	~366
Queue Length 95th (ft)	#339	#253	64	#157	#447	m#311	#458
Internal Link Dist (ft)	381	1188			1304		709
Turn Bay Length (ft)				205		205	
Base Capacity (vph)	580	398	490	177	1231	143	1121
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	1.02	0.64	0.63	0.77	1.33	0.84

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/6/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	
Lane Configurations													
Traffic Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Future Volume (vph)	219	239	93	65	280	267	1	103	812	67	13	167	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00	
Frt		0.97			1.00	0.85		1.00	0.99			1.00	
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		2925			2945	1275		1519	4319			1227	
Flt Permitted		0.57			0.73	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		1704			2175	1275		1519	4319			1227	
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95	
Adj. Flow (vph)	233	254	99	76	329	314	1	111	873	72	14	176	
RTOR Reduction (vph)	0	0	0	0	0	256	0	0	0	0	0	0	
Lane Group Flow (vph)	0	586	0	0	405	58	0	112	945	0	0	190	
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%	
Parking (#/hr)													
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot	
Protected Phases	3	3 4			4		5	5	1		5	5	
Permitted Phases	3 4			4		4							
Actuated Green, G (s)		28.0			19.0	19.0		12.0	30.6			12.0	
Effective Green, g (s)		32.0			22.0	22.0		14.0	32.6			14.0	
Actuated g/C Ratio		0.27			0.18	0.18		0.12	0.27			0.12	
Clearance Time (s)					7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		566			398	233		177	1173			143	
v/s Ratio Prot		c0.09						0.07	0.22			c0.15	
v/s Ratio Perm		0.18			c0.19	0.05							
v/c Ratio		1.06dl			1.02	0.25		0.63	0.81			1.33	
Uniform Delay, d1		44.0			49.0	41.9		50.5	40.7			53.0	
Progression Factor		1.12			1.00	1.00		1.00	1.00			1.03	
Incremental Delay, d2		43.0			49.6	0.6		5.3	6.0			177.1	
Delay (s)		92.5			98.6	42.5		55.9	46.7			231.7	
Level of Service		F			F	D		E	D			F	
Approach Delay (s)		92.5			74.1				47.7				
Approach LOS		F			E				D				
Intersection Summary													
HCM 2000 Control Delay			67.8									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	21.0
Intersection Capacity Utilization			79.6%									ICU Level of Service	D
Analysis Period (min)			15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane.													
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd









2/6/2016

Movement	SBT	SBR
Lane Configurations	↑↑↑	↙
Traffic Volume (vph)	635	256
Future Volume (vph)	635	256
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	3935	
Flt Permitted	1.00	
Satd. Flow (perm)	3935	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	668	269
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	937	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.6	
Effective Green, g (s)	32.6	
Actuated g/C Ratio	0.27	
Clearance Time (s)	6.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1069	
v/s Ratio Prot	c0.24	
v/s Ratio Perm		
v/c Ratio	0.88	
Uniform Delay, d1	41.8	
Progression Factor	0.71	
Incremental Delay, d2	7.3	
Delay (s)	36.9	
Level of Service	D	
Approach Delay (s)	69.7	
Approach LOS	E	
Intersection Summary		

Queues

611: Tremont Street & Ruggles St/Whittier St

2/6/2016




















								
Lane Group	EBL	EBR	WBT	NEL	NET	SWU	SWT	SWR
Lane Group Flow (vph)	385	227	163	193	1232	15	1047	419
v/c Ratio	0.71	0.66	0.60	1.10	0.50	0.10	0.89	0.60
Control Delay	40.1	26.8	43.0	119.1	22.7	20.2	35.9	13.3
Queue Delay	0.0	1.4	0.0	0.0	0.1	0.0	0.7	0.0
Total Delay	40.1	28.1	43.0	119.1	22.8	20.2	36.5	13.3
Queue Length 50th (ft)	88	67	88	~175	355	4	436	24
Queue Length 95th (ft)	132	142	127	m#290	412	m13	#652	417
Internal Link Dist (ft)			271		637		238	
Turn Bay Length (ft)				280		200		
Base Capacity (vph)	583	432	437	175	2452	147	1177	721
Starvation Cap Reductn	0	80	0	0	0	0	22	2
Spillback Cap Reductn	0	0	2	0	300	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.64	0.37	1.10	0.57	0.10	0.91	0.58

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

2/6/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWU	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	362	0	213	12	21	103	183	1170	0	14	0	974
Future Volume (vph)	362	0	213	12	21	103	183	1170	0	14	0	974
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	11	11	12	12	11	11
Total Lost time (s)	4.0		4.0		4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	0.97		1.00		1.00		1.00	0.91		1.00		0.95
Frbp, ped/bikes	1.00		0.98		0.98		1.00	1.00		1.00		1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00		1.00
Frt	1.00		0.85		0.90		1.00	1.00		1.00		1.00
Flt Protected	0.95		1.00		1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	2918		1076		1671		1236	4257		1624		2935
Flt Permitted	0.95		1.00		1.00		0.95	1.00		0.22		1.00
Satd. Flow (perm)	2918		1076		1671		1236	4257		368		2935
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	385	0	227	14	25	124	193	1232	0	15	0	1047
RTOR Reduction (vph)	0	0	195	0	39	0	0	0	0	0	0	0
Lane Group Flow (vph)	385	0	32	0	124	0	193	1232	0	15	0	1047
Confl. Peds. (#/hr)	7		6	6		7	37					
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	27%	6%	0%	0%	0%	7%
Parking (#/hr)				5								
Turn Type	Prot		Perm	Perm	NA		Prot	NA		Perm		NA
Protected Phases	3				4		1	6				2
Permitted Phases			4	4						2		
Actuated Green, G (s)	20.2		14.7		14.7		15.0	67.1		46.1		46.1
Effective Green, g (s)	22.2		16.7		16.7		17.0	69.1		48.1		48.1
Actuated g/C Ratio	0.18		0.14		0.14		0.14	0.58		0.40		0.40
Clearance Time (s)	6.0		6.0		6.0		6.0	6.0		6.0		6.0
Vehicle Extension (s)	3.0		2.0		2.0		2.0	2.0		2.0		2.0
Lane Grp Cap (vph)	539		149		232		175	2451		147		1176
v/s Ratio Prot	c0.13						c0.16	0.29				c0.36
v/s Ratio Perm			0.03		0.07					0.04		
v/c Ratio	0.71		0.21		0.54		1.10	0.50		0.10		0.89
Uniform Delay, d1	45.9		45.8		48.0		51.5	15.2		22.5		33.5
Progression Factor	0.72		3.31		1.00		0.52	1.33		0.66		0.71
Incremental Delay, d2	4.0		0.2		1.2		89.0	0.6		1.3		9.5
Delay (s)	37.2		151.7		49.2		115.9	20.8		16.1		33.3
Level of Service	D		F		D		F	C		B		C
Approach Delay (s)		79.7			49.2			33.6				26.5
Approach LOS		E			D			C				C
Intersection Summary												
HCM 2000 Control Delay			39.1									D
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			120.0							16.0		
Intersection Capacity Utilization			78.4%									D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

611: Tremont Street & Ruggles St/Whittier St

2/6/2016






Movement	SWR
Lane Configurations	7
Traffic Volume (vph)	390
Future Volume (vph)	390
Ideal Flow (vphpl)	1900
Lane Width	11
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frbp, ped/bikes	0.91
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1197
Flt Permitted	1.00
Satd. Flow (perm)	1197
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	419
RTOR Reduction (vph)	0
Lane Group Flow (vph)	419
Confl. Peds. (#/hr)	37
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type	pm+ov
Protected Phases	3
Permitted Phases	2
Actuated Green, G (s)	66.3
Effective Green, g (s)	70.3
Actuated g/C Ratio	0.59
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	741
v/s Ratio Prot	0.10
v/s Ratio Perm	0.25
v/c Ratio	0.57
Uniform Delay, d1	15.4
Progression Factor	0.60
Incremental Delay, d2	0.9
Delay (s)	10.1
Level of Service	B
Approach Delay (s)	
Approach LOS	
Intersection Summary	

Queues

3082: Tremont Street & Renaissance Park/Ruggles St

2/6/2016

			
Lane Group	EBR	NET	SWT
Lane Group Flow (vph)	66	1788	1400
v/c Ratio	0.19	0.61	0.47
Control Delay	7.0	10.1	3.8
Queue Delay	0.0	0.2	0.5
Total Delay	7.0	10.3	4.3
Queue Length 50th (ft)	0	401	47
Queue Length 95th (ft)	6	36	131
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	339	2954	2994
Starvation Cap Reductn	0	361	996
Spillback Cap Reductn	7	0	381
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.69	0.70
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
 3082: Tremont Street & Renaissance Park/Ruggles St








2/6/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Future Volume (vph)	0	0	43	0	0	0	0	1520	125	0	1330	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frbp, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4109			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4109			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	0	0	0	0	1652	136	0	1400	0
RTOR Reduction (vph)	0	0	52	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	14	0	0	0	0	1780	0	0	1400	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			25.0					85.0			85.0	
Effective Green, g (s)			26.0					86.0			86.0	
Actuated g/C Ratio			0.22					0.72			0.72	
Clearance Time (s)			5.0					5.0			5.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			276					2944			2994	
v/s Ratio Prot			c0.01					c0.43			0.34	
v/s Ratio Perm												
v/c Ratio			0.05					0.60			0.47	
Uniform Delay, d1			37.2					8.5			7.2	
Progression Factor			1.00					1.09			0.46	
Incremental Delay, d2			0.0					0.8			0.4	
Delay (s)			37.3					10.1			3.8	
Level of Service			D					B			A	
Approach Delay (s)		37.3			0.0			10.1			3.8	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			7.9								A	
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			120.0						8.0			
Intersection Capacity Utilization			41.9%								A	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3098: Tremont Street/Tremont St & Melnea Cass Boulevard

2/6/2016

							
Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	75	196	758	141	761	1013	568
v/c Ratio	0.48	0.70	0.86	0.32	0.79	0.66	0.55
Control Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	25.6	50.0	34.1	26.2	9.7	30.4
Queue Length 50th (ft)	57	25	284	85	246	221	165
Queue Length 95th (ft)	91	76	333	124	#342	679	282
Internal Link Dist (ft)	215			623	380		183
Turn Bay Length (ft)			350				
Base Capacity (vph)	285	378	1055	517	966	1526	1030
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.52	0.72	0.27	0.79	0.66	0.55





















Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3098: Tremont Street/Tremont St & Melnea Cass Boulevard





2/6/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Future Volume (vph)	5	52	163	728	77	41	130	500	891	33	446	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12	
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0		
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95		
Frbp, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00		
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99		
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99		
Satd. Flow (prot)		1631	1398	3015	1478			2938	1526		3217		
Flt Permitted		0.99	1.00	0.95	1.00			0.65	1.00		0.75		
Satd. Flow (perm)		1631	1398	3015	1478			1920	1526		2410		
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55	
Adj. Flow (vph)	13	62	196	758	90	51	159	602	1012	61	480	27	
RTOR Reduction (vph)	0	0	146	0	0	0	0	0	0	0	2	0	
Lane Group Flow (vph)	0	75	50	758	141	0	0	761	1013	0	566	0	
Confl. Peds. (#/hr)									20				
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%	
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA		
Protected Phases	5	5		6	6		7	17			1		
Permitted Phases			5				17		Free	1			
Actuated Green, G (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Effective Green, g (s)		11.5	11.5	35.3	35.3			57.2	120.0		51.2		
Actuated g/C Ratio		0.10	0.10	0.29	0.29			0.48	1.00		0.43		
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0		
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0		
Lane Grp Cap (vph)		156	133	886	434			966	1526		1028		
v/s Ratio Prot		0.05		c0.25	0.10			0.04					
v/s Ratio Perm			0.04					c0.34	c0.66		0.23		
v/c Ratio		0.48	0.37	0.86	0.32			0.79	0.66		0.55		
Uniform Delay, d1		51.4	50.9	39.9	33.1			26.3	0.0		25.8		
Progression Factor		1.00	1.00	1.00	1.00			0.74	1.00		1.00		
Incremental Delay, d2		0.9	0.6	7.8	0.2			5.4	1.9		2.1		
Delay (s)		52.3	51.5	47.8	33.2			24.8	1.9		27.9		
Level of Service		D	D	D	C			C	A		C		
Approach Delay (s)		51.7			45.5			11.7			27.9		
Approach LOS		D			D			B			C		
Intersection Summary													
HCM 2000 Control Delay			26.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			74.6%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

Queues

4023: Tremont Street & Prentiss St

2/6/2016

				
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	88	80	1359	1288
v/c Ratio	0.54	0.49	1.01	0.72
Control Delay	58.5	50.7	74.0	8.1
Queue Delay	0.0	0.0	1.1	1.7
Total Delay	58.5	50.7	75.0	9.7
Queue Length 50th (ft)	58	65	~416	123
Queue Length 95th (ft)	110	m86	m#498	85
Internal Link Dist (ft)	258		709	152
Turn Bay Length (ft)		150		
Base Capacity (vph)	163	164	1345	1801
Starvation Cap Reductn	0	0	0	326
Spillback Cap Reductn	0	0	5	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.54	0.49	1.01	0.87
















Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

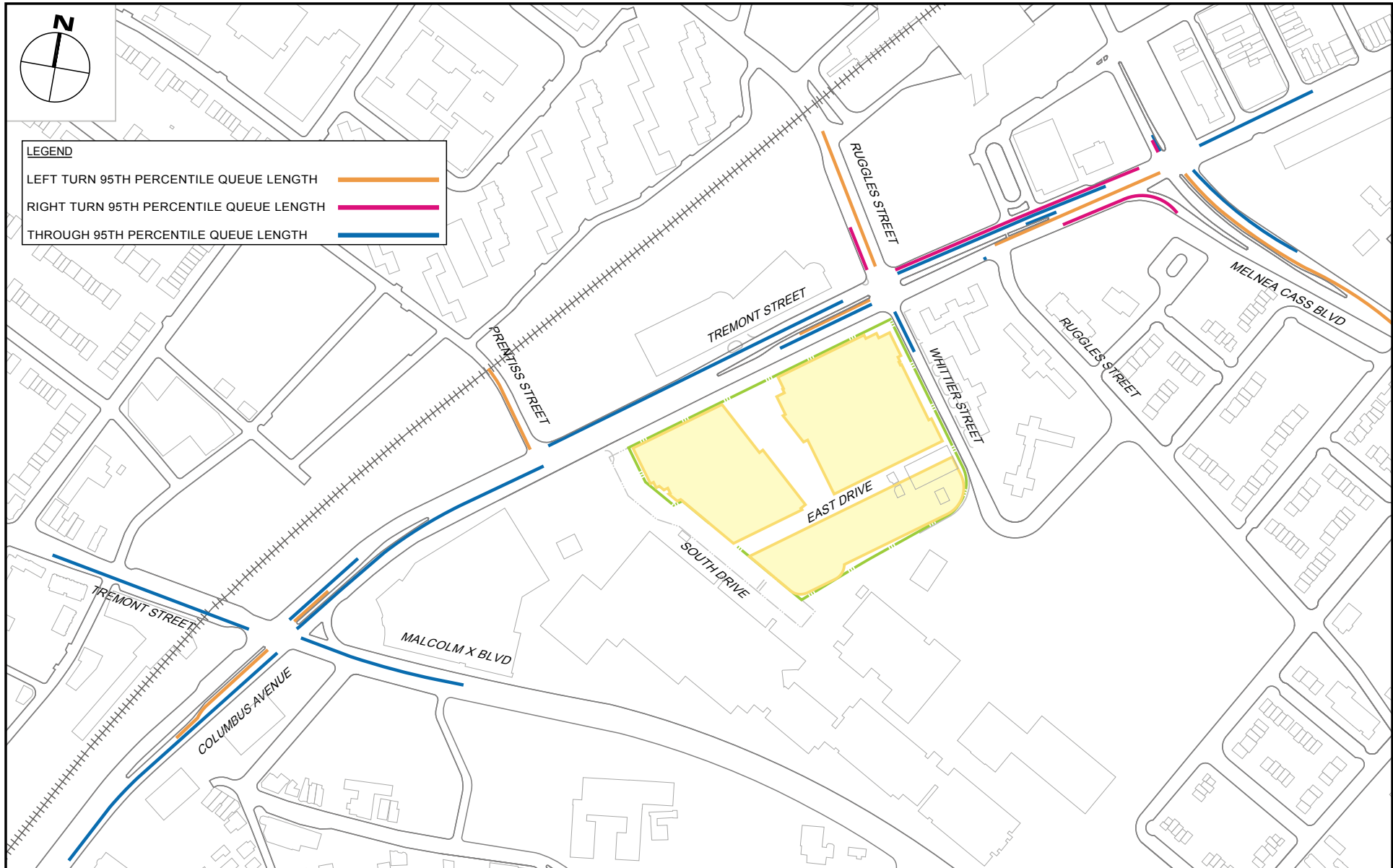
HCM Signalized Intersection Capacity Analysis

4023: Tremont Street & Prentiss St

2/6/2016

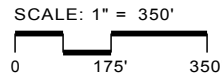
						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		 	  	 	
Traffic Volume (vph)	58	18	74	1264	1059	49
Future Volume (vph)	58	18	74	1264	1059	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1544		1518	4140	2603	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1544		1518	4140	2603	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.86	0.86
Adj. Flow (vph)	67	21	80	1359	1231	57
RTOR Reduction (vph)	9	0	0	0	2	0
Lane Group Flow (vph)	79	0	80	1359	1286	0
Heavy Vehicles (%)	6%	9%	7%	9%	11%	8%
Parking (#/hr)					10	
Turn Type	Prot		Prot	NA	NA	
Protected Phases	10		1	6	2 9	
Permitted Phases						
Actuated Green, G (s)	11.0		12.0	38.0	82.0	
Effective Green, g (s)	12.0		13.0	39.0	83.0	
Actuated g/C Ratio	0.10		0.11	0.32	0.69	
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	2.0		2.0	3.0		
Lane Grp Cap (vph)	154		164	1345	1800	
v/s Ratio Prot	c0.05		c0.05	c0.33	c0.49	
v/s Ratio Perm						
v/c Ratio	0.51		0.49	1.01	0.71	
Uniform Delay, d1	51.2		50.4	40.5	11.3	
Progression Factor	1.00		0.87	1.32	0.52	
Incremental Delay, d2	1.2		6.3	21.8	2.0	
Delay (s)	52.4		50.0	75.2	7.9	
Level of Service	D		D	E	A	
Approach Delay (s)	52.4			73.8	7.9	
Approach LOS	D			E	A	
Intersection Summary						
HCM 2000 Control Delay			43.0		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	19.0
Intersection Capacity Utilization			57.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

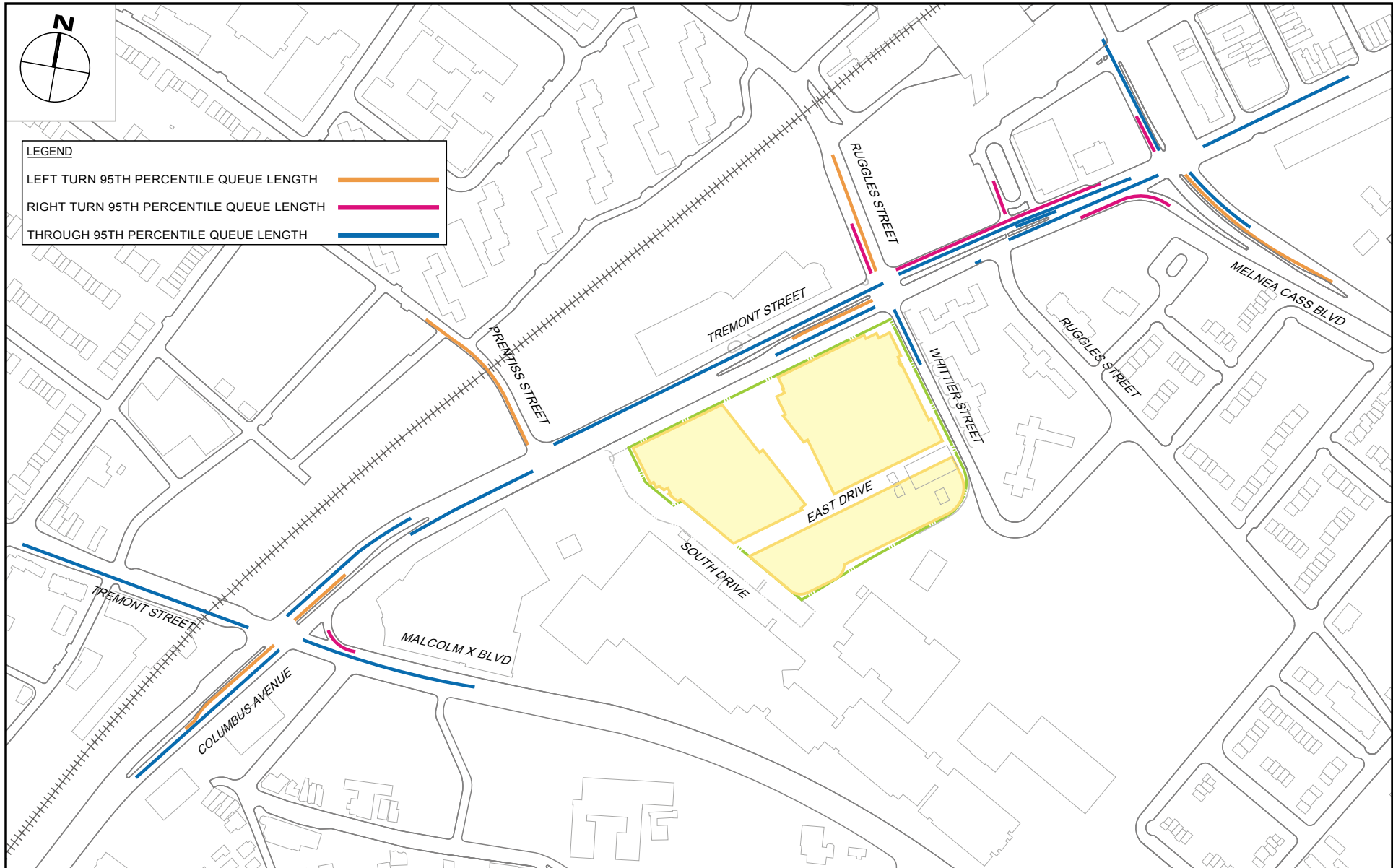
Appendix 2-H: Queue Length Figures



2016 Existing Condition Weekday Morning Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

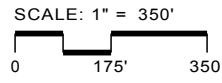
DPIR, February 2016

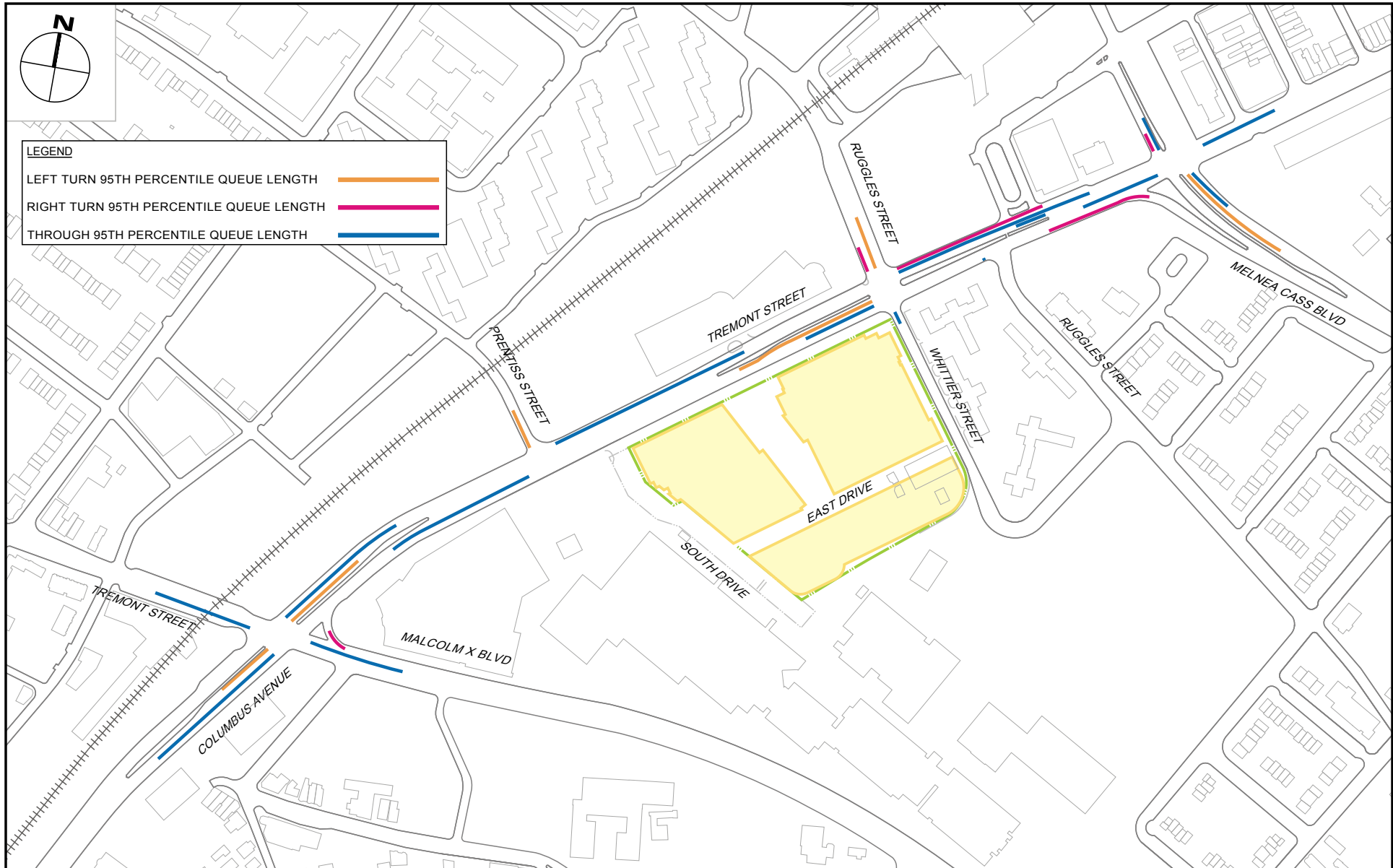




2016 Existing Condition Weekday Afternoon Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

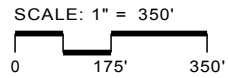
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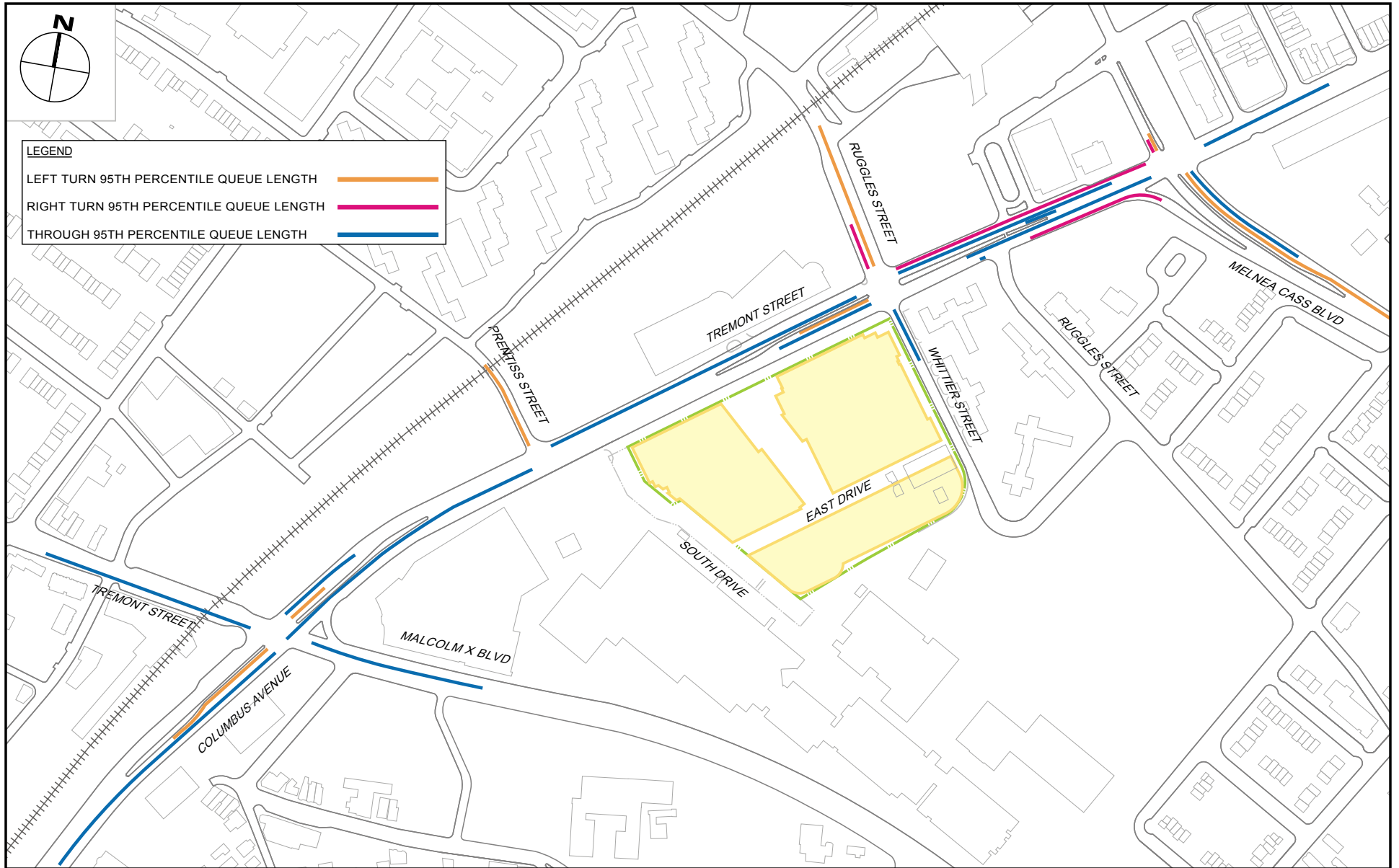




2016 Existing Condition Saturday Midday Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

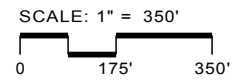
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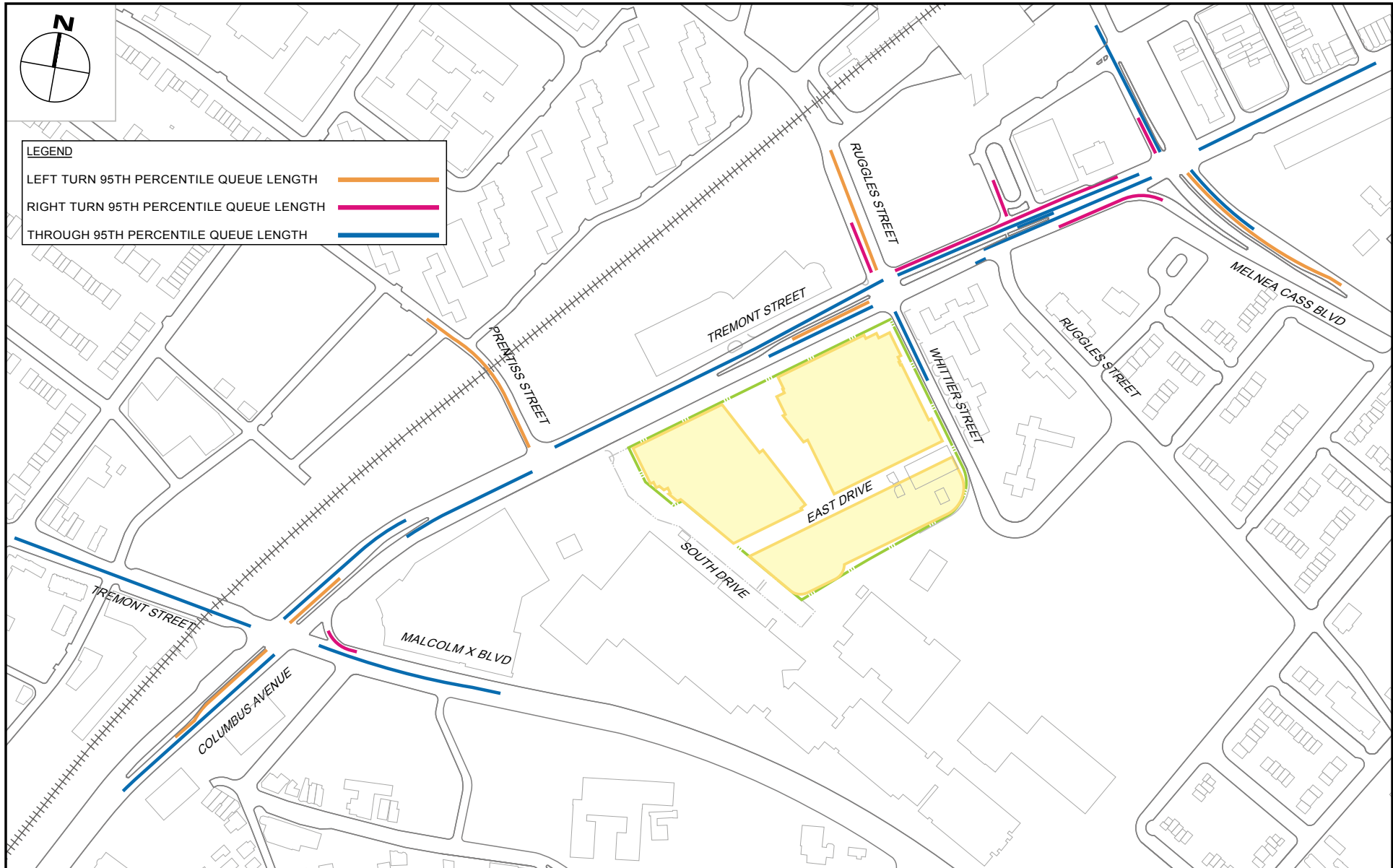




2021 No Build Condition Weekday Morning Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

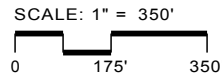
DPIR, February 2016

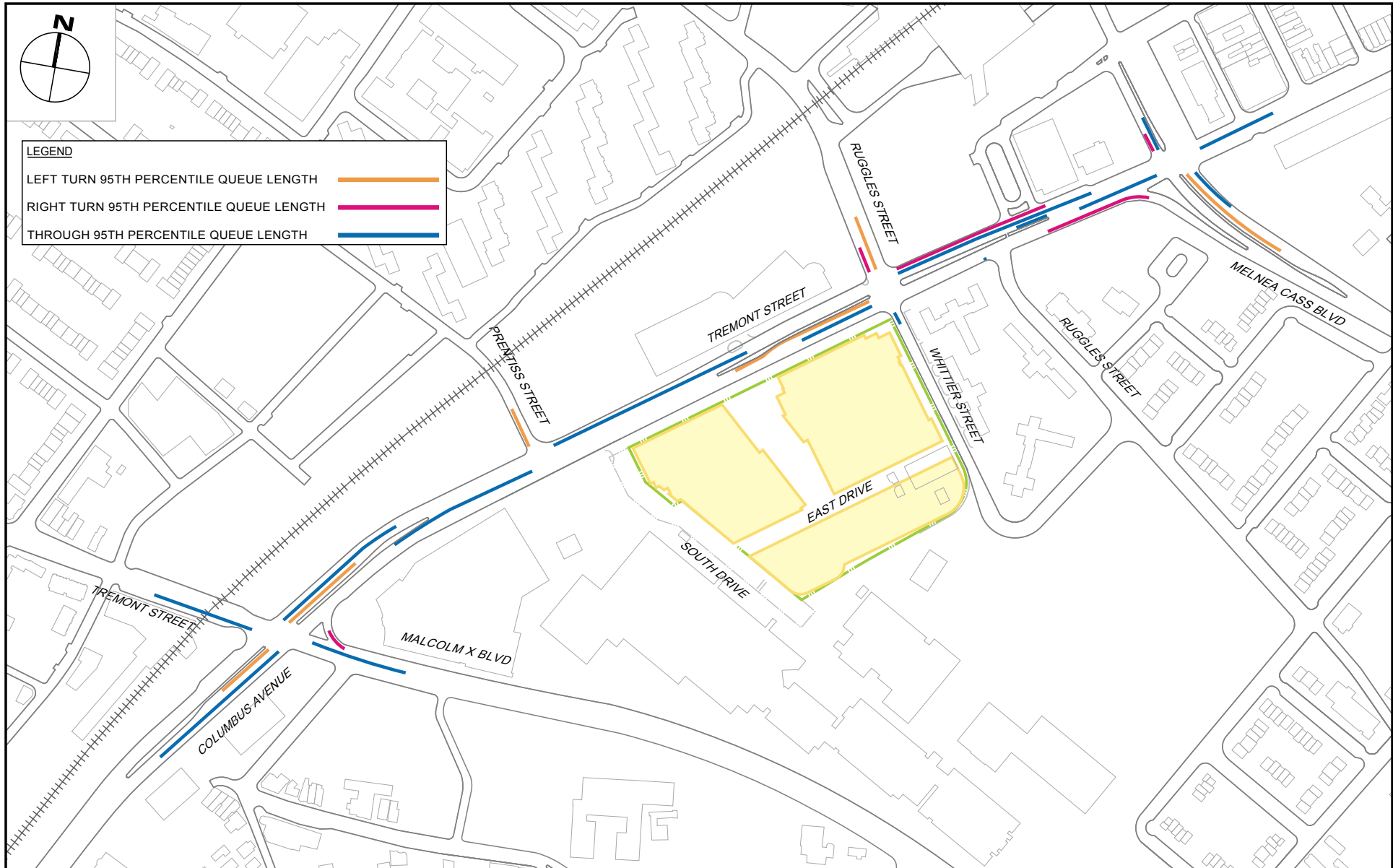




2021 No Build Condition Weekday Afternoon Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

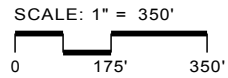
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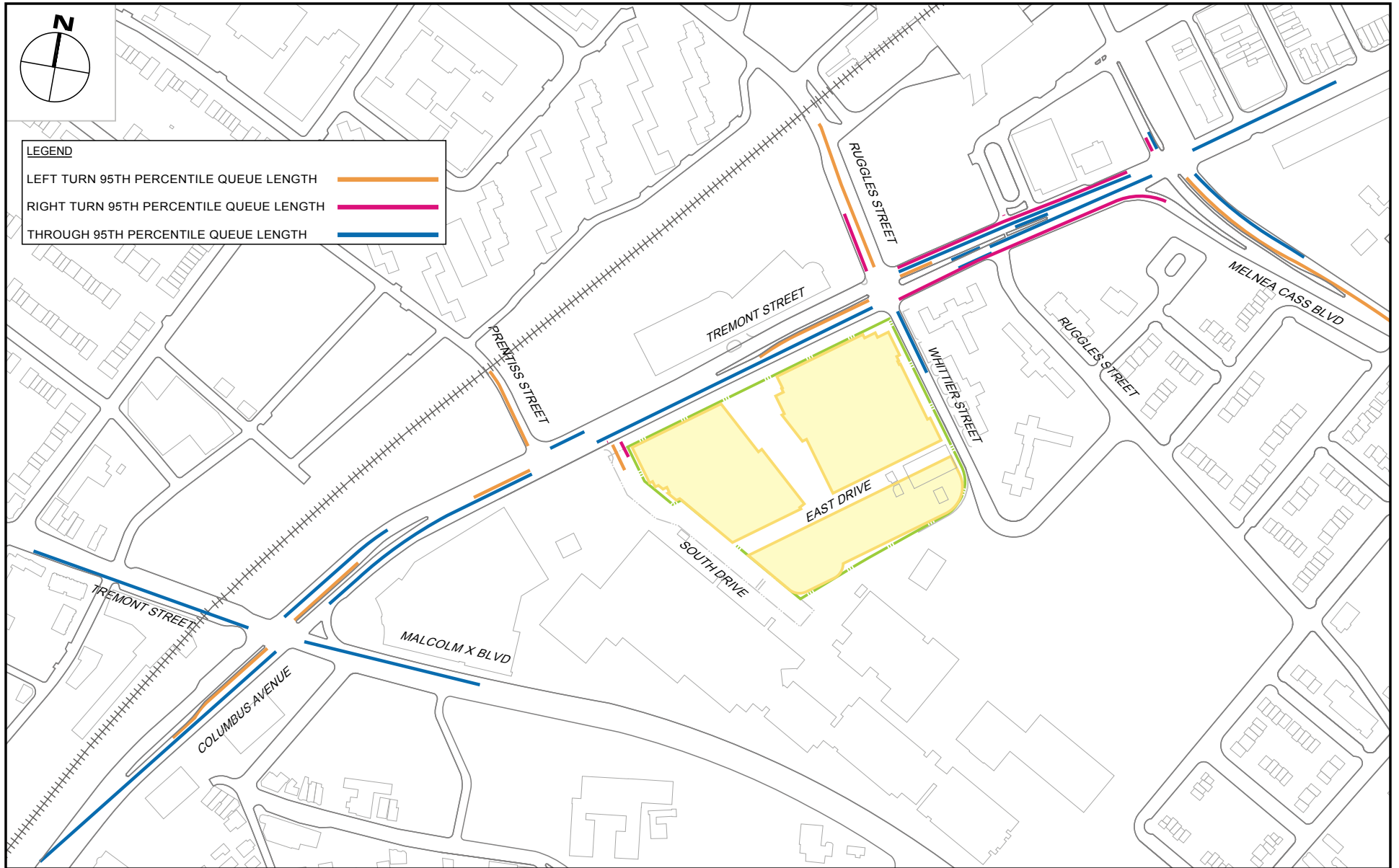




2021 No Build Condition Saturday Midday Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

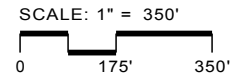
DPIR, February 2016

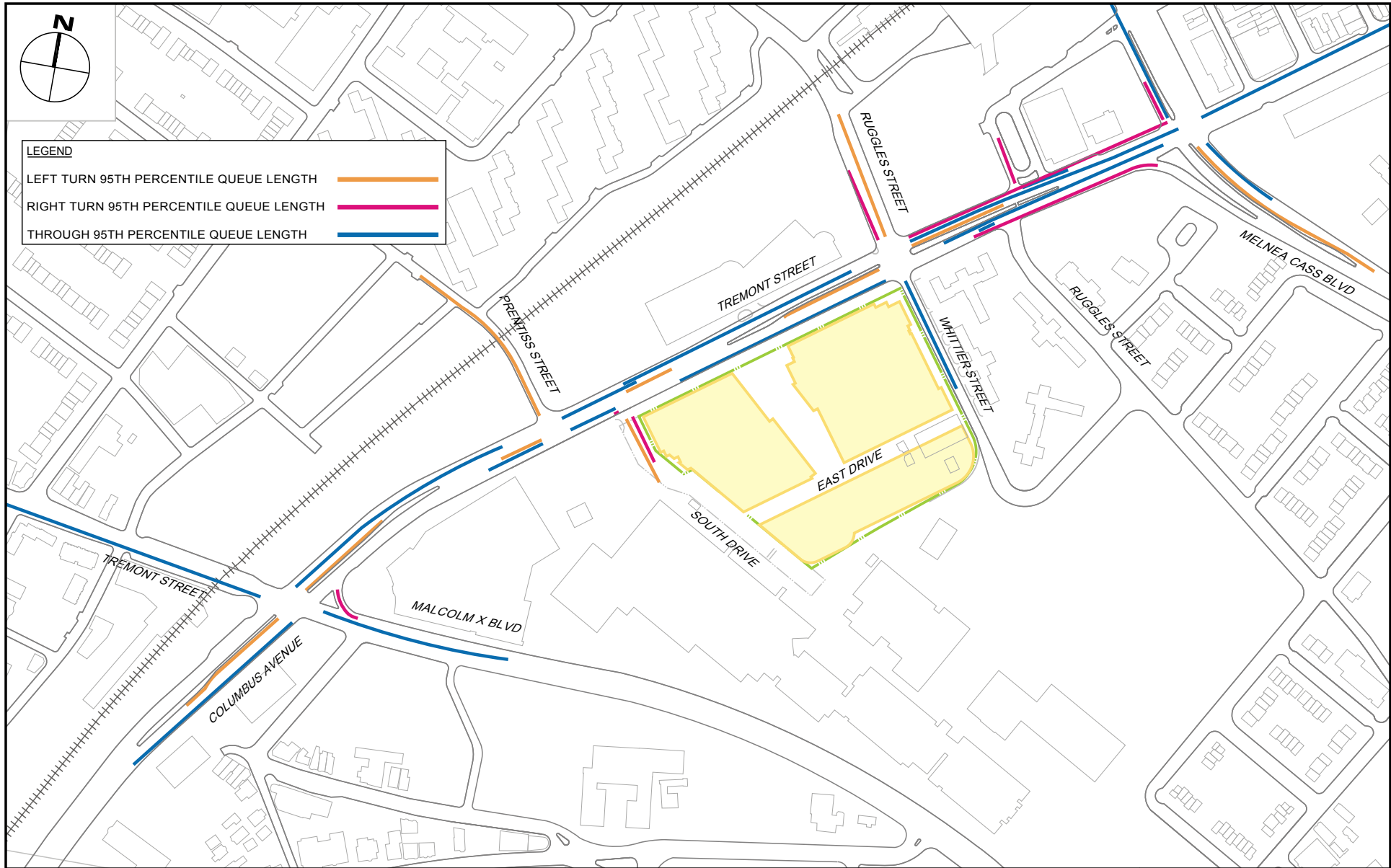




2021 Build Condition Weekday Morning Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

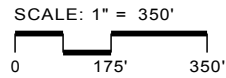
DPIR, February 2016

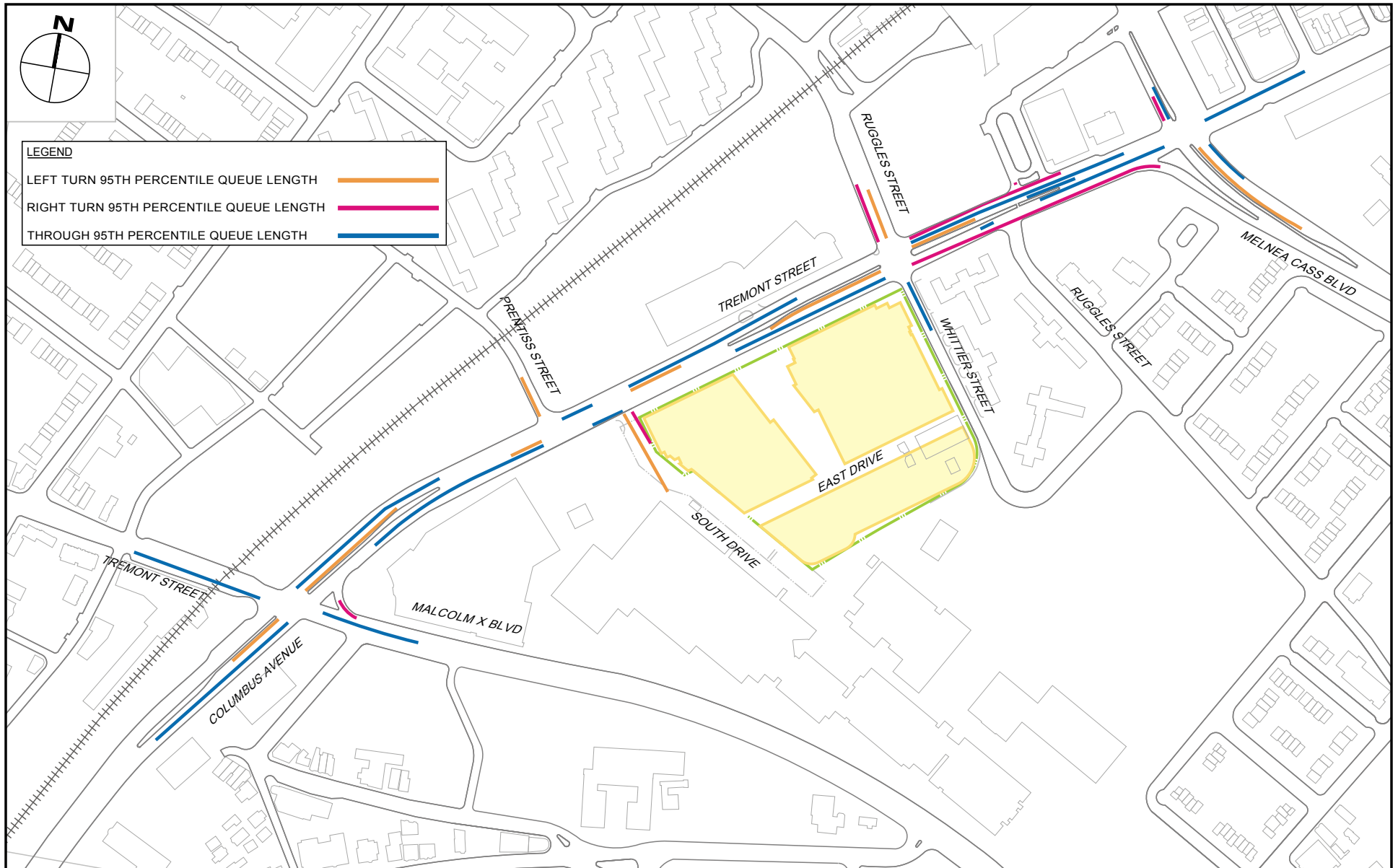




2021 Build Condition Weekday Afternoon Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

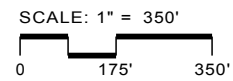
DPIR, February 2016





2021 Build Condition Saturday Midday Peak Hour Queue Lengths
 Tremont Crossing
 Boston, MA

DPIR, February 2016



Appendix 2-I: Proposed Improvement Plans

Figure App 2-I-1: Tremont St. Dimensions @ Whittier St.

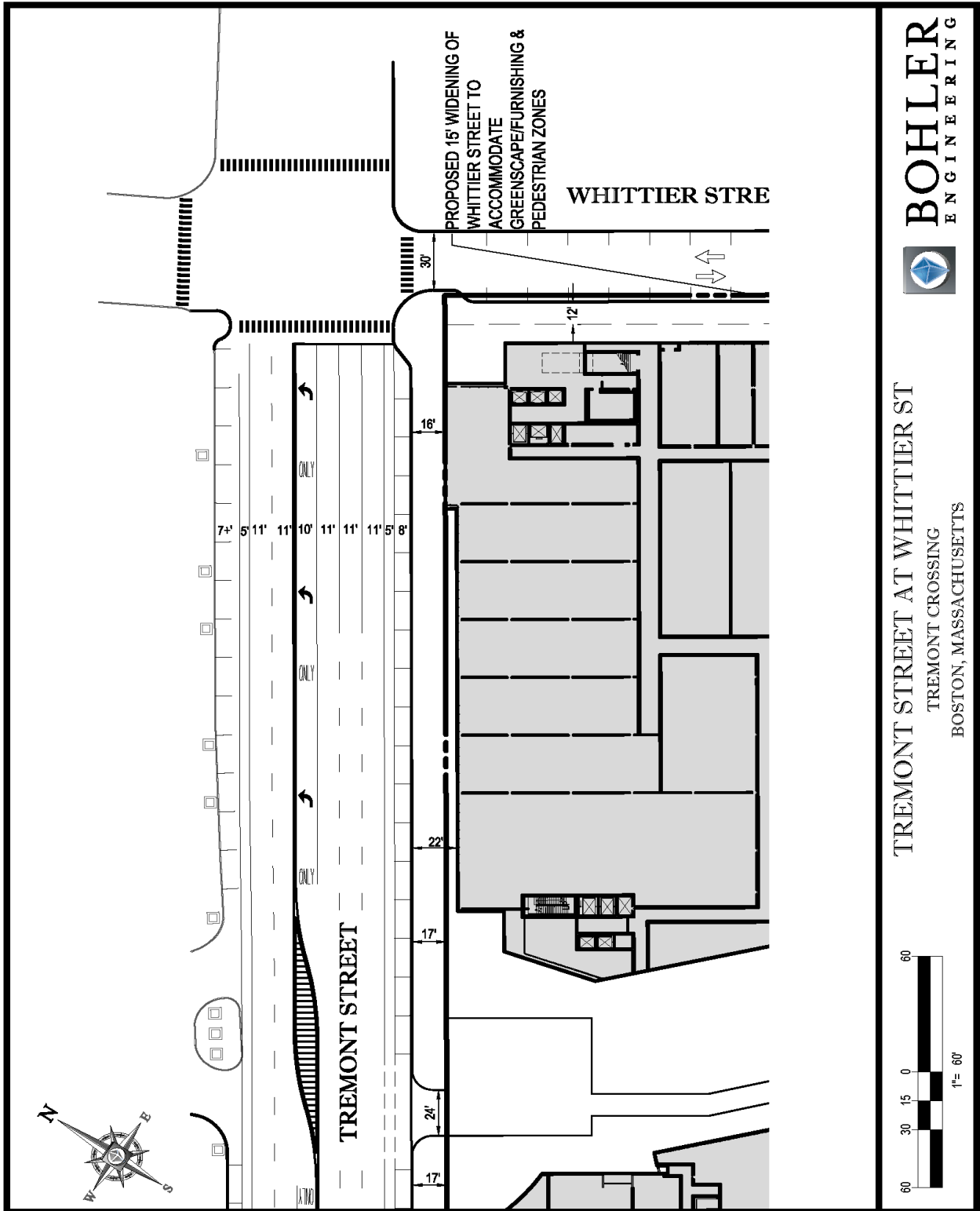


Figure App 2-I-2: Tremont St. Dimensions @ South Dr.

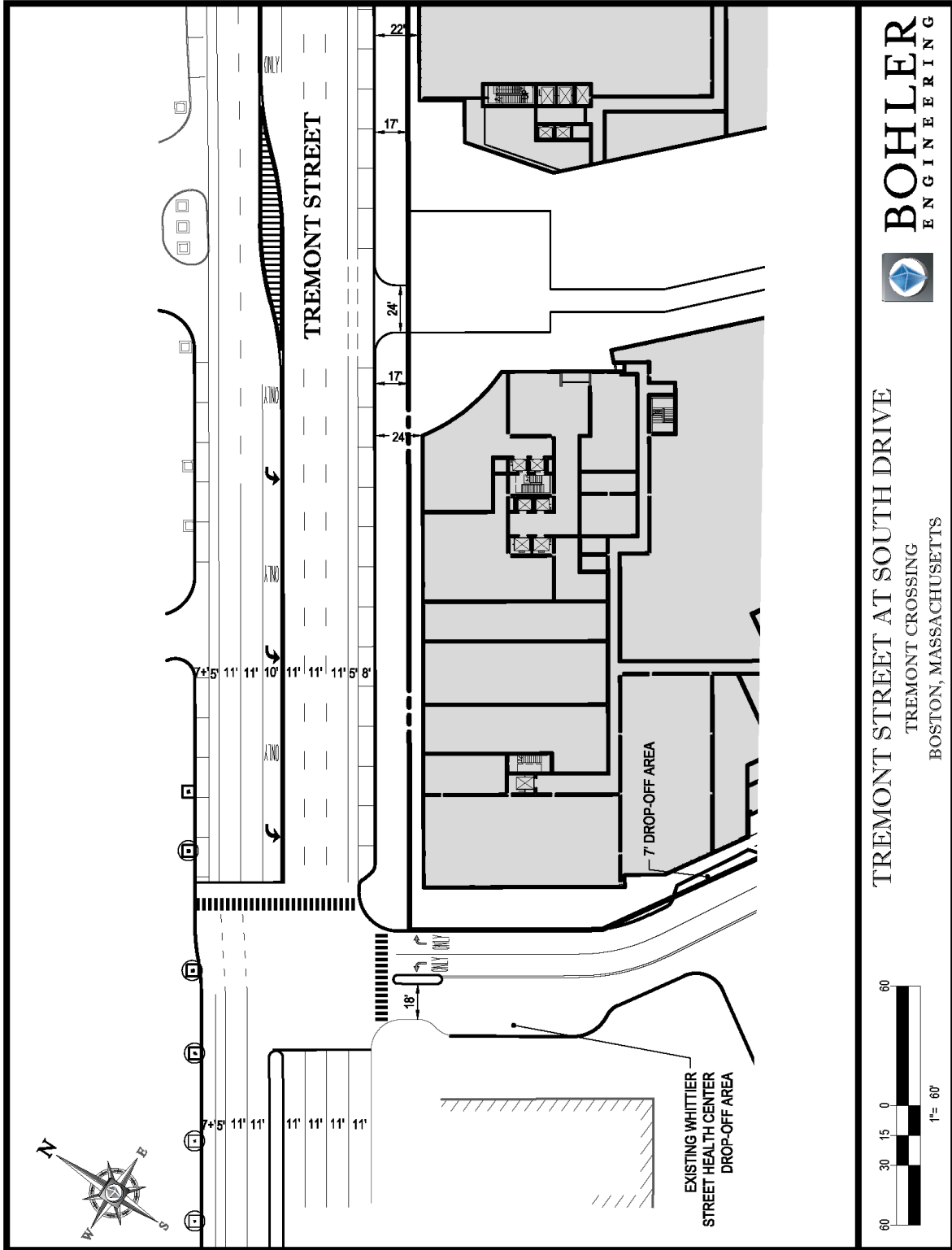


Figure App 2-I-3: South Dr. Dimensions

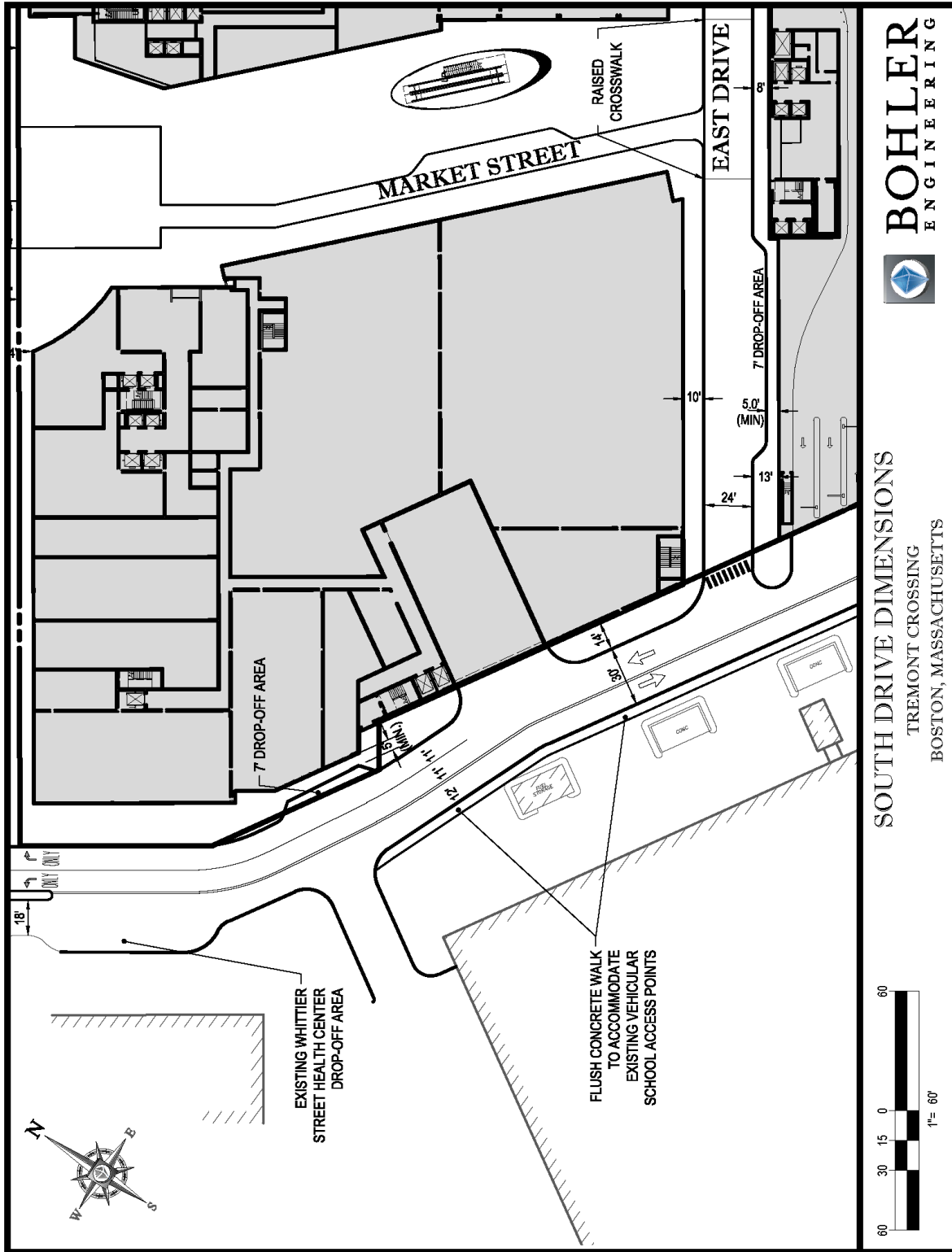


Figure App 2-I-4: East Dr. Dimensions

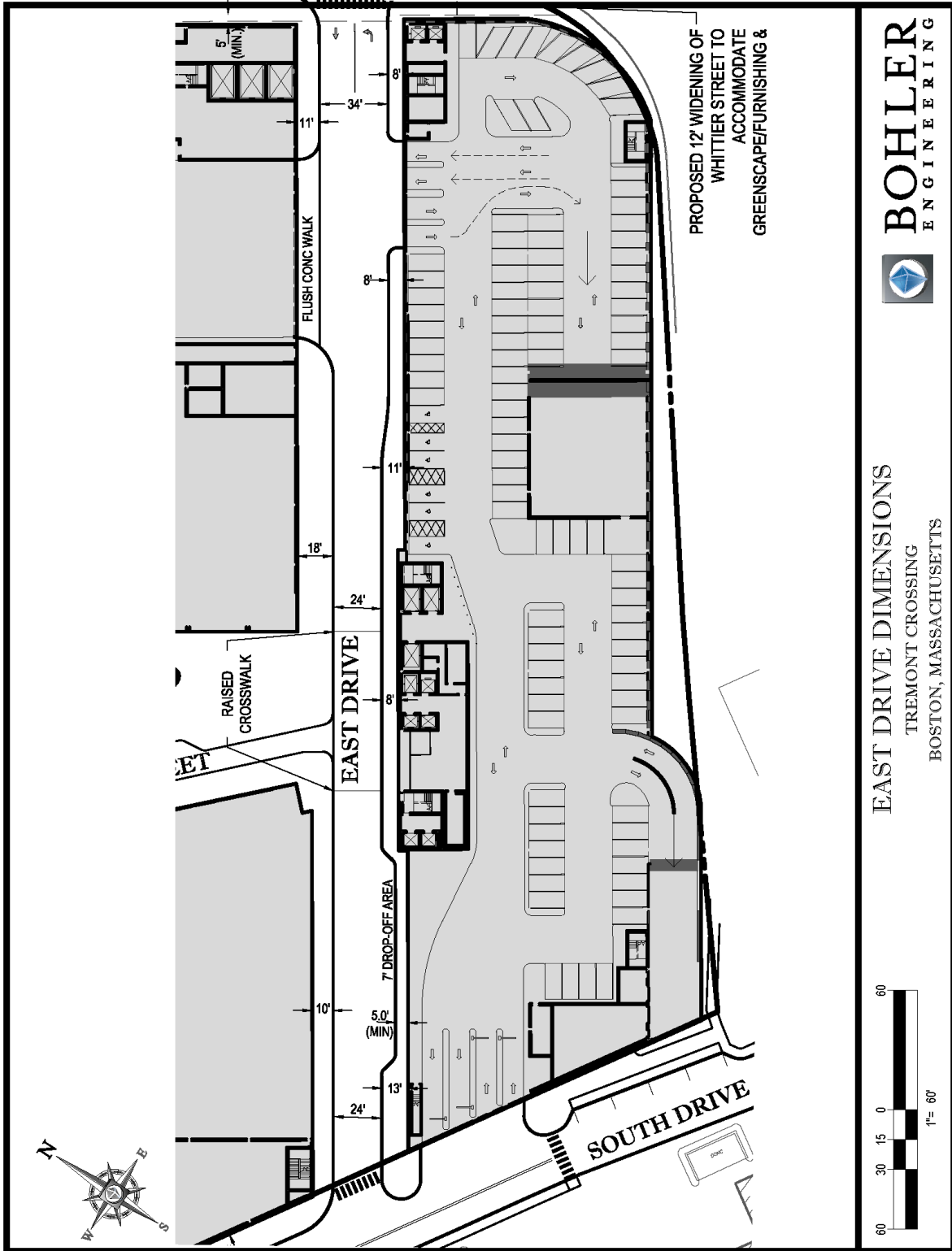


Figure App 2-I-5: Whittier St. Dimensions

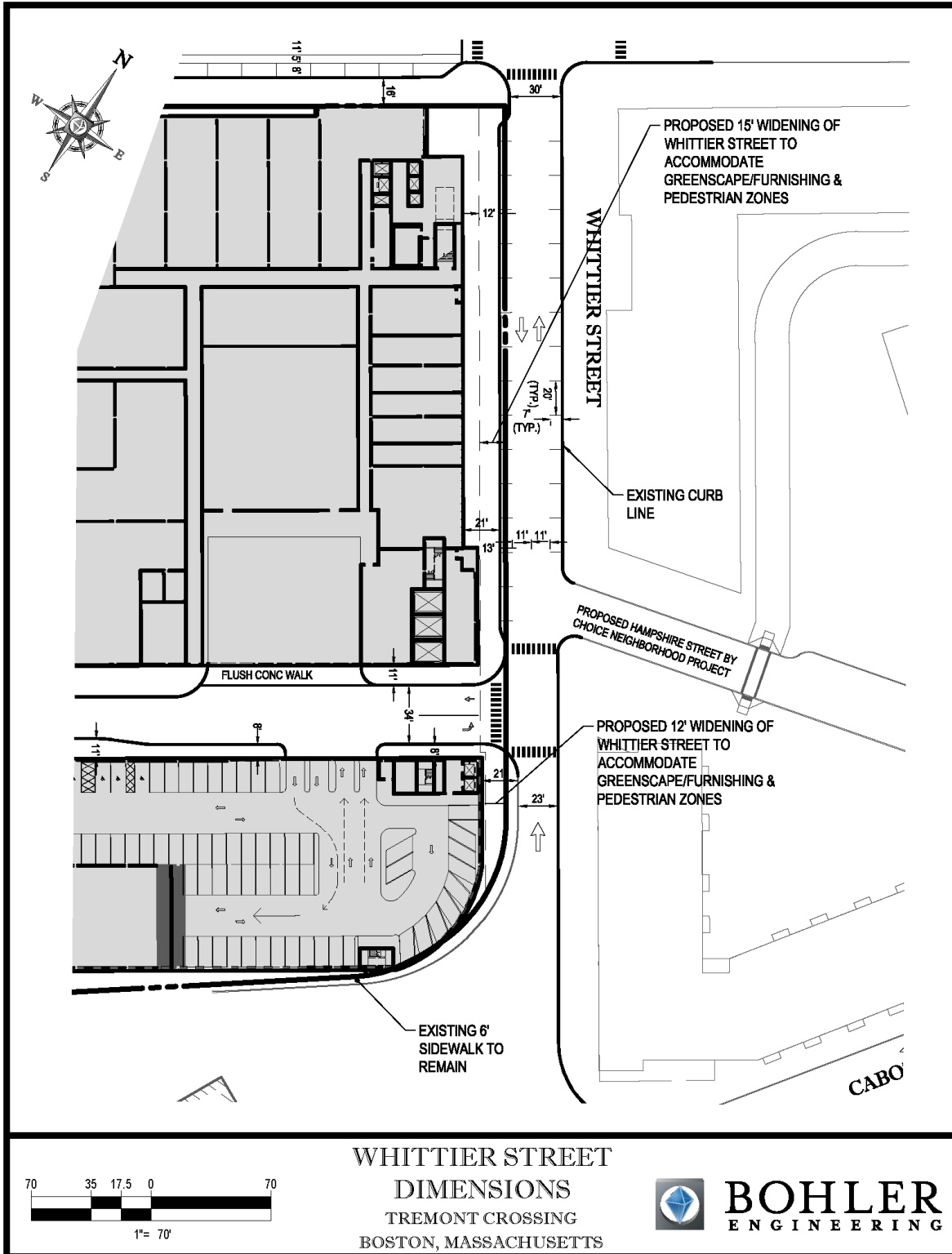
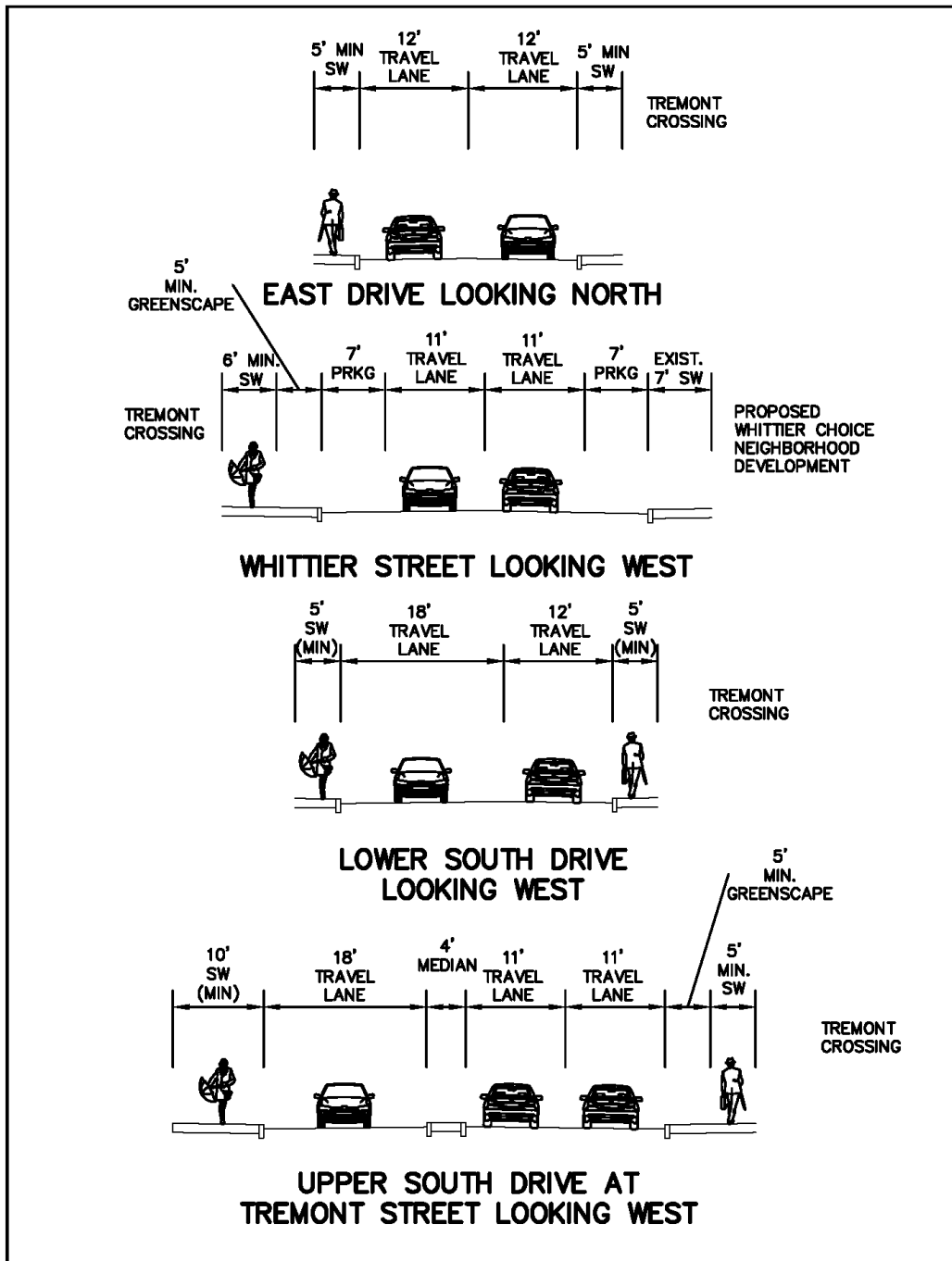


Figure App 2-I-6: Proposed Roadway Cross Sections

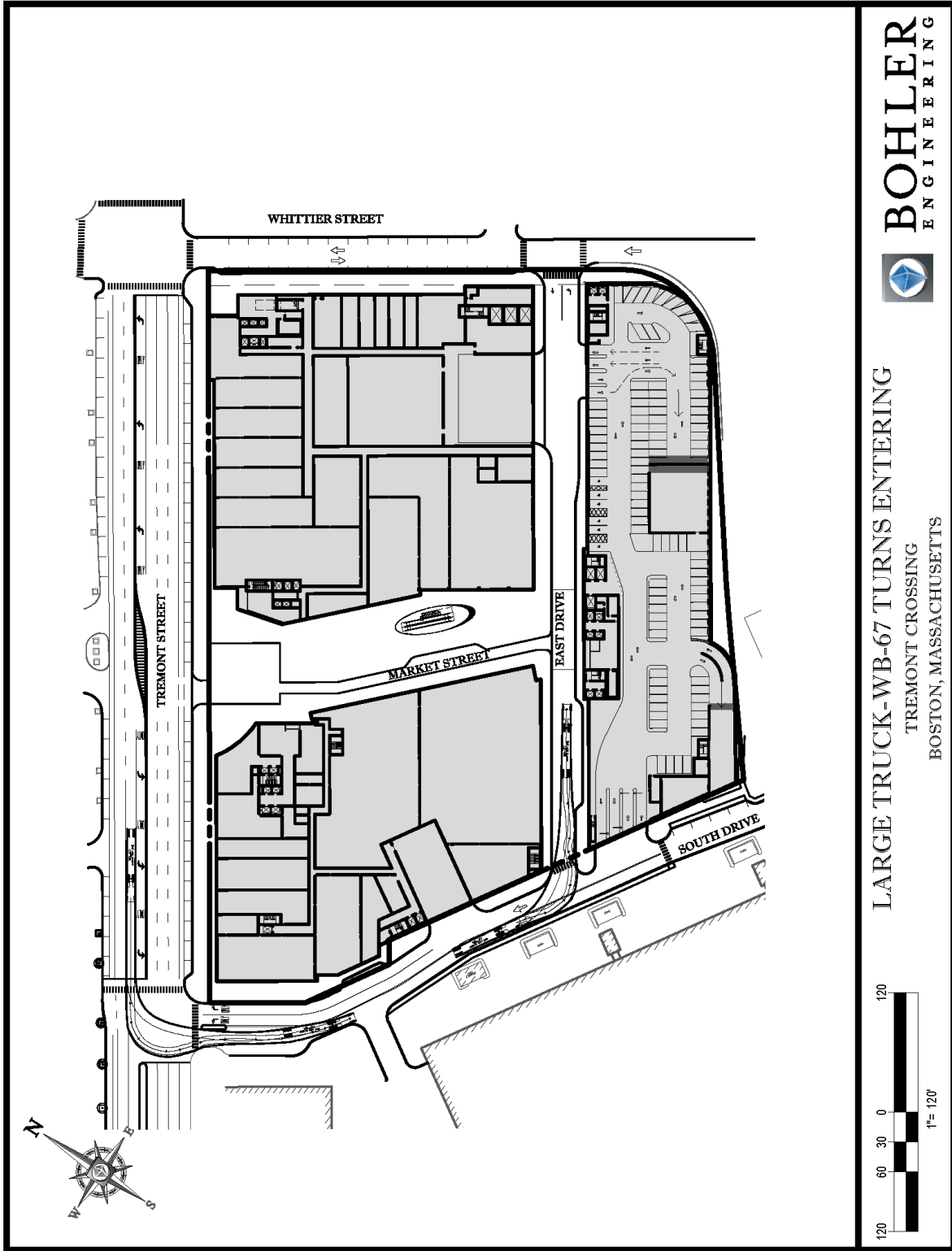


Proposed Cross Sections
Tremont Crossing
Boston, Massachusetts

Not to Scale



Figure App 2-I-7: Large Truck Turning Template - Entering



LARGE TRUCK-WB-67 TURNS ENTERING
TREMONT CROSSING
BOSTON, MASSACHUSETTS

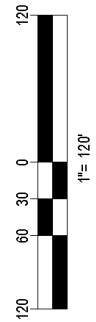


Figure App 2-I-8: Large Truck Turning Template - Existing

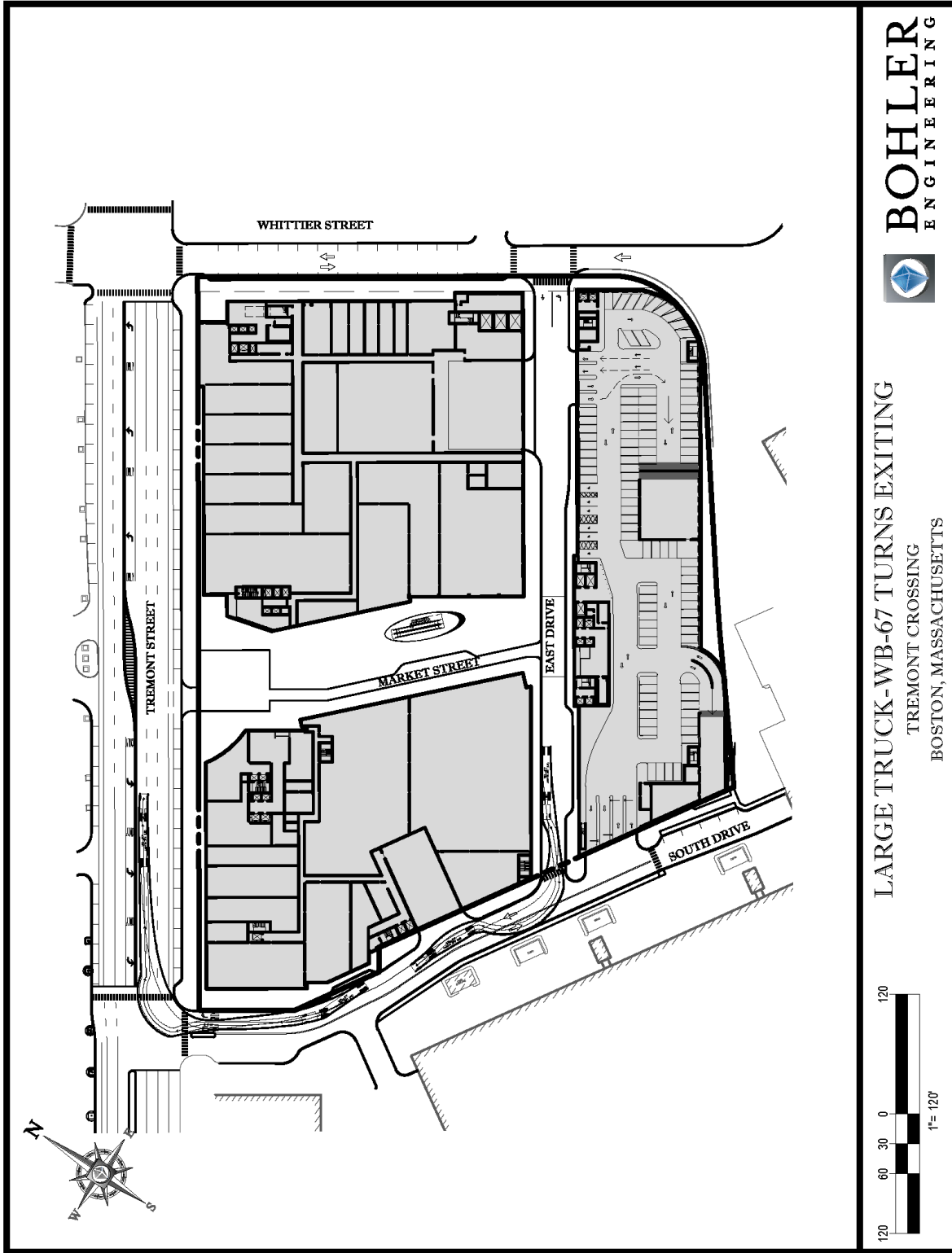


Figure App 2-I-9: Large Truck Turning Template - Loading

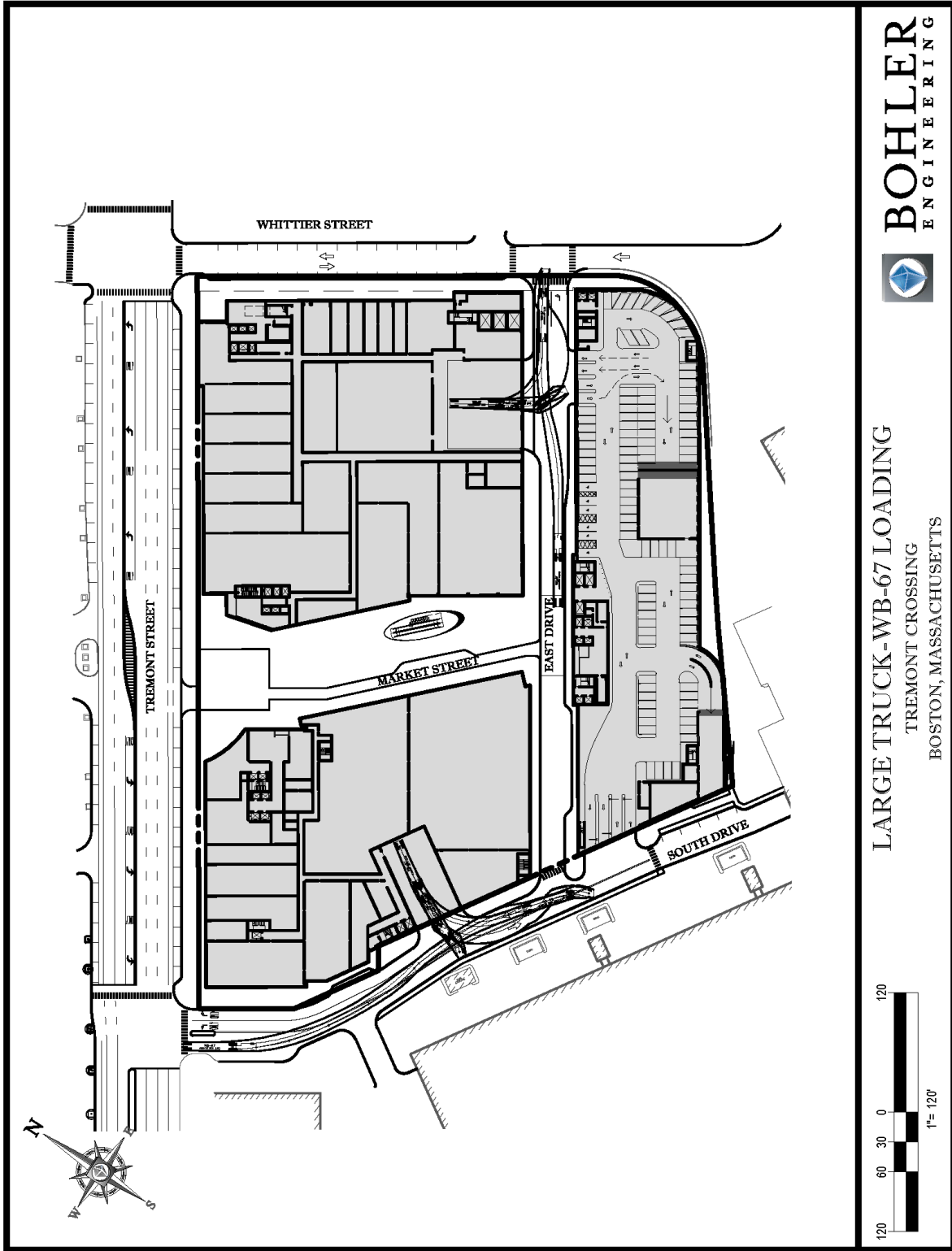
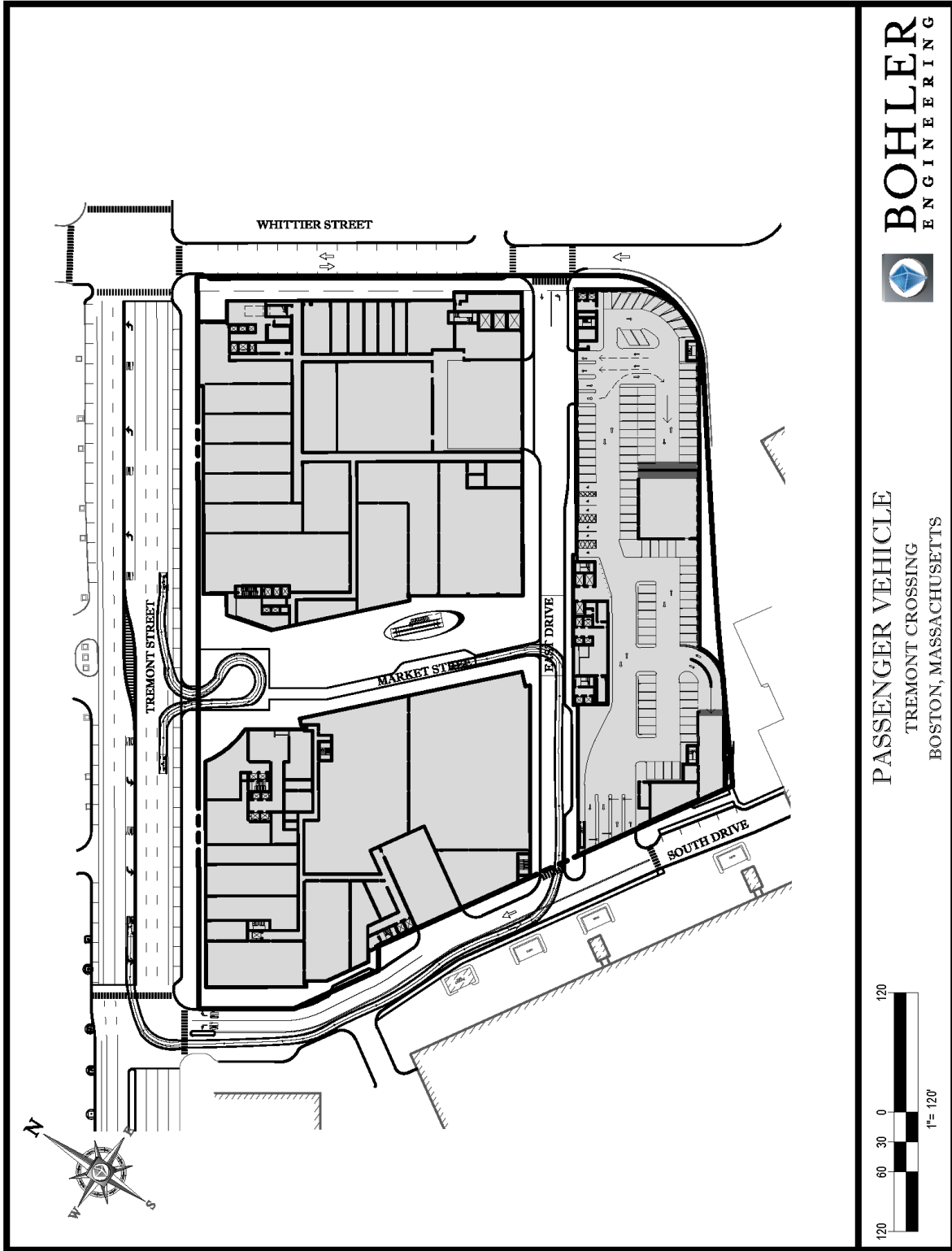


Figure App 2-I-10: Passenger Vehicle Turning Template - Market St.



APPENDIX 3

AIR QUALITY

APPENDIX 3 AIR QUALITY

TREMONT CROSSING DRAFT PROJECT IMPACT REPORT

<u>Pages</u>	<u>Contents</u>
2-4	AERMOD Model Output
5-10	MOBILE6.2 Output for Garage Analysis (vehicles exiting garage) 2013 CO
11	Garage Emissions Analysis Calculations - AM and PM Peak Hour
12- 52	CAL3QHC Model Output for 2012 Existing, 2017 No Build and 2017 Build Scenarios
53 - 55	Figures 1 and 2: CAL3QHC Existing, No-Build and Build Conditions

```

*** AERMOD - VERSION 12345 ***   *** Tremont Crossing Screening Modeling Analysis   ***   08/15/13
                                   *** One Hour CO Modeling Analysis   ***   08:17:54
                                                                                       PAGE 1

**MODELOPTs:  NonDEFAULT CONC           FLAT           FLGPOL           NOCHKD
          SCREEN

-----
***           MODEL SETUP OPTIONS SUMMARY           ***
-----

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT = F
**Model Uses NO WET DEPLETION.  WETDPLT = F

**Model Uses URBAN Dispersion Algorithm for the SBL for      6 Source(s),
for Total of      1 Urban Area(s):
Urban Population =           450.0 ; Urban Roughness Length = 1.000 m

**Model Allows User-Specified Options:
1. Stack-tip Downwash.
2. Model Assumes Receptors on FLAT Terrain.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.
6. Urban Roughness Length of 1.0 Meter Used.

**Other Options Specified:
NOCHKD  - Suppresses checking of date sequence in meteorology files
SCREEN  - Use screening option
which forces calculation of centerline values

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:  1-HR

**This Run Includes:      6 Source(s);      1 Source Group(s); and      504 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =      0.00 ; Decay Coef. =      0.000      ; Rot. Angle =      0.0
Emission Units = GRAMS/SEC      ; Emission Rate Unit Factor =      0.10000E+07
Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      3.6 MB of RAM.

**Input Runstream File:      CO_5yrs_OTHER.DTA
**Output Print File:      CO_5yrs_OTHER.LST

```


10 01 18 18 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 180. 10.0 255.2 2.0
10 01 19 19 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 190. 10.0 255.2 2.0
10 01 20 20 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 200. 10.0 255.2 2.0
10 01 21 21 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 210. 10.0 255.2 2.0
10 01 22 22 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 220. 10.0 255.2 2.0
10 01 23 23 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 230. 10.0 255.2 2.0
10 01 24 24 01 -1.2 0.043 -9.000 0.020 -999. 21. 5.5 1.00 1.62 0.21 0.50 240. 10.0 255.2 2.0

First hour of profile data

YR MO DY HR HEIGHT F WDIR WSPD AMB_TMP sigmaA sigmaW sigmaV
10 01 01 01 10.0 1 10. 0.50 255.3 99.0 -99.00 -99.00

F indicates top of profile (=1) or below (=0)

*** AERMOD - VERSION 12345 *** *** Tremont Crossing Screening Modeling Analysis *** 08/15/13
*** One Hour CO Modeling Analysis *** 08:17:54
PAGE 4

**MODELOPTS: NonDEFAULT CONC FLAT FLGPOL NOCHKD
SCREEN

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL HIGH	1ST HIGH VALUE IS 1148.67318	ON 10013106: AT (327796.30, 4688804.40, 0.00, 0.00, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 12345 *** *** Tremont Crossing Screening Modeling Analysis *** 08/15/13
*** One Hour CO Modeling Analysis *** 08:17:54
PAGE 5

**MODELOPTS: NonDEFAULT CONC FLAT FLGPOL NOCHKD
SCREEN

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)
A Total of 18504 Hours Were Processed
A Total of 0 Calm Hours Identified
A Total of 0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

LEV phase-in data read from file MA_LEV2.D

Calendar Year: 2012
Month: Jan.
Altitude: Low
Minimum Temperature: 22.8 (F)
Maximum Temperature: 38.3 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: No
Reformulated Gas: Yes

Table with 11 columns: Vehicle Type, LDGV, LDGT12, LDGT34, LDGT, HDGV, LDDV, LDDT, HDDV, MC, All Veh. Rows include VMT Distribution and Composite Emission Factors (g/mi).

* #####
* 2012 - Winter at 5.0 mph
* File 1, Run 1, Scenario 2.
* #####

M583 Warning:
The user supplied arterial average speed of 5.0 will be used for all hours of the day. 100% of VMT has been assigned to the arterial/collector roadway type for all hours of the day and all vehicle types.
M112 Warning:
Wintertime Reformulated Gasoline Rules Apply
M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D

Calendar Year: 2012
Month: Jan.
Altitude: Low
Minimum Temperature: 22.8 (F)
Maximum Temperature: 38.3 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: No
Reformulated Gas: Yes

Table with 11 columns: Vehicle Type, LDGV, LDGT12, LDGT34, LDGT, HDGV, LDDV, LDDT, HDDV, MC, All Veh. Rows include VMT Distribution and Composite Emission Factors (g/mi).

* #####
* 2012 - Winter at 25 mph
* File 1, Run 1, Scenario 3.
* #####

M583 Warning:
The user supplied arterial average speed of 25.0 will be used for all hours of the day. 100% of VMT has been assigned to the arterial/collector roadway type for all hours of the day and all vehicle types.
M112 Warning:
Wintertime Reformulated Gasoline Rules Apply
M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D

Calendar Year: 2012
Month: Jan.
Altitude: Low
Minimum Temperature: 22.8 (F)
Maximum Temperature: 38.3 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: No
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
VMT Distribution:	0.3120	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):										
Composite CO :	11.83	10.90	10.94	10.92	8.03	1.418	0.504	1.418	16.70	10.291

* #####
 * 2012 - Winter at 30 mph
 * File 1, Run 1, Scenario 4.
 * #####

M583 Warning:
 The user supplied arterial average speed of 30.0
 will be used for all hours of the day. 100% of VMT
 has been assigned to the arterial/collector roadway
 type for all hours of the day and all vehicle types.

M112 Warning:
 Wintertime Reformulated Gasoline Rules Apply

M 48 Warning:
 there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
 Calendar Year: 2012
 Month: Jan.
 Altitude: Low
 Minimum Temperature: 22.8 (F)
 Maximum Temperature: 38.3 (F)
 Absolute Humidity: 75. grains/lb
 Fuel Sulfur Content: 30. ppm

 Exhaust I/M Program: Yes
 Evap I/M Program: Yes
 ATP Program: No
 Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
VMT Distribution:	0.3120	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):										
Composite CO :	11.74	10.83	10.85	10.84	6.66	1.276	0.448	1.173	14.76	10.140

LEV phase-in data read from file MA_LEV2.D
 Calendar Year: 2017
 Month: Jan.
 Altitude: Low
 Minimum Temperature: 22.8 (F)
 Maximum Temperature: 38.3 (F)
 Absolute Humidity: 75. grains/lb
 Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
 Evap I/M Program: Yes
 ATP Program: No
 Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2753	0.4289	0.1685		0.0365	0.0002	0.0016	0.0854	0.0036	1.0000

 Composite Emission Factors (g/mi):
 Composite CO : 21.89 19.31 19.95 19.49 33.28 2.773 1.239 2.395 104.23 19.471

* #####
 * **2017 - Winter at 5.0 mph**
 * File 1, Run 1, Scenario 2.
 * #####
 M583 Warning:
 The user supplied arterial average speed of 5.0 will be used for all hours of the day. 100% of VMT has been assigned to the arterial/collector roadway type for all hours of the day and all vehicle types.
 M112 Warning:
 Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
 there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
 Calendar Year: 2017
 Month: Jan.
 Altitude: Low
 Minimum Temperature: 22.8 (F)
 Maximum Temperature: 38.3 (F)
 Absolute Humidity: 75. grains/lb
 Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
 Evap I/M Program: Yes
 ATP Program: No
 Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2753	0.4289	0.1685		0.0365	0.0002	0.0016	0.0854	0.0036	1.0000

 Composite Emission Factors (g/mi):
 Composite CO : 15.48 13.65 13.86 13.71 26.59 2.344 1.037 1.955 62.64 13.820

* #####
 * **2017 - Winter at 25 mph**
 * File 1, Run 1, Scenario 3.
 * #####
 M583 Warning:
 The user supplied arterial average speed of 25.0 will be used for all hours of the day. 100% of VMT has been assigned to the arterial/collector roadway type for all hours of the day and all vehicle types.
 M112 Warning:
 Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
 there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
 Calendar Year: 2017
 Month: Jan.
 Altitude: Low
 Minimum Temperature: 22.8 (F)
 Maximum Temperature: 38.3 (F)
 Absolute Humidity: 75. grains/lb
 Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
 Evap I/M Program: Yes
 ATP Program: No
 Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
VMT Distribution:	0.2753	0.4289	0.1685		0.0365	0.0002	0.0016	0.0854	0.0036	1.0000
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Composite Emission Factors (g/mi):										
Composite CO :	10.95	9.48	9.39	9.46	7.25	1.004	0.406	0.581	16.70	9.038
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

* #####
* 2017 - Winter at 30 mph
* File 1, Run 1, Scenario 4.
* #####

M583 Warning:
The user supplied arterial average speed of 30.0
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M112 Warning:
Wintertime Reformulated Gasoline Rules Apply

M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
Calendar Year: 2017
Month: Jan.
Altitude: Low
Minimum Temperature: 22.8 (F)
Maximum Temperature: 38.3 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: No
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
VMT Distribution:	0.2753	0.4289	0.1685		0.0365	0.0002	0.0016	0.0854	0.0036	1.0000
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Composite Emission Factors (g/mi):										
Composite CO :	10.87	9.42	9.32	9.39	6.01	0.906	0.360	0.480	14.76	8.918
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

INDOOR GARAGE ANALYSIS PROGRAM

PROJECT: TREMONT CROSSING GARAGE PEAK SAT. AM HOUR - YEAR: 2012

DISTANCE IN: 704 METERS
DISTANCE OUT: 704 METERS

NUMBER OF EXIT LANES: 1 LANE(S)
TOTAL EXIT VOLUME: 104 VEH/HOUR

CO RATE: 15.99 GRAMS CO/MILE

SPEED IN GARAGE: 5.0 M.P.H.

VENT CFM: 50,000 CFM

TOTAL CO EMISSIONS = 7.38 GRAMS/MIN = 0.123 GRAMS/SEC
TOTAL VENTILATION = 1,416.8 CU. M/MIN

PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES: 4.54 PPM

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2012 EXISTING PEAK PM

DATE : 8/ 9/13

TIME : 13:53:46

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767701.2	*****	768206.7	*****	* 848.	143. AG	104.	100.0	0.0	10.0	1.37	43.1		
2. EB R QUEUE	* 767687.7	*****	769213.4	*****	* 2523.	143. AG	104.	100.0	0.0	10.0	2.48	128.2		
3. WB L QUEUE	* 767996.7	*****	767828.7	*****	* 202.	304. AG	179.	100.0	0.0	25.0	0.54	10.3		
4. WB T/R QUEUE	* 767999.1	*****	767924.0	*****	* 90.	303. AG	90.	100.0	0.0	10.0	0.48	4.5		
5. NB L/T QUEUE	* 767637.6	*****	767774.4	*****	* 165.	56. AG	129.	100.0	0.0	20.0	0.54	8.4		
6. NB R FRE FLO (1)	* 767643.6	*****	767755.0	*****	* 129.	60. AG	1100.	10.1	0.0	30.0				
7. NB R FRE FLO (2)	* 767755.0	*****	767822.7	*****	* 68.	89. AG	1100.	10.1	0.0	30.0				
8. NB R FRE FLO (3)	* 767822.7	*****	767970.0	*****	* 159.	113. AG	1100.	10.1	0.0	30.0				
9. SB L/T/R QUEUE	* 767990.1	*****	767867.0	*****	* 152.	234. AG	35.	100.0	0.0	20.0	0.49	7.7		
10. EB OUT FRE FLO	* 767805.9	*****	767986.3	*****	* 223.	126. AG	1391.	10.3	0.0	30.0				
11. WB OUT FRE FLO	* 767845.1	*****	767721.5	*****	* 196.	321. AG	361.	10.1	0.0	30.0				
12. NB OUT FRE FLO	* 767824.4	*****	768006.3	*****	* 220.	56. AG	1098.	10.1	0.0	35.0				
13. SB OUT FRE FLO	* 767831.0	*****	767627.8	*****	* 244.	236. AG	1621.	10.1	0.0	35.0				

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2012 EXISTING PEAK PM

DATE : 8/9/13

TIME : 13:53:46

ADDITIONAL QUEUE LINK PARAMETERS

```

-----
LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
    
```

```

-----*-----
1. EB L/T QUEUE * 140 119 4.0 238 1626 45.44 2 3
2. EB R QUEUE * 140 119 4.0 370 1398 45.44 2 3
3. WB L QUEUE * 140 103 4.0 719 3015 45.44 2 3
4. WB T/R QUEUE * 140 103 4.0 159 1501 45.44 2 3
5. NB L/T QUEUE * 140 74 4.0 815 1744 45.44 2 3
9. SB L/T/R QUEUE * 140 89 4.0 624 1971 10.14 2 3
    
```

RECEPTOR LOCATIONS

```

-----
* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767675.3 ***** 5.9 *
2. 2 * 767714.4 ***** 5.9 *
3. 3 * 767758.7 ***** 5.9 *
4. 4 * 767702.1 ***** 5.9 *
5. 5 * 767624.2 ***** 5.9 *
6. 6 * 767657.7 ***** 5.9 *
7. 7 * 767742.2 ***** 5.9 *
8. 8 * 767815.7 ***** 5.9 *
9. 9 * 767881.3 ***** 5.9 *
10. 10 * 767945.8 ***** 5.9 *
11. 11 * 767828.2 ***** 5.9 *
12. 12 * 768009.3 ***** 5.9 *
13. 13 * 767954.6 ***** 5.9 *
14. 14 * 767898.3 ***** 5.9 *
15. 15 * 767955.1 ***** 5.9 *
16. 16 * 768009.8 ***** 5.9 *
17. 17 * 767957.9 ***** 5.9 *
18. 18 * 767904.8 ***** 5.9 *
19. 19 * 767837.6 ***** 5.9 *
20. 20 * 767785.6 ***** 5.9 *
21. 21 * 767750.6 ***** 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

-----*

0.	*	0.0	0.5	0.6	0.2	0.0	1.0	1.0	0.9	1.3	1.0	1.7	0.1	0.1	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0
10.	*	0.0	0.5	0.5	0.2	0.0	1.0	1.1	1.0	1.3	1.0	1.5	0.0	0.1	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0
20.	*	0.0	0.6	0.5	0.2	0.0	1.2	1.0	1.0	1.2	0.9	1.4	0.0	0.1	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0
30.	*	0.0	0.5	0.5	0.2	0.1	1.3	1.2	1.0	1.2	0.7	1.5	0.0	0.0	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0
40.	*	0.1	0.5	0.5	0.2	0.3	1.2	1.1	1.0	1.2	0.5	1.4	0.0	0.0	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0
50.	*	0.2	0.5	0.5	0.3	0.4	1.4	0.8	1.0	1.2	0.4	1.3	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0
60.	*	0.3	0.5	0.7	0.6	0.7	1.2	0.9	0.9	1.1	0.2	1.3	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2	0.0	0.0
70.	*	0.4	0.5	0.9	0.9	1.1	0.8	0.7	0.9	1.0	0.1	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.0	0.0
80.	*	0.5	0.6	1.1	1.0	1.2	0.6	0.6	0.9	1.0	0.0	1.3	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.0	0.0
90.	*	0.6	0.7	1.3	1.2	1.5	0.4	0.7	0.8	0.9	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.1
100.	*	0.7	0.8	1.7	1.3	1.4	0.2	0.4	0.6	0.8	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.1
110.	*	0.8	1.0	1.7	1.3	1.0	0.2	0.3	0.6	0.6	0.1	1.4	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1	0.1
120.	*	1.1	1.0	1.9	1.2	1.1	0.1	0.2	0.4	0.5	0.2	1.3	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.3	0.1	0.1
130.	*	1.0	1.3	1.4	1.0	0.9	0.1	0.2	0.3	0.6	0.4	1.2	0.0	0.2	0.3	0.0	0.0	0.2	0.3	0.5	0.3	0.3
140.	*	0.9	1.0	1.2	1.0	0.9	0.0	0.1	0.3	0.5	0.8	1.2	0.0	0.3	0.6	0.0	0.0	0.3	0.3	0.8	0.7	0.7
150.	*	0.5	0.6	1.1	1.0	0.7	0.0	0.0	0.1	0.3	1.1	0.8	0.1	0.7	1.0	0.1	0.1	0.4	0.5	1.0	1.1	1.1
160.	*	0.3	0.4	0.8	0.7	0.5	0.0	0.0	0.0	0.1	1.1	0.5	0.2	0.8	1.0	0.3	0.1	0.4	0.7	1.2	1.0	1.0
170.	*	0.3	0.4	0.7	0.8	0.5	0.0	0.0	0.0	0.0	0.9	0.3	0.2	1.1	0.9	0.5	0.2	0.6	0.9	1.3	0.8	0.8
180.	*	0.2	0.4	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.8	0.3	0.3	1.1	0.9	0.7	0.3	0.7	0.9	1.2	0.7	0.7
190.	*	0.1	0.4	0.8	0.8	0.1	0.0	0.0	0.0	0.0	0.8	0.3	0.4	1.1	0.9	0.7	0.4	0.8	1.0	1.1	0.6	0.6
200.	*	0.0	0.2	0.8	0.8	0.1	0.0	0.0	0.0	0.0	0.6	0.3	0.7	1.1	0.9	0.6	0.5	0.8	0.8	1.2	0.7	0.7
210.	*	0.0	0.1	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.9	1.1	0.9	0.7	0.6	0.8	0.8	1.0	0.6	0.6
220.	*	0.0	0.0	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.6	0.3	0.9	1.1	1.0	0.7	0.6	0.8	0.9	1.0	0.4	0.4
230.	*	0.0	0.0	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.6	0.4	1.1	1.1	1.2	1.0	0.8	0.5	0.6	0.8	0.3	0.3
240.	*	0.0	0.0	0.2	0.1	0.0	0.0	0.3	0.0	0.0	0.6	0.6	1.1	1.1	1.4	1.1	1.0	0.3	0.4	0.6	0.3	0.3
250.	*	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.1	0.0	0.6	0.7	1.1	1.4	1.4	1.1	0.9	0.2	0.3	0.4	0.3	0.3
260.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.4	0.0	0.6	0.6	1.3	1.1	1.3	0.8	0.8	0.0	0.2	0.3	0.3	0.3
270.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.5	0.3	0.7	0.7	1.3	1.2	1.1	0.9	0.6	0.0	0.2	0.3	0.3	0.3
280.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.4	1.2	0.5	1.1	1.0	0.9	0.7	0.5	0.0	0.0	0.3	0.3	0.3
290.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.5	1.1	0.4	0.9	0.7	0.8	0.5	0.5	0.0	0.0	0.3	0.2	0.2
300.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.8	0.4	1.4	0.5	0.8	0.5	0.7	0.5	0.5	0.0	0.0	0.3	0.1	0.1
310.	*	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.6	0.6	1.5	0.6	0.2	0.1	0.5	0.5	0.5	0.0	0.0	0.1	0.1	0.1
320.	*	0.0	0.1	0.1	0.0	0.0	0.5	0.9	0.6	0.9	1.7	0.8	0.1	0.1	0.3	0.5	0.3	0.0	0.0	0.1	0.0	0.0
330.	*	0.0	0.1	0.3	0.0	0.0	0.6	0.9	0.8	1.1	1.8	1.1	0.1	0.1	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0
340.	*	0.0	0.3	0.3	0.0	0.0	0.7	0.9	0.7	1.3	1.3	1.4	0.1	0.1	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0
350.	*	0.0	0.3	0.5	0.0	0.0	0.9	0.9	0.8	1.3	1.0	1.5	0.1	0.1	0.4	0.5	0.2	0.0	0.0	0.0	0.0	0.0
360.	*	0.0	0.5	0.6	0.2	0.0	1.0	1.0	0.9	1.3	1.0	1.7	0.1	0.1	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0

-----*-----
 MAX * 1.1 1.3 1.9 1.3 1.5 1.4 1.2 1.0 1.3 1.8 1.7 1.3 1.4 1.4 1.1 1.0 0.8 1.0 1.3 1.1
 DEGR * 120 130 120 100 90 50 30 10 0 330 0 260 250 240 240 240 190 190 170 150

PAGE 4

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2012 EXISTING PEAK PM

MODEL RESULTS

REMARKS : In search of the angle corresponding to
 the maximum concentration, only the first
 angle, of the angles with same maximum
 concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC21

-----*-----

0. * 0.0
 10. * 0.0
 20. * 0.0
 30. * 0.0
 40. * 0.0
 50. * 0.0
 60. * 0.0
 70. * 0.0
 80. * 0.0
 90. * 0.0
 100. * 0.0
 110. * 0.1
 120. * 0.1
 130. * 0.2
 140. * 0.6
 150. * 0.9
 160. * 0.8
 170. * 0.6
 180. * 0.6
 190. * 0.5
 200. * 0.5
 210. * 0.4
 220. * 0.3
 230. * 0.3
 240. * 0.3
 250. * 0.3
 260. * 0.1
 270. * 0.0
 280. * 0.0
 290. * 0.0
 300. * 0.0
 310. * 0.0
 320. * 0.0

330. * 0.0
340. * 0.0
350. * 0.0
360. * 0.0
-----*-----
MAX * 0.9
DEGR. * 150

THE HIGHEST CONCENTRATION OF 1.90 PPM OCCURRED AT RECEPTOR REC3 .

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2012 EXISTING PEAK PM
 DATE : 8/ 9/13
 TIME : 14:25:15

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767701.2	*****	768206.7	*****	*****	848.	143. AG	104.	100.0	0.0	10.0	1.37	43.1
2. EB R QUEUE	* 767687.7	*****	769213.4	*****	*****	2523.	143. AG	104.	100.0	0.0	10.0	2.48	128.2
3. WB L QUEUE	* 767996.7	*****	767828.7	*****	*****	202.	304. AG	179.	100.0	0.0	25.0	0.54	10.3
4. WB T/R QUEUE	* 767999.1	*****	767924.0	*****	*****	90.	303. AG	90.	100.0	0.0	10.0	0.48	4.5
5. NB L/T QUEUE	* 767637.6	*****	767774.4	*****	*****	165.	56. AG	129.	100.0	0.0	20.0	0.54	8.4
6. NB R FRE FLO (1)	* 767643.6	*****	767755.0	*****	*****	129.	60. AG	1100.	10.1	0.0	30.0		
7. NB R FRE FLO (2)	* 767755.0	*****	767822.7	*****	*****	68.	89. AG	1100.	10.1	0.0	30.0		
8. NB R FRE FLO (3)	* 767822.7	*****	767970.0	*****	*****	159.	113. AG	1100.	10.1	0.0	30.0		
9. SB L/T/R QUEUE	* 767990.1	*****	767867.0	*****	*****	152.	234. AG	35.	100.0	0.0	20.0	0.49	7.7
10. EB OUT FRE FLO	* 767805.9	*****	767986.3	*****	*****	223.	126. AG	1391.	10.3	0.0	30.0		
11. WB OUT FRE FLO	* 767845.1	*****	767721.5	*****	*****	196.	321. AG	361.	10.1	0.0	30.0		
12. NB OUT FRE FLO	* 767824.4	*****	768006.3	*****	*****	220.	56. AG	1098.	10.1	0.0	35.0		
13. SB OUT FRE FLO	* 767831.0	*****	767627.8	*****	*****	244.	236. AG	1621.	10.1	0.0	35.0		

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2012 EXISTING PEAK PM

DATE : 8/9/13

TIME : 14:25:15

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
    
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-----*-----
1. EB L/T QUEUE * 140 119 4.0 238 1626 45.44 2 3
2. EB R QUEUE * 140 119 4.0 370 1398 45.44 2 3
3. WB L QUEUE * 140 103 4.0 719 3015 45.44 2 3
4. WB T/R QUEUE * 140 103 4.0 159 1501 45.44 2 3
5. NB L/T QUEUE * 140 74 4.0 815 1744 45.44 2 3
9. SB L/T/R QUEUE * 140 89 4.0 624 1971 10.14 2 3
    
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RECEPTOR LOCATIONS

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* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767675.3 ***** 5.9 *
2. 2 * 767714.4 ***** 5.9 *
3. 3 * 767758.7 ***** 5.9 *
4. 4 * 767702.1 ***** 5.9 *
5. 5 * 767624.2 ***** 5.9 *
6. 6 * 767657.7 ***** 5.9 *
7. 7 * 767742.2 ***** 5.9 *
8. 8 * 767815.7 ***** 5.9 *
9. 9 * 767881.3 ***** 5.9 *
10. 10 * 767945.8 ***** 5.9 *
11. 11 * 767828.2 ***** 5.9 *
12. 12 * 768009.3 ***** 5.9 *
13. 13 * 767954.6 ***** 5.9 *
14. 14 * 767898.3 ***** 5.9 *
15. 15 * 767955.1 ***** 5.9 *
16. 16 * 768009.8 ***** 5.9 *
17. 17 * 767957.9 ***** 5.9 *
18. 18 * 767904.8 ***** 5.9 *
19. 19 * 767837.6 ***** 5.9 *
20. 20 * 767785.6 ***** 5.9 *
21. 21 * 767750.6 ***** 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

ANGLE	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.0	0.5	0.6	0.2	0.0	1.0	1.0	0.9	1.3	1.0	1.7	0.1	0.1	0.4	0.5	0.1	0.0	0.0	0.0	0.0
10.	0.0	0.5	0.5	0.2	0.0	1.0	1.1	1.0	1.3	1.0	1.5	0.0	0.1	0.4	0.5	0.1	0.0	0.0	0.0	0.0
20.	0.0	0.6	0.5	0.2	0.0	1.2	1.0	1.0	1.2	0.9	1.4	0.0	0.1	0.5	0.4	0.1	0.0	0.0	0.0	0.0
30.	0.0	0.5	0.5	0.2	0.1	1.3	1.2	1.0	1.2	0.7	1.5	0.0	0.0	0.4	0.4	0.1	0.0	0.0	0.0	0.0
40.	0.1	0.5	0.5	0.2	0.3	1.2	1.1	1.0	1.2	0.5	1.4	0.0	0.0	0.3	0.4	0.1	0.0	0.0	0.0	0.0
50.	0.2	0.5	0.5	0.3	0.4	1.4	0.8	1.0	1.2	0.4	1.3	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0
60.	0.3	0.5	0.7	0.6	0.7	1.2	0.9	0.9	1.1	0.2	1.3	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2	0.0
70.	0.4	0.5	0.9	0.9	1.1	0.8	0.7	0.9	1.0	0.1	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.0
80.	0.5	0.6	1.1	1.0	1.2	0.6	0.6	0.9	1.0	0.0	1.3	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.0
90.	0.6	0.7	1.3	1.2	1.5	0.4	0.7	0.8	0.9	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
100.	0.7	0.8	1.7	1.3	1.4	0.2	0.4	0.6	0.8	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
110.	0.8	1.0	1.7	1.3	1.0	0.2	0.3	0.6	0.6	0.1	1.4	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1
120.	1.1	1.0	1.9	1.2	1.1	0.1	0.2	0.4	0.5	0.2	1.3	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.3	0.1
130.	1.0	1.3	1.4	1.0	0.9	0.1	0.2	0.3	0.6	0.4	1.2	0.0	0.2	0.3	0.0	0.0	0.2	0.3	0.5	0.3
140.	0.9	1.0	1.2	1.0	0.9	0.0	0.1	0.3	0.5	0.8	1.2	0.0	0.3	0.6	0.0	0.0	0.3	0.3	0.8	0.7
150.	0.5	0.6	1.1	1.0	0.7	0.0	0.0	0.1	0.3	1.1	0.8	0.1	0.7	1.0	0.1	0.1	0.4	0.5	1.0	1.1
160.	0.3	0.4	0.8	0.7	0.5	0.0	0.0	0.0	0.1	1.1	0.5	0.2	0.8	1.0	0.3	0.1	0.4	0.7	1.2	1.0
170.	0.3	0.4	0.7	0.8	0.5	0.0	0.0	0.0	0.0	0.9	0.3	0.2	1.1	0.9	0.5	0.2	0.6	0.9	1.3	0.8
180.	0.2	0.4	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.8	0.3	0.3	1.1	0.9	0.7	0.3	0.7	0.9	1.2	0.7
190.	0.1	0.4	0.8	0.8	0.1	0.0	0.0	0.0	0.0	0.8	0.3	0.4	1.1	0.9	0.7	0.4	0.8	1.0	1.1	0.6
200.	0.0	0.2	0.8	0.8	0.1	0.0	0.0	0.0	0.0	0.6	0.3	0.7	1.1	0.9	0.6	0.5	0.8	0.8	1.2	0.7
210.	0.0	0.1	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.9	1.1	0.9	0.7	0.6	0.8	0.8	1.0	0.6
220.	0.0	0.0	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.6	0.3	0.9	1.1	1.0	0.7	0.6	0.8	0.9	1.0	0.4
230.	0.0	0.0	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.6	0.4	1.1	1.1	1.2	1.0	0.8	0.5	0.6	0.8	0.3
240.	0.0	0.0	0.2	0.1	0.0	0.0	0.3	0.0	0.0	0.6	0.6	1.1	1.1	1.4	1.1	1.0	0.3	0.4	0.6	0.3
250.	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.1	0.0	0.6	0.7	1.1	1.4	1.4	1.1	0.9	0.2	0.3	0.4	0.3
260.	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.4	0.0	0.6	0.6	1.3	1.1	1.3	0.8	0.8	0.0	0.2	0.3	0.3
270.	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.5	0.3	0.7	0.7	1.3	1.2	1.1	0.9	0.6	0.0	0.2	0.3	0.3
280.	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.4	1.2	0.5	1.1	1.0	0.9	0.7	0.5	0.0	0.0	0.3	0.3
290.	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.5	1.1	0.4	0.9	0.7	0.8	0.5	0.5	0.0	0.0	0.3	0.2
300.	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.8	0.4	1.4	0.5	0.8	0.5	0.7	0.5	0.5	0.0	0.0	0.3	0.1
310.	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.6	0.6	1.5	0.6	0.2	0.1	0.5	0.5	0.5	0.0	0.0	0.1	0.1
320.	0.0	0.1	0.1	0.0	0.0	0.5	0.9	0.6	0.9	1.7	0.8	0.1	0.1	0.3	0.5	0.3	0.0	0.0	0.1	0.0
330.	0.0	0.1	0.3	0.0	0.0	0.6	0.9	0.8	1.1	1.8	1.1	0.1	0.1	0.3	0.5	0.3	0.0	0.0	0.0	0.0
340.	0.0	0.3	0.3	0.0	0.0	0.7	0.9	0.7	1.3	1.3	1.4	0.1	0.1	0.3	0.5	0.2	0.0	0.0	0.0	0.0
350.	0.0	0.3	0.5	0.0	0.0	0.9	0.9	0.8	1.3	1.0	1.5	0.1	0.1	0.4	0.5	0.2	0.0	0.0	0.0	0.0

360. * 0.0 0.5 0.6 0.2 0.0 1.0 1.0 0.9 1.3 1.0 1.7 0.1 0.1 0.4 0.5 0.1 0.0 0.0 0.0 0.0
-----*-----
MAX * 1.1 1.3 1.9 1.3 1.5 1.4 1.2 1.0 1.3 1.8 1.7 1.3 1.4 1.4 1.1 1.0 0.8 1.0 1.3 1.1
DEGR.* 120 130 120 100 90 50 30 10 0 330 0 260 250 240 240 240 190 190 170 150

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC21

-----*-----

- 0. * 0.0
- 10. * 0.0
- 20. * 0.0
- 30. * 0.0
- 40. * 0.0
- 50. * 0.0
- 60. * 0.0
- 70. * 0.0
- 80. * 0.0
- 90. * 0.0
- 100. * 0.0
- 110. * 0.1
- 120. * 0.1
- 130. * 0.2
- 140. * 0.6
- 150. * 0.9
- 160. * 0.8
- 170. * 0.6
- 180. * 0.6
- 190. * 0.5
- 200. * 0.5
- 210. * 0.4
- 220. * 0.3
- 230. * 0.3
- 240. * 0.3
- 250. * 0.3
- 260. * 0.1
- 270. * 0.0
- 280. * 0.0
- 290. * 0.0
- 300. * 0.0
- 310. * 0.0
- 320. * 0.0
- 330. * 0.0
- 340. * 0.0
- 350. * 0.0

360. * 0.0

-----*-----

MAX * 0.9

DEGR. * 150

THE HIGHEST CONCENTRATION OF 1.90 PPM OCCURRED AT RECEPTOR REC3 .

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2017 BUILD PEAK PM

DATE : 8/ 9/13

TIME : 14:28:51

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767701.2	*****	768432.4	*****	*****	1226.	143. AG	91.	100.0	0.0	10.0	1.73	62.3
2. EB R QUEUE	* 767687.7	*****	769291.7	*****	*****	2653.	143. AG	89.	100.0	0.0	10.0	2.56	134.8
3. WB L QUEUE	* 767996.7	*****	767812.6	*****	*****	221.	304. AG	151.	100.0	0.0	25.0	0.56	11.3
4. WB T/R QUEUE	* 767999.1	*****	767944.9	*****	*****	65.	303. AG	75.	100.0	0.0	10.0	0.33	3.3
5. NB L/T QUEUE	* 767637.6	*****	767818.8	*****	*****	218.	56. AG	113.	100.0	0.0	20.0	0.77	11.1
6. NB R FRE FLO (1)	* 767643.6	*****	767755.0	*****	*****	129.	60. AG	1197.	8.9	0.0	30.0		
7. NB R FRE FLO (2)	* 767755.0	*****	767822.7	*****	*****	68.	89. AG	1197.	8.9	0.0	30.0		
8. NB R FRE FLO (3)	* 767822.7	*****	767970.0	*****	*****	159.	113. AG	1197.	8.9	0.0	30.0		
9. SB L/T/R QUEUE	* 767990.1	*****	767844.9	*****	*****	179.	234. AG	136.	100.0	0.0	20.0	0.65	9.1
10. EB OUT FRE FLO	* 767805.9	*****	767986.3	*****	*****	223.	126. AG	1496.	9.0	0.0	30.0		
11. WB OUT FRE FLO	* 767845.1	*****	767721.5	*****	*****	196.	321. AG	368.	8.9	0.0	30.0		
12. NB OUT FRE FLO	* 767824.4	*****	768006.3	*****	*****	220.	56. AG	890.	8.9	0.0	35.0		
13. SB OUT FRE FLO	* 767831.0	*****	767627.8	*****	*****	244.	236. AG	1807.	8.9	0.0	35.0		

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS RUN: 2017 BUILD PEAK PM

DATE : 8/ 9/13

TIME : 14:28:51

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
    
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-----*-----
1. EB L/T QUEUE * 140 122 4.0 240 1626 38.94 2 3
2. EB R QUEUE * 140 119 4.0 382 1398 38.94 2 3
3. WB L QUEUE * 140 101 4.0 802 3015 38.94 2 3
4. WB T/R QUEUE * 140 101 4.0 117 1493 38.94 2 3
5. NB L/T QUEUE * 140 76 4.0 1050 1643 38.94 2 3
9. SB L/T/R QUEUE * 140 91 4.0 721 1804 38.94 2 3
    
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RECEPTOR LOCATIONS

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* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767675.3 ***** 5.9 *
2. 2 * 767714.4 ***** 5.9 *
3. 3 * 767758.7 ***** 5.9 *
4. 4 * 767702.1 ***** 5.9 *
5. 5 * 767624.2 ***** 5.9 *
6. 6 * 767657.7 ***** 5.9 *
7. 7 * 767742.2 ***** 5.9 *
8. 8 * 767815.7 ***** 5.9 *
9. 9 * 767881.3 ***** 5.9 *
10. 10 * 767945.8 ***** 5.9 *
11. 11 * 767828.2 ***** 5.9 *
12. 12 * 768009.3 ***** 5.9 *
13. 13 * 767954.6 ***** 5.9 *
14. 14 * 767898.3 ***** 5.9 *
15. 15 * 767955.1 ***** 5.9 *
16. 16 * 768009.8 ***** 5.9 *
17. 17 * 767957.9 ***** 5.9 *
18. 18 * 767904.8 ***** 5.9 *
19. 19 * 767837.6 ***** 5.9 *
20. 20 * 767785.6 ***** 5.9 *
21. 21 * 767750.6 ***** 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

-----*

0.	*	0.0	0.3	0.5	0.1	0.0	0.9	1.0	0.9	1.3	1.0	1.5	0.0	0.2	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0
10.	*	0.0	0.4	0.5	0.2	0.0	1.0	1.1	1.1	1.3	0.8	1.3	0.0	0.2	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0
20.	*	0.0	0.4	0.5	0.2	0.0	1.0	1.0	1.0	1.3	0.7	1.3	0.0	0.1	0.5	0.5	0.1	0.0	0.0	0.0	0.0	0.0
30.	*	0.0	0.5	0.4	0.2	0.0	1.1	1.4	1.1	1.1	0.6	1.5	0.0	0.0	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0
40.	*	0.1	0.4	0.4	0.2	0.1	1.0	1.2	1.1	1.1	0.5	1.4	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0
50.	*	0.2	0.5	0.5	0.4	0.4	1.2	1.0	0.9	1.1	0.4	1.2	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.0
60.	*	0.2	0.5	0.8	0.7	0.8	0.8	0.8	0.9	1.0	0.2	1.1	0.0	0.0	0.1	0.2	0.0	0.0	0.2	0.3	0.0	0.0
70.	*	0.3	0.5	0.9	1.0	1.2	0.6	0.7	0.9	1.0	0.1	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.4	0.0	0.0
80.	*	0.4	0.6	1.1	1.2	1.2	0.4	0.6	0.8	1.0	0.0	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.4	0.1	0.1
90.	*	0.6	0.7	1.3	1.3	1.4	0.4	0.6	0.7	0.8	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.1	0.1
100.	*	0.8	0.8	1.5	1.3	1.4	0.2	0.4	0.6	0.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.5	0.2	0.2
110.	*	0.9	1.0	1.7	1.3	1.0	0.2	0.3	0.4	0.6	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.5	0.2	0.2
120.	*	1.1	1.0	1.6	1.1	1.0	0.2	0.2	0.4	0.5	0.1	1.2	0.0	0.0	0.1	0.0	0.0	0.3	0.6	0.6	0.2	0.2
130.	*	0.8	1.2	1.5	1.0	0.9	0.1	0.2	0.3	0.5	0.3	1.1	0.0	0.2	0.2	0.0	0.0	0.4	0.6	0.7	0.4	0.4
140.	*	0.8	1.1	1.4	1.0	0.7	0.0	0.1	0.2	0.5	0.6	0.9	0.0	0.3	0.6	0.0	0.0	0.4	0.6	1.0	0.7	0.7
150.	*	0.6	0.7	1.2	0.8	0.6	0.0	0.0	0.1	0.3	0.8	0.7	0.2	0.6	0.7	0.1	0.0	0.5	0.9	1.2	1.0	1.0
160.	*	0.3	0.4	0.8	0.7	0.5	0.0	0.0	0.0	0.1	0.8	0.5	0.2	0.8	0.8	0.3	0.1	0.7	1.0	1.2	0.8	0.8
170.	*	0.2	0.4	0.7	0.7	0.5	0.0	0.0	0.0	0.0	0.7	0.2	0.2	1.0	0.8	0.4	0.2	0.8	1.1	1.2	0.8	0.8
180.	*	0.2	0.4	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.6	0.3	0.3	0.9	0.8	0.5	0.3	0.9	1.1	1.3	0.6	0.6
190.	*	0.1	0.4	0.8	0.8	0.1	0.0	0.0	0.0	0.0	0.6	0.3	0.4	0.9	0.8	0.6	0.4	1.1	1.2	1.2	0.6	0.6
200.	*	0.0	0.2	0.8	0.7	0.1	0.0	0.0	0.0	0.0	0.5	0.3	0.7	0.9	0.8	0.6	0.4	0.9	1.0	1.2	0.7	0.7
210.	*	0.0	0.1	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.8	0.9	0.8	0.7	0.4	1.0	1.1	1.2	0.6	0.6
220.	*	0.0	0.0	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.5	0.3	0.9	0.8	0.9	0.6	0.3	0.8	1.1	1.2	0.4	0.4
230.	*	0.0	0.0	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.5	0.4	0.9	0.8	1.1	0.8	0.6	0.6	0.9	0.8	0.3	0.3
240.	*	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.5	0.6	0.9	0.8	1.4	1.1	0.8	0.2	0.6	0.6	0.3	0.3
250.	*	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.1	0.0	0.5	0.6	1.0	1.2	1.3	1.2	0.8	0.1	0.3	0.4	0.3	0.3
260.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.5	0.6	1.2	1.0	1.2	1.0	0.7	0.0	0.2	0.3	0.3	0.3
270.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.5	0.3	0.5	0.7	1.2	1.0	1.2	0.8	0.6	0.0	0.1	0.3	0.3	0.3
280.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.6	0.4	1.0	0.5	1.0	1.0	0.8	0.6	0.6	0.0	0.0	0.3	0.3	0.3
290.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.6	0.5	0.9	0.5	0.8	0.7	0.8	0.6	0.6	0.0	0.0	0.3	0.2	0.2
300.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.4	1.3	0.5	0.6	0.6	0.7	0.6	0.5	0.0	0.0	0.3	0.1	0.1
310.	*	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.6	0.6	1.4	0.6	0.3	0.3	0.6	0.5	0.5	0.0	0.0	0.1	0.1	0.1
320.	*	0.0	0.1	0.1	0.0	0.0	0.5	0.8	0.6	1.0	1.3	0.9	0.2	0.2	0.4	0.6	0.4	0.0	0.0	0.0	0.0	0.0
330.	*	0.0	0.1	0.3	0.0	0.0	0.6	0.8	0.8	1.1	1.3	1.2	0.2	0.2	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0
340.	*	0.0	0.3	0.3	0.0	0.0	0.7	0.8	0.8	1.2	1.2	1.3	0.2	0.2	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0
350.	*	0.0	0.3	0.4	0.0	0.0	0.7	0.8	1.0	1.4	1.1	1.5	0.2	0.2	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0

360. * 0.0 0.3 0.5 0.1 0.0 0.9 1.0 0.9 1.3 1.0 1.5 0.0 0.2 0.4 0.5 0.1 0.0 0.0 0.0 0.0
-----*-----
MAX * 1.1 1.2 1.7 1.3 1.4 1.2 1.4 1.1 1.4 1.4 1.5 1.2 1.2 1.4 1.2 0.8 1.1 1.2 1.3 1.0
DEGR.* 120 130 110 110 90 50 30 40 350 310 0 270 250 240 250 240 190 190 180 150

JOB: TREMONT CROSSING - TREMONT/MELNEA CASS

RUN: 2017 BUILD PEAK PM

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC21

-----*-----

0. * 0.0
10. * 0.0
20. * 0.0
30. * 0.0
40. * 0.0
50. * 0.0
60. * 0.0
70. * 0.0
80. * 0.0
90. * 0.0
100. * 0.1
110. * 0.2
120. * 0.2
130. * 0.3
140. * 0.7
150. * 0.6
160. * 0.7
170. * 0.7
180. * 0.5
190. * 0.5
200. * 0.4
210. * 0.4
220. * 0.3
230. * 0.3
240. * 0.3
250. * 0.2
260. * 0.1
270. * 0.0
280. * 0.0
290. * 0.0
300. * 0.0
310. * 0.0
320. * 0.0
330. * 0.0
340. * 0.0
350. * 0.0

360. * 0.0

-----*-----

MAX * 0.7

DEGR. * 140

THE HIGHEST CONCENTRATION OF 1.70 PPM OCCURRED AT RECEPTOR REC3 .

JOB: TREMONT CROSSING - TREMONT/RUGGLES RUN: 2012 EXISTING PEAK PM

DATE : 8/ 9/13

TIME : 14:31:30

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767034.3	*****	767146.6	*****	*****	213.	148.	AG	183.	100.0	0.0	20.0	0.64	10.8
2. EB R QUEUE	* 767019.1	*****	767102.1	*****	*****	155.	148.	AG	104.	100.0	0.0	10.0	-.63	7.9
3. WB L/T/R QUEUE	* 767328.1	*****	767282.2	*****	*****	77.	324.	AG	103.	100.0	0.0	10.0	0.69	3.9
4. NB U/L QUEUE	* 767000.7	*****	767632.0	*****	*****	777.	54.	AG	104.	100.0	0.0	10.0	1.51	39.5
5. NB T/R QUEUE	* 767014.2	*****	767152.5	*****	*****	172.	53.	AG	180.	100.0	0.0	30.0	0.24	8.7
6. SB U/L QUEUE	* 767346.6	*****	767342.4	*****	*****	5.	236.	AG	82.	100.0	0.0	10.0	0.03	0.3
7. SB T QUEUE	* 767341.3	*****	763077.5	*****	*****	5140.	236.	AG	82.	100.0	0.0	10.0	2.19	261.1
8. SB R QUEUE	* 767333.1	*****	767206.9	*****	*****	153.	236.	AG	55.	100.0	0.0	10.0	0.71	7.8
9. WB OUT FRE FLO	* 767192.1	*****	767054.0	*****	*****	260.	328.	AG	641.	10.3	0.0	22.0		
10. NB OUT FRE FLO	* 767165.9	*****	767366.1	*****	*****	245.	55.	AG	2168.	10.1	0.0	40.0		
11. SB OUT FRE FLO	* 767169.2	*****	766989.7	*****	*****	222.	234.	AG	1146.	10.1	0.0	35.0		

JOB: TREMONT CROSSING - TREMONT/RUGGLES

RUN: 2012 EXISTING PEAK PM

DATE : 8/9/13

TIME : 14:31:30

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
      * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
      * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
-----*-----
1. EB L/T QUEUE * 140 105 6.0 742 3001 45.44 2 3
2. EB R QUEUE * 140 119 64.0 238 1171 45.44 2 3
3. WB L/T/R QUEUE * 140 118 6.0 120 1736 45.44 2 3
4. NB U/L QUEUE * 140 119 6.0 180 1287 45.44 2 3
5. NB T/R QUEUE * 140 69 6.0 1370 4298 45.44 2 3
6. SB U/L QUEUE * 140 94 6.0 10 1430 45.44 2 3
7. SB T QUEUE * 140 94 6.0 851 1430 45.44 2 3
8. SB R QUEUE * 140 63 6.0 444 1275 45.44 2 3
    
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RECEPTOR LOCATIONS

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      * COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767009.4 * 5.9 *
2. 2 * 767052.6 * 5.9 *
3. 3 * 767100.7 * 5.9 *
4. 4 * 767049.9 * 5.9 *
5. 5 * 766978.2 * 5.9 *
6. 6 * 767034.0 * 5.9 *
7. 7 * 767111.1 * 5.9 *
8. 8 * 767175.0 * 5.9 *
9. 9 * 767236.3 * 5.9 *
10. 10 * 767297.6 * 5.9 *
11. 11 * 767327.2 * 5.9 *
12. 12 * 767264.5 * 5.9 *
13. 13 * 767219.0 * 5.9 *
14. 14 * 767282.4 * 5.9 *
15. 15 * 767369.8 * 5.9 *
16. 16 * 767317.6 * 5.9 *
17. 17 * 767263.1 * 5.9 *
18. 18 * 767172.1 * 5.9 *
19. 19 * 767112.7 * 5.9 *
20. 20 * 767071.0 * 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

ANGLE *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.0	0.8	0.6	0.2	0.0	1.0	1.2	1.0	0.4	0.4	0.2	0.4	0.8	1.2	0.4	0.0	0.0	0.0	0.0	0.0
10.	0.0	0.8	0.6	0.4	0.1	1.0	1.1	1.0	0.4	0.5	0.2	0.4	0.9	1.1	0.4	0.0	0.0	0.0	0.0	0.0
20.	0.0	0.8	0.5	0.4	0.1	1.1	1.1	1.1	0.3	0.5	0.0	0.3	1.0	1.2	0.4	0.0	0.0	0.0	0.0	0.0
30.	0.1	0.8	0.5	0.4	0.1	1.2	1.0	1.1	0.3	0.2	0.0	0.2	1.0	1.1	0.3	0.0	0.0	0.0	0.0	0.0
40.	0.2	0.8	0.5	0.3	0.2	1.0	0.8	1.1	0.2	0.2	0.0	0.2	0.9	1.1	0.3	0.0	0.0	0.0	0.0	0.0
50.	0.4	0.8	0.5	0.7	0.5	0.6	0.5	0.7	0.0	0.2	0.0	0.0	0.6	0.8	0.1	0.0	0.0	0.2	0.0	0.0
60.	0.5	0.8	0.8	0.8	0.8	0.3	0.3	0.4	0.0	0.2	0.0	0.0	0.3	0.6	0.1	0.1	0.2	0.4	0.0	0.0
70.	0.6	0.8	0.9	1.1	1.1	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.1	0.3	0.0	0.1	0.3	0.4	0.0	0.0
80.	0.8	1.0	1.1	1.0	1.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.2	0.4	0.7	0.1	0.0
90.	0.9	1.0	1.1	0.9	1.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.2	0.4	0.7	0.2	0.1
100.	1.1	1.2	1.0	0.9	0.9	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.5	0.7	0.3	0.1
110.	1.1	1.2	0.9	0.9	0.9	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.6	0.7	0.4	0.2	0.2
120.	1.2	1.2	0.7	0.8	0.9	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.6	0.5	0.4	0.2	0.2
130.	1.0	1.1	0.6	0.8	0.8	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.6	0.5	0.5	0.3	0.3
140.	1.0	0.8	0.7	0.9	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.5	0.7	0.5	0.6	0.4	0.4
150.	0.7	0.7	0.7	0.9	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.6	0.7	0.6	0.8	0.6	0.6
160.	0.4	0.4	0.7	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.6	0.7	0.6	0.9	1.1	1.1
170.	0.2	0.4	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.6	0.7	0.8	1.1	1.1	1.1
180.	0.2	0.4	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.8	0.8	0.9	1.2	1.0	1.0
190.	0.0	0.3	0.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.8	0.8	1.0	1.2	1.0
200.	0.1	0.2	0.8	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	1.0	0.8	1.2	1.0	0.8
210.	0.1	0.1	0.6	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	1.0	0.9	1.2	0.9	0.8
220.	0.1	0.1	0.5	0.4	0.3	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.1	0.4	0.3	0.8	0.7	1.1	0.8	0.7
230.	0.1	0.1	0.3	0.4	0.3	0.1	0.2	0.3	0.0	0.0	0.2	0.0	0.3	0.8	0.8	0.8	0.9	1.1	0.8	0.7
240.	0.0	0.0	0.1	0.2	0.2	0.1	0.3	0.6	0.1	0.0	0.2	0.1	0.7	1.3	1.2	0.5	0.5	0.8	0.7	0.6
250.	0.0	0.0	0.1	0.1	0.1	0.1	0.4	0.8	0.1	0.1	0.3	0.2	0.8	1.4	1.5	0.2	0.3	0.6	0.7	0.5
260.	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.9	0.2	0.1	0.3	0.2	1.0	1.6	1.4	0.1	0.2	0.5	0.7	0.2
270.	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.9	0.3	0.0	0.3	0.5	1.0	1.5	1.3	0.1	0.3	0.6	0.7	0.2
280.	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.9	0.5	0.1	0.4	0.5	1.0	1.4	1.2	0.1	0.2	0.6	0.8	0.1
290.	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.8	0.5	0.1	0.4	0.4	1.0	1.4	1.1	0.0	0.1	0.7	0.8	0.0
300.	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.7	0.5	0.2	0.4	0.5	1.2	1.1	1.0	0.0	0.0	0.6	0.7	0.0
310.	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.8	0.5	0.2	0.5	0.5	1.4	1.1	0.9	0.0	0.0	0.6	0.5	0.0
320.	0.0	0.1	0.2	0.0	0.0	0.5	0.8	1.0	0.5	0.5	0.4	0.6	1.4	0.9	0.9	0.0	0.0	0.4	0.3	0.0
330.	0.0	0.3	0.4	0.0	0.0	0.6	0.8	1.1	0.6	0.4	0.3	0.5	1.2	1.0	0.8	0.0	0.0	0.2	0.2	0.0
340.	0.0	0.4	0.6	0.0	0.0	0.7	0.9	1.0	0.5	0.5	0.3	0.5	1.0	1.0	0.6	0.0	0.0	0.0	0.1	0.0
350.	0.0	0.6	0.7	0.2	0.0	0.8	0.9	1.0	0.5	0.5	0.3	0.4	0.9	1.1	0.5	0.0	0.0	0.0	0.0	0.0

360. * 0.0 0.8 0.6 0.2 0.0 1.0 1.2 1.0 0.4 0.4 0.2 0.4 0.8 1.2 0.4 0.0 0.0 0.0 0.0 0.0

-----*

MAX * 1.2 1.2 1.1 1.1 1.1 1.2 1.2 1.1 0.6 0.5 0.5 0.6 1.4 1.6 1.5 1.0 0.9 1.2 1.2 1.1

DEGR. * 120 100 80 70 70 30 0 20 330 10 310 320 310 260 250 200 230 200 180 160

THE HIGHEST CONCENTRATION OF 1.60 PPM OCCURRED AT RECEPTOR REC14.

JOB: TREMONT CROSSING - TREMONT/RUGGLES RUN: 2017 NO BUILD PEAK PM

DATE : 8/ 9/13

TIME : 14:37: 5

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767034.3	*****	767148.7	*****	*****	217.	148.	AG	157.	100.0	0.0	20.0	0.65	11.0
2. EB R QUEUE	* 767019.1	*****	767908.3	*****	*****	1659.	148.	AG	89.	100.0	0.0	10.0	2.32	84.3
3. WB L/T/R QUEUE	* 767328.1	*****	767281.1	*****	*****	79.	324.	AG	88.	100.0	0.0	10.0	0.71	4.0
4. NB U/L QUEUE	* 767000.7	*****	767675.9	*****	*****	831.	54.	AG	89.	100.0	0.0	10.0	1.55	42.2
5. NB T/R QUEUE	* 767014.2	*****	767159.5	*****	*****	181.	53.	AG	154.	100.0	0.0	30.0	0.25	9.2
6. SB U/L QUEUE	* 767346.6	*****	767342.4	*****	*****	5.	236.	AG	70.	100.0	0.0	10.0	0.03	0.3
7. SB T QUEUE	* 767341.3	*****	762423.3	*****	*****	5929.	236.	AG	70.	100.0	0.0	10.0	2.39	301.2
8. SB R QUEUE	* 767333.1	*****	767203.8	*****	*****	157.	236.	AG	47.	100.0	0.0	10.0	0.72	8.0
9. WB OUT FRE FLO	* 767192.1	*****	767054.0	*****	*****	260.	328.	AG	657.	9.0	0.0	22.0		
10. NB OUT FRE FLO	* 767165.9	*****	767366.1	*****	*****	245.	55.	AG	2249.	8.9	0.0	40.0		
11. SB OUT FRE FLO	* 767169.2	*****	766989.7	*****	*****	222.	234.	AG	1235.	8.9	0.0	35.0		

JOB: TREMONT CROSSING - TREMONT/RUGGLES

RUN: 2017 NO BUILD PEAK PM

DATE : 8/9/13

TIME : 14:37:5

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
-----*-----
1. EB L/T QUEUE * 140 105 6.0 756 3001 38.94 2 3
2. EB R QUEUE * 140 119 6.0 251 1171 38.94 2 3
3. WB L/T/R QUEUE * 140 118 6.0 123 1736 38.94 2 3
4. NB U/L QUEUE * 140 119 6.0 185 1287 38.94 2 3
5. NB T/R QUEUE * 140 69 6.0 1437 4298 38.94 2 3
6. SB U/L QUEUE * 140 94 6.0 10 1424 38.94 2 3
7. SB T QUEUE * 140 94 6.0 924 1424 38.94 2 3
8. SB R QUEUE * 140 63 6.0 455 1275 38.94 2 3
    
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RECEPTOR LOCATIONS

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* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767009.4 * 5.9 *
2. 2 * 767052.6 * 5.9 *
3. 3 * 767100.7 * 5.9 *
4. 4 * 767049.9 * 5.9 *
5. 5 * 766978.2 * 5.9 *
6. 6 * 767034.0 * 5.9 *
7. 7 * 767111.1 * 5.9 *
8. 8 * 767175.0 * 5.9 *
9. 9 * 767236.3 * 5.9 *
10. 10 * 767297.6 * 5.9 *
11. 11 * 767327.2 * 5.9 *
12. 12 * 767264.5 * 5.9 *
13. 13 * 767219.0 * 5.9 *
14. 14 * 767282.4 * 5.9 *
15. 15 * 767369.8 * 5.9 *
16. 16 * 767317.6 * 5.9 *
17. 17 * 767263.1 * 5.9 *
18. 18 * 767172.1 * 5.9 *
19. 19 * 767112.7 * 5.9 *
20. 20 * 767071.0 * 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

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0.	*	0.0	0.7	0.7	0.2	0.0	0.9	1.1	1.4	0.4	0.3	0.1	0.3	0.8	0.9	0.4	0.0	0.0	0.0	0.0	0.0
10.	*	0.0	0.7	0.7	0.3	0.1	1.0	1.2	1.2	0.3	0.3	0.1	0.3	0.8	1.0	0.3	0.0	0.0	0.0	0.0	0.0
20.	*	0.0	0.7	0.6	0.4	0.1	1.1	1.1	1.2	0.3	0.3	0.0	0.3	0.9	1.1	0.3	0.0	0.0	0.0	0.0	0.0
30.	*	0.1	0.6	0.6	0.4	0.2	1.1	0.9	1.3	0.2	0.2	0.0	0.2	0.9	1.0	0.3	0.0	0.0	0.0	0.0	0.0
40.	*	0.2	0.6	0.6	0.4	0.2	0.9	0.7	1.1	0.2	0.2	0.0	0.1	0.7	1.0	0.2	0.0	0.0	0.0	0.0	0.0
50.	*	0.2	0.6	0.6	0.7	0.6	0.7	0.6	0.9	0.0	0.2	0.0	0.0	0.5	0.8	0.1	0.0	0.0	0.1	0.0	0.0
60.	*	0.5	0.6	0.9	0.7	0.8	0.4	0.4	0.7	0.0	0.2	0.0	0.0	0.3	0.5	0.0	0.1	0.2	0.4	0.0	0.0
70.	*	0.6	0.6	1.0	0.9	1.0	0.2	0.2	0.4	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.1	0.3	0.4	0.0	0.0
80.	*	0.6	0.7	1.2	1.0	1.1	0.1	0.1	0.3	0.0	0.2	0.0	0.0	0.1	0.0	0.1	0.3	0.5	0.1	0.0	0.0
90.	*	0.7	0.9	1.1	1.0	1.0	0.1	0.1	0.3	0.0	0.2	0.0	0.0	0.1	0.0	0.1	0.4	0.6	0.2	0.0	0.0
100.	*	0.9	0.9	1.2	0.9	0.9	0.1	0.1	0.4	0.0	0.2	0.0	0.0	0.1	0.0	0.1	0.5	0.5	0.2	0.0	0.0
110.	*	0.9	1.2	1.1	0.9	0.9	0.1	0.1	0.4	0.0	0.1	0.0	0.0	0.0	0.1	0.5	0.5	0.4	0.1	0.0	0.0
120.	*	0.9	1.2	1.0	0.8	0.9	0.1	0.1	0.4	0.1	0.1	0.0	0.0	0.0	0.1	0.6	0.5	0.4	0.1	0.0	0.0
130.	*	1.0	1.0	1.0	0.8	0.9	0.1	0.1	0.5	0.2	0.2	0.0	0.0	0.0	0.4	0.6	0.5	0.5	0.2	0.0	0.0
140.	*	1.0	0.8	0.9	0.8	0.7	0.0	0.1	0.5	0.3	0.1	0.1	0.2	0.1	0.0	0.5	0.6	0.6	0.6	0.4	0.0
150.	*	0.7	0.8	0.8	0.8	0.6	0.0	0.1	0.4	0.4	0.2	0.1	0.2	0.1	0.1	0.0	0.5	0.6	0.7	0.8	0.6
160.	*	0.5	0.4	0.7	0.7	0.4	0.0	0.0	0.3	0.4	0.3	0.3	0.3	0.2	0.1	0.0	0.6	0.7	0.7	1.1	1.0
170.	*	0.2	0.4	0.6	0.7	0.3	0.0	0.0	0.1	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.7	0.7	0.8	1.3	1.0
180.	*	0.1	0.3	0.6	0.7	0.3	0.0	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.7	0.7	0.9	1.1	1.0
190.	*	0.0	0.3	0.7	0.8	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.8	0.7	1.0	1.0	0.9
200.	*	0.0	0.2	0.7	0.7	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.7	0.8	1.2	0.9	0.6
210.	*	0.0	0.1	0.5	0.6	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.8	0.9	1.3	0.8	0.7
220.	*	0.1	0.1	0.5	0.4	0.2	0.0	0.0	0.1	0.2	0.2	0.3	0.1	0.2	0.5	0.2	0.8	0.8	1.2	0.7	0.7
230.	*	0.1	0.1	0.3	0.3	0.3	0.0	0.1	0.3	0.2	0.2	0.3	0.1	0.4	0.9	0.8	0.8	0.9	1.0	0.7	0.7
240.	*	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.4	0.3	0.2	0.3	0.2	0.8	1.2	1.2	0.4	0.5	0.8	0.6	0.5
250.	*	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.8	0.3	0.2	0.3	0.2	0.9	1.3	1.3	0.2	0.4	0.7	0.6	0.4
260.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.8	0.4	0.2	0.3	0.3	1.1	1.4	1.4	0.1	0.3	0.6	0.6	0.2
270.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.9	0.5	0.2	0.3	0.4	1.1	1.5	1.1	0.1	0.2	0.6	0.6	0.2
280.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.9	0.7	0.3	0.4	0.5	1.0	1.4	1.0	0.0	0.1	0.6	0.6	0.1
290.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.8	0.7	0.3	0.5	0.4	1.1	1.2	1.0	0.0	0.1	0.6	0.6	0.0
300.	*	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.9	0.7	0.4	0.5	0.5	1.1	1.0	0.8	0.0	0.0	0.6	0.7	0.0
310.	*	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.9	0.9	0.5	0.6	0.6	1.2	0.9	0.8	0.0	0.0	0.5	0.5	0.0
320.	*	0.0	0.1	0.2	0.0	0.0	0.4	0.8	1.2	0.8	0.6	0.4	0.7	1.3	0.9	0.8	0.0	0.0	0.2	0.3	0.0
330.	*	0.0	0.2	0.3	0.0	0.0	0.6	0.8	1.4	0.8	0.5	0.3	0.6	1.1	0.9	0.7	0.0	0.0	0.2	0.1	0.0
340.	*	0.0	0.4	0.5	0.0	0.0	0.6	0.9	1.5	0.6	0.3	0.1	0.3	0.9	0.8	0.6	0.0	0.0	0.0	0.1	0.0
350.	*	0.0	0.5	0.6	0.1	0.0	0.8	1.0	1.6	0.3	0.4	0.1	0.3	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0

360. * 0.0 0.7 0.7 0.2 0.0 0.9 1.1 1.4 0.4 0.3 0.1 0.3 0.8 0.9 0.4 0.0 0.0 0.0 0.0

-----*

MAX * 1.0 1.2 1.2 1.0 1.1 1.1 1.2 1.6 0.9 0.6 0.6 0.7 1.3 1.5 1.4 0.8 0.9 1.3 1.3 1.0

DEGR. * 140 110 80 80 80 20 10 350 310 320 310 320 320 270 260 230 230 210 170 160

THE HIGHEST CONCENTRATION OF 1.60 PPM OCCURRED AT RECEPTOR REC8 .

JOB: TREMONT CROSSING - TREMONT/RUGGLES RUN: 2017 NO BUILD PEAK PM

DATE : 8/ 9/13

TIME : 14:46: 8

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T QUEUE	* 767034.3	*****	767148.7	*****	*****	217.	148.	AG	157.	100.0	0.0	20.0	0.65	11.0
2. EB R QUEUE	* 767019.1	*****	767908.3	*****	*****	1659.	148.	AG	89.	100.0	0.0	10.0	2.32	84.3
3. WB L/T/R QUEUE	* 767328.1	*****	767281.1	*****	*****	79.	324.	AG	88.	100.0	0.0	10.0	0.71	4.0
4. NB U/L QUEUE	* 767000.7	*****	767675.9	*****	*****	831.	54.	AG	89.	100.0	0.0	10.0	1.55	42.2
5. NB T/R QUEUE	* 767014.2	*****	767159.5	*****	*****	181.	53.	AG	154.	100.0	0.0	30.0	0.25	9.2
6. SB U/L QUEUE	* 767346.6	*****	767342.4	*****	*****	5.	236.	AG	70.	100.0	0.0	10.0	0.03	0.3
7. SB T QUEUE	* 767341.3	*****	762423.3	*****	*****	5929.	236.	AG	70.	100.0	0.0	10.0	2.39	301.2
8. SB R QUEUE	* 767333.1	*****	767203.8	*****	*****	157.	236.	AG	47.	100.0	0.0	10.0	0.72	8.0
9. WB OUT FRE FLO	* 767192.1	*****	767054.0	*****	*****	260.	328.	AG	657.	9.0	0.0	22.0		
10. NB OUT FRE FLO	* 767165.9	*****	767366.1	*****	*****	245.	55.	AG	2249.	8.9	0.0	40.0		
11. SB OUT FRE FLO	* 767169.2	*****	766989.7	*****	*****	222.	234.	AG	1235.	8.9	0.0	35.0		

JOB: TREMONT CROSSING - TREMONT/RUGGLES

RUN: 2017 NO BUILD PEAK PM

DATE : 8/9/13

TIME : 14:46: 8

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
      * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
      * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
-----*-----
1. EB L/T QUEUE * 140 105 6.0 756 3001 38.94 2 3
2. EB R QUEUE * 140 119 6.0 251 1171 38.94 2 3
3. WB L/T/R QUEUE * 140 118 6.0 123 1736 38.94 2 3
4. NB U/L QUEUE * 140 119 6.0 185 1287 38.94 2 3
5. NB T/R QUEUE * 140 69 6.0 1437 4298 38.94 2 3
6. SB U/L QUEUE * 140 94 6.0 10 1425 38.94 2 3
7. SB T QUEUE * 140 94 6.0 924 1425 38.94 2 3
8. SB R QUEUE * 140 63 6.0 455 1275 38.94 2 3
    
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RECEPTOR LOCATIONS

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      * COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 767009.4 * 5.9 *
2. 2 * 767052.6 * 5.9 *
3. 3 * 767100.7 * 5.9 *
4. 4 * 767049.9 * 5.9 *
5. 5 * 766978.2 * 5.9 *
6. 6 * 767034.0 * 5.9 *
7. 7 * 767111.1 * 5.9 *
8. 8 * 767175.0 * 5.9 *
9. 9 * 767236.3 * 5.9 *
10. 10 * 767297.6 * 5.9 *
11. 11 * 767327.2 * 5.9 *
12. 12 * 767264.5 * 5.9 *
13. 13 * 767219.0 * 5.9 *
14. 14 * 767282.4 * 5.9 *
15. 15 * 767369.8 * 5.9 *
16. 16 * 767317.6 * 5.9 *
17. 17 * 767263.1 * 5.9 *
18. 18 * 767172.1 * 5.9 *
19. 19 * 767112.7 * 5.9 *
20. 20 * 767071.0 * 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

ANGLE	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.0	0.7	0.7	0.2	0.0	0.9	1.1	1.4	0.4	0.3	0.1	0.3	0.8	0.9	0.4	0.0	0.0	0.0	0.0	0.0
10.	0.0	0.7	0.7	0.3	0.1	1.0	1.2	1.2	0.3	0.3	0.1	0.3	0.8	1.0	0.3	0.0	0.0	0.0	0.0	0.0
20.	0.0	0.7	0.6	0.4	0.1	1.1	1.1	1.2	0.3	0.3	0.0	0.3	0.9	1.1	0.3	0.0	0.0	0.0	0.0	0.0
30.	0.1	0.6	0.6	0.4	0.2	1.1	0.9	1.3	0.2	0.2	0.0	0.2	0.9	1.0	0.3	0.0	0.0	0.0	0.0	0.0
40.	0.2	0.6	0.6	0.4	0.2	0.9	0.7	1.1	0.2	0.2	0.0	0.1	0.7	1.0	0.2	0.0	0.0	0.0	0.0	0.0
50.	0.2	0.6	0.6	0.7	0.6	0.7	0.6	0.9	0.0	0.2	0.0	0.0	0.5	0.8	0.1	0.0	0.0	0.1	0.0	0.0
60.	0.5	0.6	0.9	0.7	0.8	0.4	0.4	0.7	0.0	0.2	0.0	0.0	0.3	0.5	0.0	0.1	0.2	0.4	0.0	0.0
70.	0.6	0.6	1.0	0.9	1.0	0.2	0.2	0.4	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.1	0.3	0.4	0.0	0.0
80.	0.6	0.7	1.2	1.0	1.1	0.1	0.1	0.3	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.5	0.1	0.0
90.	0.7	0.9	1.1	1.0	1.0	0.1	0.1	0.3	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.4	0.6	0.2	0.0
100.	0.9	0.9	1.2	0.9	0.9	0.1	0.1	0.4	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.5	0.5	0.2	0.0
110.	0.9	1.2	1.1	0.9	0.9	0.1	0.1	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.4	0.1	0.1
120.	0.9	1.2	1.0	0.8	0.9	0.1	0.1	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.6	0.5	0.4	0.1	0.1
130.	1.0	1.0	1.0	0.8	0.9	0.1	0.1	0.5	0.2	0.2	0.0	0.0	0.0	0.0	0.4	0.6	0.5	0.5	0.2	0.2
140.	1.0	0.8	0.9	0.8	0.7	0.0	0.1	0.5	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.5	0.6	0.6	0.6	0.4
150.	0.7	0.8	0.8	0.8	0.6	0.0	0.1	0.4	0.4	0.2	0.1	0.2	0.1	0.1	0.0	0.5	0.6	0.7	0.8	0.6
160.	0.5	0.4	0.7	0.7	0.4	0.0	0.0	0.3	0.4	0.3	0.3	0.3	0.2	0.1	0.0	0.6	0.7	0.7	1.1	1.0
170.	0.2	0.4	0.6	0.7	0.3	0.0	0.0	0.1	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.7	0.7	0.8	1.3	1.0
180.	0.1	0.3	0.6	0.7	0.3	0.0	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.7	0.7	0.9	1.1	1.0
190.	0.0	0.3	0.7	0.8	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.8	0.7	1.0	1.0	0.9
200.	0.0	0.2	0.7	0.7	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.7	0.8	1.2	0.9	0.6
210.	0.0	0.1	0.5	0.6	0.2	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.8	0.9	1.3	0.8	0.7
220.	0.1	0.1	0.5	0.4	0.2	0.0	0.0	0.1	0.2	0.2	0.3	0.1	0.2	0.5	0.2	0.8	0.8	1.2	0.7	0.7
230.	0.1	0.1	0.3	0.3	0.3	0.0	0.1	0.3	0.2	0.2	0.3	0.1	0.4	0.9	0.8	0.8	0.9	1.0	0.7	0.7
240.	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.4	0.3	0.2	0.3	0.2	0.8	1.2	1.2	0.4	0.5	0.8	0.6	0.5
250.	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.8	0.3	0.2	0.3	0.2	0.9	1.3	1.3	0.2	0.4	0.7	0.6	0.4
260.	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.8	0.4	0.2	0.3	0.3	1.1	1.4	1.4	0.1	0.3	0.6	0.6	0.2
270.	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.9	0.5	0.2	0.3	0.4	1.1	1.5	1.1	0.1	0.2	0.6	0.6	0.2
280.	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.9	0.7	0.3	0.4	0.5	1.0	1.4	1.0	0.0	0.1	0.6	0.6	0.1
290.	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.8	0.7	0.3	0.5	0.4	1.1	1.2	1.0	0.0	0.1	0.6	0.6	0.0
300.	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.9	0.7	0.4	0.5	0.5	1.1	1.0	0.8	0.0	0.0	0.6	0.7	0.0
310.	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.9	0.9	0.5	0.6	0.6	1.2	0.9	0.8	0.0	0.0	0.5	0.5	0.0
320.	0.0	0.1	0.2	0.0	0.0	0.4	0.8	1.2	0.8	0.6	0.4	0.7	1.3	0.9	0.8	0.0	0.0	0.2	0.3	0.0
330.	0.0	0.2	0.3	0.0	0.0	0.6	0.8	1.4	0.8	0.5	0.3	0.6	1.1	0.9	0.7	0.0	0.0	0.2	0.1	0.0
340.	0.0	0.4	0.5	0.0	0.0	0.6	0.9	1.5	0.6	0.3	0.1	0.3	0.9	0.8	0.6	0.0	0.0	0.0	0.1	0.0
350.	0.0	0.5	0.6	0.1	0.0	0.8	1.0	1.6	0.3	0.4	0.1	0.3	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0

360. * 0.0 0.7 0.7 0.2 0.0 0.9 1.1 1.4 0.4 0.3 0.1 0.3 0.8 0.9 0.4 0.0 0.0 0.0 0.0

-----*

MAX * 1.0 1.2 1.2 1.0 1.1 1.1 1.2 1.6 0.9 0.6 0.6 0.7 1.3 1.5 1.4 0.8 0.9 1.3 1.3 1.0

DEGR. * 140 110 80 80 80 20 10 350 310 320 310 320 320 270 260 230 230 210 170 160

THE HIGHEST CONCENTRATION OF 1.60 PPM OCCURRED AT RECEPTOR REC8 .

JOB: TREMONT CROSSING - TREMONT/MALCOLM X RUN: 2012 EXISTING PEAK PM

DATE : 8/ 9/13

TIME : 15:43:11

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T/R QUEUE	* 765525.8	*****	765742.1	*****	*****	220.	100.	AG	176.	100.0	0.0	20.0	0.90	11.2
2. WB L/T QUEUE	* 766105.6	*****	765960.2	*****	*****	147.	279.	AG	195.	100.0	0.0	20.0	0.81	7.5
3. WB R QUEUE	* 766025.8	*****	764743.9	*****	*****	1365.	290.	AG	98.	100.0	0.0	12.0	1.59	69.3
4. NB U/L QUEUE	* 765689.8	*****	766173.4	*****	*****	783.	38.	AG	106.	100.0	0.0	10.0	1.50	39.8
5. NB T/R QUEUE	* 765709.5	*****	765826.0	*****	*****	189.	38.	AG	274.	100.0	0.0	30.0	0.37	9.6
6. SB U/L QUEUE	* 765960.1	*****	765451.0	*****	*****	835.	218.	AG	106.	100.0	0.0	10.0	1.64	42.4
7. SB T/R QUEUE	* 765942.0	*****	765826.4	*****	*****	189.	218.	AG	274.	100.0	0.0	30.0	0.38	9.6
8. EB OUT FRE FLO	* 765795.7	*****	766091.6	*****	*****	300.	99.	AG	627.	10.3	0.0	30.0		
9. WB OUT FRE FLO	* 765847.6	*****	765529.9	*****	*****	322.	280.	AG	754.	10.1	0.0	30.0		
10. NB OUT FRE FLO	* 765847.6	*****	765985.2	*****	*****	232.	36.	AG	1381.	10.3	0.0	40.0		
11. SB OUT FRE FLO	* 765797.7	*****	765668.6	*****	*****	209.	218.	AG	1160.	10.1	0.0	35.0		

DATE : 8/ 9/13

TIME : 15:43:11

ADDITIONAL QUEUE LINK PARAMETERS

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-----
LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
    
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-----*-----
1. EB L/T/R QUEUE * 140 101 5.0 734 1777 45.44 2 3
2. WB L/T QUEUE * 140 112 5.0 480 1991 45.44 2 3
3. WB R QUEUE * 140 112 5.0 303 1275 45.44 2 3
4. NB U/L QUEUE * 140 122 5.0 184 1577 45.44 2 3
5. NB T/R QUEUE * 140 105 4.0 991 4363 45.44 2 3
6. SB U/L QUEUE * 140 122 5.0 172 1345 45.44 2 3
7. SB T/R QUEUE * 140 105 4.0 987 4208 45.44 2 3
    
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RECEPTOR LOCATIONS

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* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 765523.5 * 5.9 *
2. 2 * 765616.0 * 5.9 *
3. 3 * 765717.2 * 5.9 *
4. 4 * 765684.7 * 5.9 *
5. 5 * 765646.5 * 5.9 *
6. 6 * 765747.1 * 5.9 *
7. 7 * 765794.4 * 5.9 *
8. 8 * 765849.6 * 5.9 *
9. 9 * 765946.9 * 5.9 *
10. 10 * 766080.4 * 5.9 *
11. 11 * 766094.6 * 5.9 *
12. 12 * 765907.0 * 5.9 *
13. 13 * 765955.7 * 5.9 *
14. 14 * 765955.1 * 5.9 *
15. 15 * 765999.4 * 5.9 *
16. 16 * 765910.3 * 5.9 *
17. 17 * 765862.2 * 5.9 *
18. 18 * 765780.7 * 5.9 *
19. 19 * 765663.3 * 5.9 *
20. 20 * 765562.1 * 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

-----*

0.	*	0.4	0.6	0.6	0.4	0.4	1.7	1.7	1.4	0.9	0.5	0.1	1.4	0.6	1.0	0.3	0.0	0.0	0.2	0.1	0.1
10.	*	0.5	0.6	0.6	0.4	0.4	1.7	2.0	1.5	0.7	0.4	0.0	1.4	0.4	0.9	0.3	0.0	0.0	0.2	0.1	0.1
20.	*	0.5	0.7	0.6	0.4	0.3	1.6	1.7	1.4	0.7	0.3	0.0	1.2	0.2	0.6	0.2	0.0	0.0	0.3	0.1	0.1
30.	*	0.6	0.7	0.6	0.4	0.5	1.2	1.4	1.3	0.6	0.3	0.0	0.9	0.2	0.4	0.1	0.0	0.1	0.4	0.1	0.1
40.	*	0.6	0.7	0.8	0.9	0.7	0.9	1.0	0.9	0.6	0.2	0.0	0.6	0.0	0.3	0.1	0.1	0.4	0.7	0.1	0.1
50.	*	0.8	0.9	1.1	1.0	0.9	0.5	0.4	0.6	0.7	0.0	0.0	0.4	0.0	0.1	0.0	0.1	0.6	1.1	0.2	0.1
60.	*	0.9	1.2	1.1	1.2	1.0	0.3	0.2	0.5	0.7	0.0	0.0	0.3	0.0	0.0	0.0	0.1	1.0	1.2	0.3	0.1
70.	*	1.1	1.3	1.1	1.0	1.0	0.1	0.2	0.5	0.7	0.0	0.0	0.3	0.0	0.0	0.0	0.2	1.2	1.2	0.5	0.3
80.	*	1.1	1.1	1.1	1.1	1.0	0.0	0.2	0.6	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.2	1.1	1.0	0.7	0.4
90.	*	1.1	1.2	1.0	1.1	0.9	0.0	0.0	0.4	0.4	0.0	0.0	0.5	0.0	0.0	0.0	0.3	1.2	1.0	0.7	0.5
100.	*	0.8	0.8	1.0	0.9	0.9	0.0	0.0	0.3	0.2	0.0	0.0	0.6	0.1	0.0	0.0	0.4	1.1	1.0	0.8	0.8
110.	*	0.5	0.6	0.9	0.9	0.8	0.0	0.0	0.1	0.1	0.0	0.0	0.6	0.3	0.0	0.0	0.7	1.1	0.9	1.0	0.7
120.	*	0.3	0.5	0.8	0.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.1	0.0	0.8	1.2	0.7	0.9	0.9
130.	*	0.3	0.5	0.9	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.1	0.0	1.0	1.3	0.6	1.0	0.9
140.	*	0.2	0.5	0.9	0.9	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.3	0.0	1.2	1.3	0.8	1.0	0.8
150.	*	0.1	0.3	0.9	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.4	0.1	1.2	1.4	0.8	1.0	0.8
160.	*	0.1	0.3	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.6	0.4	0.1	1.3	1.3	1.0	1.0	0.6
170.	*	0.1	0.1	0.8	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.5	0.3	0.1	1.4	1.5	1.0	0.8	0.6
180.	*	0.0	0.1	0.7	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.4	0.3	0.2	1.4	1.6	1.2	0.8	0.5
190.	*	0.0	0.1	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.4	0.3	0.4	1.5	1.4	1.1	0.6	0.5
200.	*	0.0	0.0	0.4	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.5	0.2	0.3	0.4	0.3	1.5	1.5	1.0	0.6	0.4
210.	*	0.0	0.0	0.2	0.2	0.1	0.0	0.2	0.4	0.0	0.0	0.5	0.4	0.4	0.6	0.6	1.3	1.2	0.8	0.5	0.4
220.	*	0.0	0.0	0.2	0.1	0.0	0.1	0.6	0.8	0.0	0.0	0.5	0.8	0.6	1.1	1.1	1.0	0.8	0.6	0.5	0.3
230.	*	0.0	0.0	0.0	0.0	0.0	0.2	1.0	1.3	0.2	0.0	0.6	1.1	0.9	1.3	1.4	0.4	0.5	0.5	0.5	0.2
240.	*	0.0	0.0	0.0	0.0	0.0	0.4	1.3	1.4	0.3	0.0	0.8	1.1	1.0	1.6	1.8	0.2	0.3	0.5	0.6	0.1
250.	*	0.0	0.0	0.0	0.0	0.0	0.6	1.4	1.5	0.6	0.2	0.8	1.4	1.2	1.6	1.7	0.1	0.3	0.6	0.6	0.1
260.	*	0.0	0.0	0.0	0.0	0.0	0.7	1.5	1.4	0.6	0.2	1.0	1.2	1.3	1.4	1.5	0.1	0.2	0.6	0.4	0.1
270.	*	0.0	0.1	0.1	0.0	0.0	0.8	1.4	1.3	0.7	0.4	1.2	1.1	1.1	1.6	1.3	0.1	0.1	0.4	0.3	0.0
280.	*	0.0	0.2	0.2	0.0	0.0	1.0	1.2	1.4	0.9	0.9	0.9	1.2	1.2	1.1	1.1	0.1	0.1	0.3	0.1	0.0
290.	*	0.0	0.3	0.5	0.0	0.0	1.0	1.3	1.4	1.0	1.0	0.6	1.2	1.1	1.1	0.9	0.0	0.1	0.3	0.1	0.1
300.	*	0.1	0.6	0.7	0.2	0.0	1.1	1.4	1.3	1.0	1.0	0.6	1.3	0.9	1.0	0.9	0.0	0.0	0.2	0.2	0.1
310.	*	0.1	0.7	0.7	0.4	0.1	1.4	1.6	1.1	1.0	1.0	0.3	1.3	0.8	1.0	0.8	0.0	0.0	0.2	0.2	0.1
320.	*	0.1	0.7	0.8	0.4	0.2	1.4	1.6	0.9	0.9	1.0	0.3	1.3	0.8	1.0	0.5	0.0	0.0	0.2	0.2	0.1
330.	*	0.1	0.7	0.6	0.4	0.2	1.5	1.5	0.8	0.9	0.9	0.3	1.3	0.8	1.0	0.3	0.0	0.0	0.2	0.1	0.1
340.	*	0.1	0.6	0.6	0.4	0.3	1.5	1.6	1.1	0.9	0.8	0.1	1.3	0.8	1.0	0.4	0.0	0.0	0.2	0.1	0.1
350.	*	0.2	0.6	0.6	0.4	0.4	1.7	1.7	1.3	0.9	0.6	0.1	1.4	0.7	1.1	0.3	0.0	0.0	0.2	0.1	0.1

360. * 0.4 0.6 0.6 0.4 0.4 1.7 1.7 1.4 0.9 0.5 0.1 1.4 0.6 1.0 0.3 0.0 0.0 0.2 0.1 0.1

-----*

MAX * 1.1 1.3 1.1 1.2 1.0 1.7 2.0 1.5 1.0 1.0 1.2 1.4 1.3 1.6 1.8 1.5 1.6 1.2 1.0 0.9

DEGR.* 70 70 80 60 60 0 10 250 310 290 270 0 260 240 240 190 180 60 110 120

THE HIGHEST CONCENTRATION OF 2.00 PPM OCCURRED AT RECEPTOR REC7 .

JOB: TREMONT CROSSING - TREMONT/MALCOLM X

RUN: 2017 NO BUILD PEAK PM

DATE : 8/ 9/13

TIME : 15:50:25

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T/R QUEUE	* 765525.8	*****	766363.6	*****	*	851.	100.	AG	151.	100.0	0.0	20.0	1.17	43.2
2. WB L/T QUEUE	* 766105.6	*****	765649.2	*****	*	462.	279.	AG	167.	100.0	0.0	20.0	1.10	23.5
3. WB R QUEUE	* 766025.8	*****	764422.1	*****	*	1707.	290.	AG	84.	100.0	0.0	12.0	1.84	86.7
4. NB U/L QUEUE	* 765689.8	*****	766356.4	*****	*	1079.	38.	AG	91.	100.0	0.0	10.0	1.79	54.8
5. NB T/R QUEUE	* 765709.5	*****	765832.7	*****	*	200.	38.	AG	235.	100.0	0.0	30.0	0.41	10.2
6. SB U/L QUEUE	* 765960.1	*****	765335.4	*****	*	1025.	218.	AG	91.	100.0	0.0	10.0	1.89	52.1
7. SB T/R QUEUE	* 765942.0	*****	765816.9	*****	*	204.	218.	AG	235.	100.0	0.0	30.0	0.44	10.4
8. EB OUT FRE FLO	* 765795.7	*****	766091.6	*****	*	300.	99.	AG	671.	9.0	0.0	30.0		
9. WB OUT FRE FLO	* 765847.6	*****	765529.9	*****	*	322.	280.	AG	766.	8.9	0.0	30.0		
10. NB OUT FRE FLO	* 765847.6	*****	765985.2	*****	*	232.	36.	AG	1453.	9.0	0.0	40.0		
11. SB OUT FRE FLO	* 765797.7	*****	765668.6	*****	*	209.	218.	AG	1439.	8.9	0.0	35.0		

DATE : 8/ 9/13

TIME : 15:50:25

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
      * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
      * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
-----*-----
1. EB L/T/R QUEUE * 140 101 7.0 789 1575 38.94 2 3
2. WB L/T QUEUE * 140 112 7.0 545 1830 38.94 2 3
3. WB R QUEUE * 140 112 7.0 318 1275 38.94 2 3
4. NB U/L QUEUE * 140 122 6.0 201 1577 38.94 2 3
5. NB T/R QUEUE * 140 105 6.0 1047 4364 38.94 2 3
6. SB U/L QUEUE * 140 122 6.0 181 1345 38.94 2 3
7. SB T/R QUEUE * 140 105 6.0 1070 4209 38.94 2 3
    
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RECEPTOR LOCATIONS

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      * COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 765523.5 ***** 5.9 *
2. 2 * 765616.0 ***** 5.9 *
3. 3 * 765717.2 ***** 5.9 *
4. 4 * 765684.7 ***** 5.9 *
5. 5 * 765646.5 ***** 5.9 *
6. 6 * 765747.1 ***** 5.9 *
7. 7 * 765794.4 ***** 5.9 *
8. 8 * 765849.6 ***** 5.9 *
9. 9 * 765946.9 ***** 5.9 *
10. 10 * 766080.4 ***** 5.9 *
11. 11 * 766094.6 ***** 5.9 *
12. 12 * 765907.0 ***** 5.9 *
13. 13 * 765955.7 ***** 5.9 *
14. 14 * 765955.1 ***** 5.9 *
15. 15 * 765999.4 ***** 5.9 *
16. 16 * 765910.3 ***** 5.9 *
17. 17 * 765862.2 ***** 5.9 *
18. 18 * 765780.7 ***** 5.9 *
19. 19 * 765663.3 ***** 5.9 *
20. 20 * 765562.1 ***** 5.9 *
    
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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

ANGLE *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	* 0.3	0.6	0.8	0.6	0.3	1.5	1.8	1.9	1.4	1.0	0.1	1.2	0.5	0.8	0.2	0.0	0.0	0.2	0.1	0.1
10.	* 0.4	0.6	0.8	0.6	0.3	1.6	2.2	2.0	1.3	0.7	0.1	1.1	0.4	0.7	0.3	0.0	0.0	0.1	0.1	0.1
20.	* 0.5	0.6	0.8	0.6	0.3	1.6	1.9	2.1	1.2	0.8	0.0	1.1	0.2	0.6	0.2	0.0	0.0	0.1	0.1	0.1
30.	* 0.5	0.7	0.9	0.8	0.5	1.3	1.8	1.9	1.2	0.7	0.0	0.7	0.2	0.4	0.1	0.0	0.1	0.3	0.1	0.1
40.	* 0.6	0.8	1.2	1.2	0.9	1.1	1.3	1.6	1.1	0.7	0.0	0.5	0.0	0.3	0.1	0.1	0.3	0.5	0.1	0.1
50.	* 0.6	1.0	1.6	1.3	1.0	0.6	0.7	1.3	1.1	0.5	0.0	0.3	0.0	0.1	0.0	0.1	0.5	1.0	0.1	0.1
60.	* 0.8	1.3	1.6	1.4	1.2	0.2	0.5	1.2	1.0	0.5	0.0	0.2	0.0	0.0	0.0	0.1	0.8	1.1	0.3	0.1
70.	* 1.1	1.6	1.6	1.5	1.4	0.2	0.4	1.1	1.1	0.6	0.0	0.3	0.0	0.0	0.0	0.1	1.0	1.2	0.5	0.3
80.	* 1.3	1.6	1.9	1.5	1.0	0.1	0.3	1.2	1.0	0.6	0.0	0.4	0.0	0.0	0.0	0.2	1.0	1.1	0.6	0.3
90.	* 1.2	1.6	1.6	1.2	0.9	0.1	0.1	1.0	0.9	0.6	0.0	0.6	0.0	0.0	0.0	0.3	1.1	1.2	1.0	0.6
100.	* 0.9	1.1	1.2	0.9	0.8	0.0	0.1	0.6	0.7	0.4	0.1	0.7	0.2	0.0	0.0	0.3	1.0	1.4	1.2	0.8
110.	* 0.5	0.8	1.1	0.8	0.8	0.0	0.0	0.3	0.4	0.2	0.2	1.1	0.3	0.1	0.0	0.7	1.1	1.6	1.7	1.0
120.	* 0.3	0.6	0.8	0.8	0.8	0.0	0.0	0.1	0.1	0.1	0.2	1.0	0.5	0.2	0.0	0.8	1.2	1.4	1.5	0.9
130.	* 0.2	0.5	0.8	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.9	0.8	0.2	0.1	1.0	1.2	1.5	1.5	0.8
140.	* 0.1	0.4	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.9	0.8	0.4	0.1	1.2	1.3	1.5	1.4	0.7
150.	* 0.0	0.3	0.8	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.9	0.8	0.5	0.2	1.2	1.4	1.5	1.4	0.7
160.	* 0.0	0.3	0.8	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.9	0.8	0.5	0.2	1.2	1.4	1.6	1.2	0.5
170.	* 0.0	0.1	0.8	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.8	0.8	0.5	0.2	1.4	1.5	1.6	1.2	0.5
180.	* 0.0	0.1	0.7	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.8	0.5	0.2	1.4	1.6	1.6	0.9	0.4
190.	* 0.0	0.1	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.8	0.8	0.5	0.4	1.5	1.7	1.7	0.8	0.4
200.	* 0.0	0.1	0.4	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.7	0.9	0.8	0.6	0.4	1.6	1.6	1.5	0.7	0.4
210.	* 0.0	0.0	0.2	0.2	0.1	0.0	0.3	0.4	0.0	0.0	0.7	1.1	0.9	0.9	0.8	1.3	1.2	1.3	0.5	0.4
220.	* 0.0	0.0	0.2	0.1	0.1	0.1	0.5	0.6	0.0	0.0	0.7	1.5	1.1	1.4	1.2	0.9	0.9	1.1	0.6	0.3
230.	* 0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.1	0.2	0.0	0.7	1.8	1.4	1.5	1.5	0.5	0.6	1.0	0.5	0.2
240.	* 0.0	0.0	0.0	0.0	0.0	0.3	1.2	1.4	0.3	0.0	1.0	1.9	1.5	1.6	1.9	0.3	0.4	0.9	0.5	0.1
250.	* 0.0	0.0	0.0	0.0	0.0	0.4	1.1	1.3	0.4	0.1	1.1	2.1	1.5	1.5	1.5	0.1	0.4	0.9	0.4	0.1
260.	* 0.0	0.0	0.0	0.0	0.0	0.5	1.2	1.3	0.7	0.2	1.3	1.9	1.6	1.4	1.3	0.1	0.1	0.7	0.4	0.0
270.	* 0.0	0.1	0.1	0.0	0.0	0.7	1.1	1.3	1.0	0.7	1.1	1.8	1.4	1.2	1.1	0.1	0.1	0.6	0.3	0.0
280.	* 0.0	0.1	0.2	0.0	0.0	0.9	1.1	1.8	1.4	1.2	0.8	1.5	1.3	1.0	1.0	0.1	0.1	0.4	0.1	0.0
290.	* 0.0	0.2	0.4	0.0	0.0	0.9	1.2	2.0	1.8	1.5	0.6	1.4	1.0	1.0	0.9	0.0	0.1	0.3	0.1	0.1
300.	* 0.1	0.5	0.7	0.2	0.0	1.0	1.3	2.3	1.9	1.7	0.3	1.2	0.9	0.9	0.9	0.0	0.0	0.2	0.1	0.1
310.	* 0.1	0.6	0.8	0.2	0.1	1.3	1.6	2.0	1.8	1.5	0.2	1.2	0.8	0.9	0.7	0.0	0.0	0.2	0.2	0.1
320.	* 0.1	0.6	0.8	0.4	0.2	1.3	1.6	2.0	1.7	1.4	0.2	1.2	0.8	0.9	0.5	0.0	0.0	0.2	0.1	0.1
330.	* 0.1	0.6	0.9	0.4	0.2	1.2	1.6	1.8	1.7	1.2	0.1	1.2	0.8	0.9	0.3	0.0	0.0	0.2	0.1	0.1
340.	* 0.1	0.6	0.9	0.5	0.2	1.4	1.7	1.8	1.7	1.1	0.1	1.2	0.7	0.9	0.2	0.0	0.0	0.2	0.1	0.1
350.	* 0.2	0.6	0.8	0.5	0.2	1.4	1.8	1.9	1.6	0.9	0.1	1.1	0.7	0.9	0.2	0.0	0.0	0.2	0.1	0.1

360. * 0.3 0.6 0.8 0.6 0.3 1.5 1.8 1.9 1.4 1.0 0.1 1.2 0.5 0.8 0.2 0.0 0.0 0.2 0.1 0.1

-----*

MAX * 1.3 1.6 1.9 1.5 1.4 1.6 2.2 2.3 1.9 1.7 1.3 2.1 1.6 1.6 1.9 1.6 1.7 1.7 1.7 1.0

DEGR. * 80 70 80 70 70 10 10 300 300 300 260 250 260 240 240 200 190 190 110 110

THE HIGHEST CONCENTRATION OF 2.30 PPM OCCURRED AT RECEPTOR REC8 .

JOB: TREMONT CROSSING - TREMONT/MALCOLM X RUN: 2017 BUILD PEAK PM
 DATE : 8/ 9/13
 TIME : 15:51:41

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

 VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 321. CM
 U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	* X1	Y1	X2	Y2	* (FT) (DEG)	* LENGTH (G/MI)	BRG (FT)	TYPE (FT)	VPH (VEH)	EF	H	W	V/C	QUEUE
1. EB L/T/R QUEUE	* 765525.8	*****	765721.9	*****	*****	199.	100.	AG	131.	100.0	0.0	20.0	0.81	10.1
2. WB L/T QUEUE	* 766105.6	*****	765956.9	*****	*****	150.	279.	AG	157.	100.0	0.0	20.0	0.69	7.6
3. WB R QUEUE	* 766025.8	*****	766025.7	*****	*****	0.	228.	AG	0.	100.0	0.0	12.0	0.28	0.0
4. NB U/L QUEUE	* 765689.8	*****	766072.6	*****	*****	619.	38.	AG	88.	100.0	0.0	10.0	1.28	31.5
5. NB T/R QUEUE	* 765709.5	*****	765820.6	*****	*****	181.	38.	AG	204.	100.0	0.0	30.0	0.28	9.2
6. SB U/L QUEUE	* 765960.1	*****	765467.5	*****	*****	808.	218.	AG	88.	100.0	0.0	10.0	1.47	41.1
7. SB T/R QUEUE	* 765942.0	*****	765821.4	*****	*****	197.	218.	AG	204.	100.0	0.0	30.0	0.32	10.0
8. EB OUT FRE FLO	* 765795.7	*****	766091.6	*****	*****	300.	99.	AG	687.	9.0	0.0	30.0		
9. WB OUT FRE FLO	* 765847.6	*****	765529.9	*****	*****	322.	280.	AG	826.	8.9	0.0	30.0		
10. NB OUT FRE FLO	* 765847.6	*****	765985.2	*****	*****	232.	36.	AG	1550.	9.0	0.0	40.0		
11. SB OUT FRE FLO	* 765797.7	*****	765668.6	*****	*****	209.	218.	AG	1321.	8.9	0.0	35.0		

DATE : 8/ 9/13

TIME : 15:51:41

ADDITIONAL QUEUE LINK PARAMETERS

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LINK DESCRIPTION * CYCLE RED CLEARANCE APPROACH SATURATION IDLE SIGNAL ARRIVAL
                  * LENGTH TIME LOST TIME VOL FLOW RATE EM FAC TYPE RATE
                  * (SEC) (SEC) (SEC) (VPH) (VPH) (gm/hr)
    
```

```

-----*-----
1. EB L/T/R QUEUE * 140 88 7.0 828 1659 38.94 2 3
2. WB L/T QUEUE * 140 105 7.0 525 2053 38.94 2 3
3. WB R QUEUE * 140 0 7.0 332 1275 38.94 2 3
4. NB U/L QUEUE * 140 118 6.0 201 1577 38.94 2 3
5. NB T/R QUEUE * 140 91 6.0 1091 4367 38.94 2 3
6. SB U/L QUEUE * 140 118 6.0 197 1344 38.94 2 3
7. SB T/R QUEUE * 140 91 6.0 1190 4184 38.94 2 3
    
```

RECEPTOR LOCATIONS

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-----
* COORDINATES (FT) *
RECEPTOR * X Y Z *
-----*-----
1. 1 * 765523.5 ***** 5.9 *
2. 2 * 765616.0 ***** 5.9 *
3. 3 * 765717.2 ***** 5.9 *
4. 4 * 765684.7 ***** 5.9 *
5. 5 * 765646.5 ***** 5.9 *
6. 6 * 765747.1 ***** 5.9 *
7. 7 * 765794.4 ***** 5.9 *
8. 8 * 765849.6 ***** 5.9 *
9. 9 * 765946.9 ***** 5.9 *
10. 10 * 766080.4 ***** 5.9 *
11. 11 * 766094.6 ***** 5.9 *
12. 12 * 765907.0 ***** 5.9 *
13. 13 * 765955.7 ***** 5.9 *
14. 14 * 765955.1 ***** 5.9 *
15. 15 * 765999.4 ***** 5.9 *
16. 16 * 765910.3 ***** 5.9 *
17. 17 * 765862.2 ***** 5.9 *
18. 18 * 765780.7 ***** 5.9 *
19. 19 * 765663.3 ***** 5.9 *
20. 20 * 765562.1 ***** 5.9 *
    
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND * CONCENTRATION

ANGLE * (PPM)

(DEGR)* REC1 REC2 REC3 REC4 REC5 REC6 REC7 REC8 REC9 REC10 REC11 REC12 REC13 REC14 REC15 REC16 REC17 REC18 REC19 REC20

ANGLE	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.1	0.4	0.3	0.2	0.2	1.2	1.2	1.1	0.7	0.5	0.0	1.0	0.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0
10.	0.3	0.4	0.2	0.2	0.2	1.2	1.4	1.2	0.5	0.3	0.0	0.9	0.3	0.7	0.2	0.0	0.0	0.0	0.0	0.0
20.	0.4	0.4	0.2	0.2	0.2	1.3	1.3	1.1	0.5	0.3	0.0	0.8	0.2	0.5	0.1	0.0	0.0	0.0	0.0	0.0
30.	0.4	0.4	0.2	0.3	0.4	0.9	1.0	1.0	0.4	0.2	0.0	0.5	0.1	0.4	0.1	0.0	0.1	0.1	0.0	0.0
40.	0.4	0.4	0.4	0.6	0.6	0.8	0.7	0.7	0.5	0.2	0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.4	0.0	0.0
50.	0.5	0.6	0.7	0.7	0.8	0.3	0.3	0.5	0.5	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.4	0.8	0.0	0.0
60.	0.7	0.8	0.9	0.9	0.8	0.1	0.2	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.8	0.1	0.0
70.	0.7	1.0	0.9	0.8	0.9	0.0	0.2	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.9	0.4	0.1
80.	0.8	0.9	0.9	1.0	0.8	0.0	0.2	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	0.8	0.5	0.2
90.	0.5	0.8	0.9	0.8	0.8	0.0	0.0	0.3	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.2	1.0	0.7	0.5	0.3
100.	0.5	0.7	0.8	0.8	0.8	0.0	0.0	0.3	0.2	0.0	0.0	0.2	0.1	0.0	0.0	0.3	1.0	0.8	0.6	0.4
110.	0.3	0.5	0.7	0.8	0.7	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.1	0.0	0.0	0.5	0.9	0.8	0.7	0.4
120.	0.2	0.5	0.7	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.7	1.0	0.8	0.8	0.7
130.	0.2	0.5	0.8	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.1	0.0	0.9	1.0	0.6	0.8	0.7
140.	0.1	0.3	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.1	0.0	1.0	1.0	0.8	0.7
150.	0.0	0.3	0.8	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.3	0.1	1.0	1.1	0.7	0.8
160.	0.0	0.3	0.8	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.2	0.1	1.1	1.1	0.9	0.7
170.	0.0	0.1	0.7	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.2	0.1	1.0	1.1	0.8	0.7
180.	0.0	0.1	0.7	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.2	0.1	1.0	1.2	1.0	0.6
190.	0.0	0.1	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.2	0.2	0.2	1.1	1.0	0.9	0.5
200.	0.0	0.0	0.3	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.4	0.1	0.1	0.2	0.1	1.2	1.2	0.9	0.4	0.4
210.	0.0	0.0	0.2	0.2	0.1	0.0	0.2	0.2	0.0	0.0	0.4	0.3	0.2	0.4	0.4	0.9	0.8	0.6	0.4	0.4
220.	0.0	0.0	0.1	0.0	0.0	0.1	0.4	0.6	0.0	0.0	0.5	0.7	0.3	0.9	0.9	0.6	0.6	0.5	0.4	0.3
230.	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.9	0.1	0.0	0.5	1.0	0.7	1.0	1.1	0.3	0.4	0.4	0.4	0.2
240.	0.0	0.0	0.0	0.0	0.0	0.3	1.0	1.0	0.2	0.0	0.6	0.9	0.7	1.2	1.3	0.1	0.2	0.4	0.4	0.1
250.	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.0	0.4	0.1	0.7	1.0	0.8	1.2	1.2	0.0	0.2	0.4	0.4	0.1
260.	0.0	0.0	0.0	0.0	0.0	0.5	1.1	0.9	0.5	0.1	0.7	1.1	0.9	1.1	1.0	0.0	0.0	0.4	0.3	0.1
270.	0.0	0.0	0.1	0.0	0.0	0.6	1.0	0.9	0.6	0.3	0.5	1.1	0.8	1.1	1.0	0.0	0.0	0.3	0.3	0.0
280.	0.0	0.1	0.2	0.0	0.0	0.8	1.0	1.0	0.8	0.5	0.3	1.0	0.8	0.9	0.9	0.0	0.0	0.2	0.1	0.0
290.	0.0	0.2	0.4	0.0	0.0	0.8	1.1	0.9	0.9	0.5	0.2	0.9	0.7	0.9	0.9	0.0	0.0	0.1	0.0	0.0
300.	0.0	0.4	0.4	0.1	0.0	0.9	1.1	1.0	0.7	0.6	0.2	0.8	0.7	0.9	0.8	0.0	0.0	0.0	0.0	0.0
310.	0.0	0.4	0.5	0.1	0.0	1.0	1.2	0.7	0.8	0.7	0.2	0.9	0.7	0.9	0.7	0.0	0.0	0.0	0.0	0.0
320.	0.0	0.5	0.4	0.3	0.1	1.1	1.2	0.7	0.7	0.7	0.2	0.9	0.7	0.9	0.5	0.0	0.0	0.0	0.0	0.0
330.	0.0	0.5	0.4	0.3	0.1	1.2	1.2	0.7	0.8	0.7	0.1	0.9	0.7	0.9	0.3	0.0	0.0	0.0	0.0	0.0
340.	0.0	0.4	0.4	0.3	0.2	1.2	1.1	0.8	0.8	0.6	0.0	0.9	0.7	0.9	0.3	0.0	0.0	0.0	0.0	0.0
350.	0.1	0.4	0.4	0.3	0.2	1.2	1.2	0.9	0.7	0.5	0.0	1.0	0.7	0.9	0.2	0.0	0.0	0.0	0.0	0.0

360. * 0.1 0.4 0.3 0.2 0.2 1.2 1.2 1.1 0.7 0.5 0.0 1.0 0.6 0.8 0.2 0.0 0.0 0.0 0.0

-----*

MAX * 0.8 1.0 0.9 1.0 0.9 1.3 1.4 1.2 0.9 0.7 0.7 1.1 0.9 1.2 1.3 1.2 1.2 1.0 0.8 0.7

DEGR. * 80 70 80 80 70 20 10 10 290 310 250 260 260 240 240 200 180 180 120 120

THE HIGHEST CONCENTRATION OF 1.40 PPM OCCURRED AT RECEPTOR REC7 .

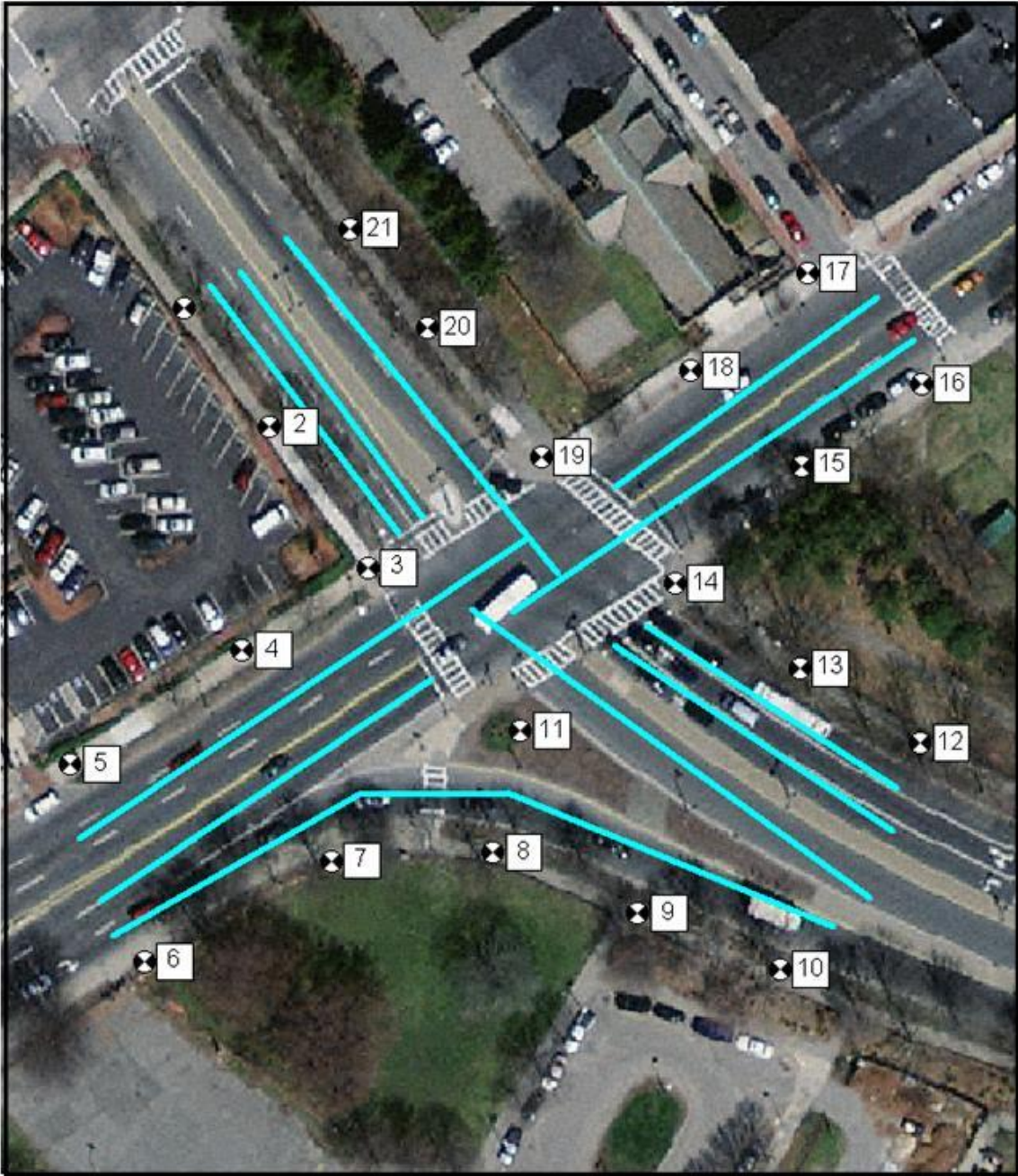


Figure 1

**Tremont Street/Melnea Cass Boulevard
Existing and Future No Build & Build Conditions
Roadway Links and Receptors**



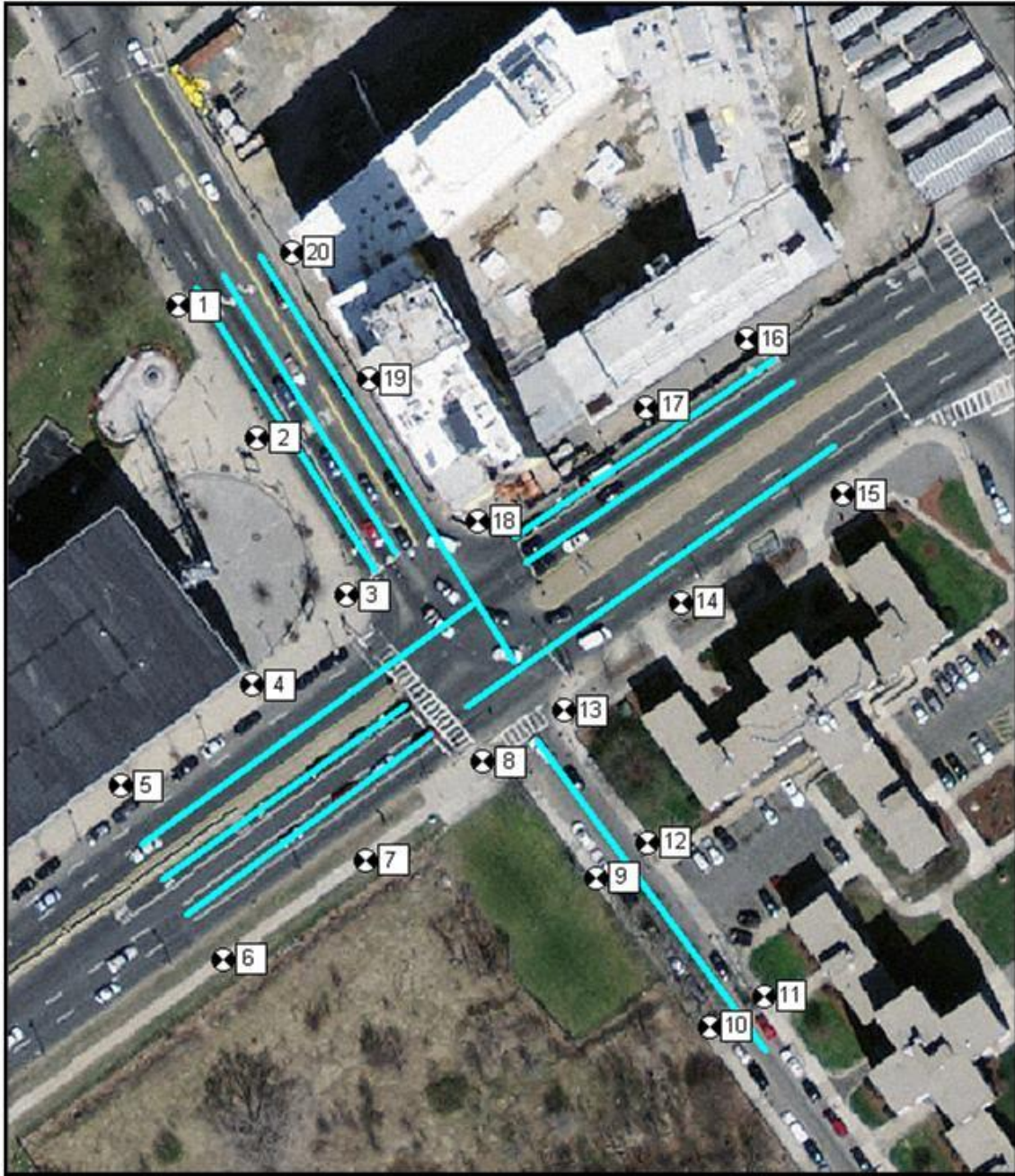


Figure 2

Tremont Street/Ruggles Street/Whittier
 Existing and Future No Build & Build Conditions
 Roadway Links and Receptors



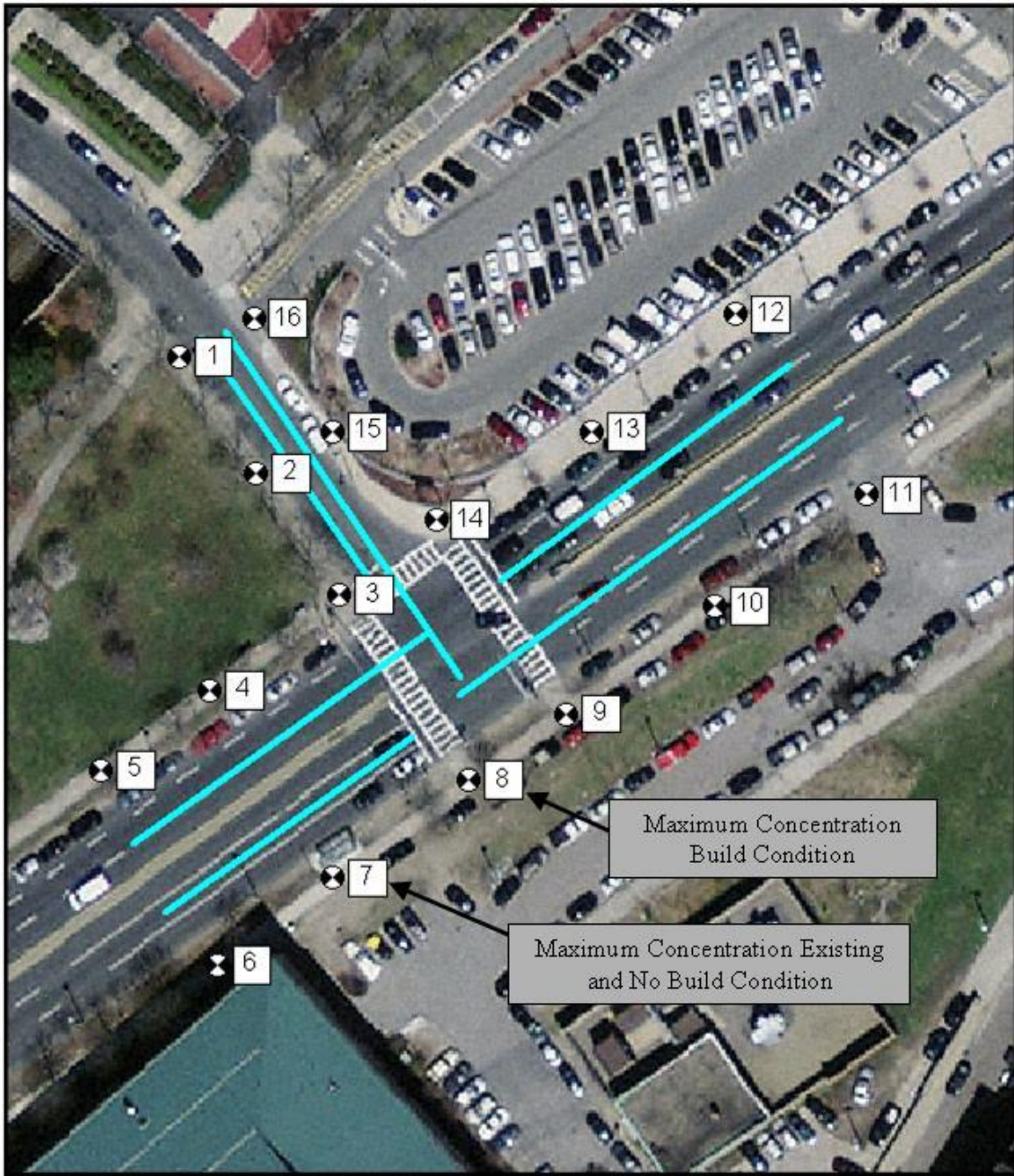


Figure 3

**Tremont Street/Malcom X Blvd/Columbus Ave
Existing and Future No Build & Build Conditions
Roadway Links and Receptors**



APPENDIX 4

NOISE

APPENDIX 4 NOISE

TREMONT CROSSING DRAFT PROJECT IMPACT REPORT

Page Contents

2	Figure 1: Modeling Receptor Locations
3-5	Cadna Noise Modeling Results

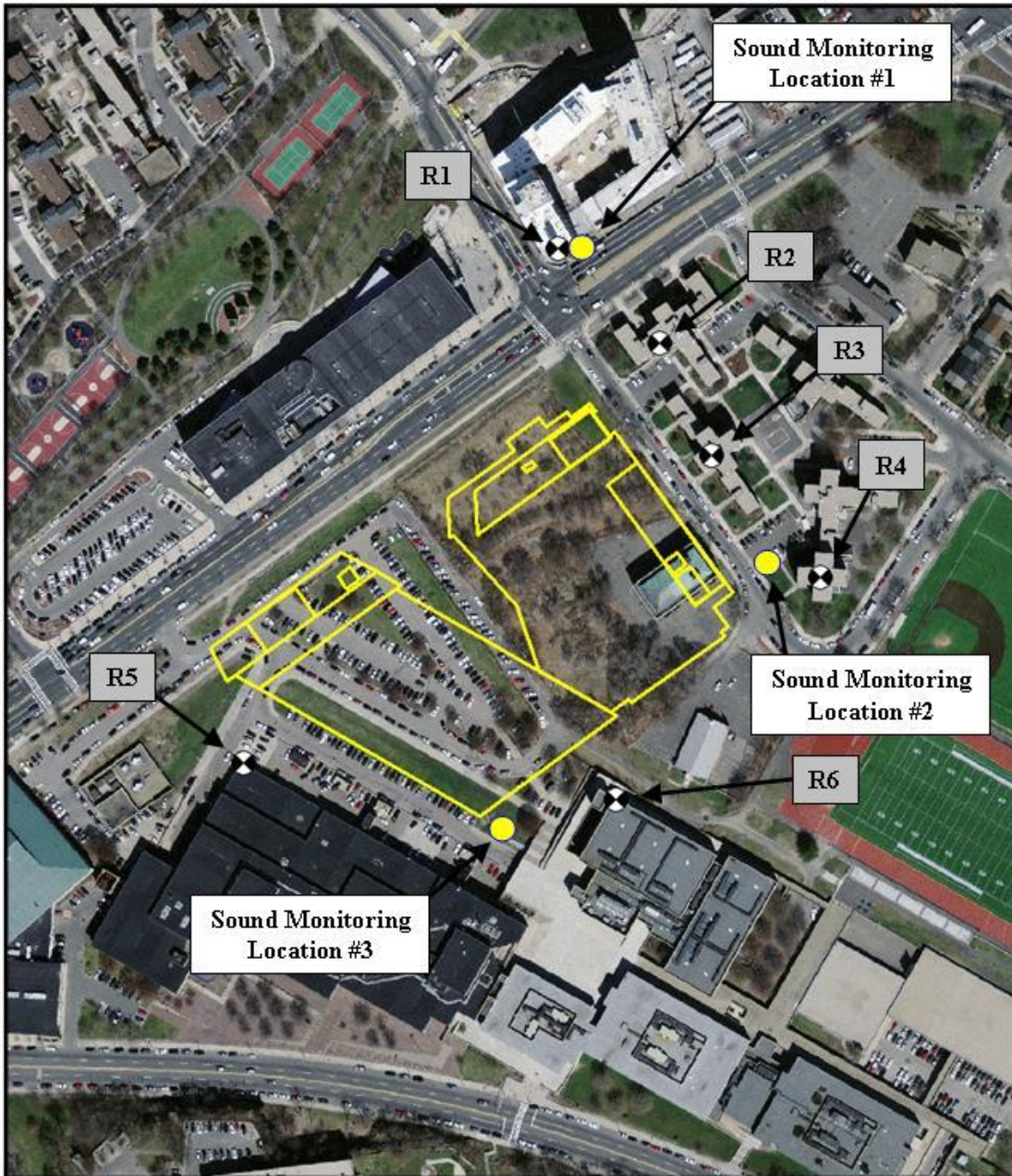


Figure 1

**Sound Monitoring and Modeling Receptor Locations for the Tremont Crossing Project
Boston, MA**



Cadna Noise Modeling Results

Sound Modeling Results

Name	ID	Sound Level (dBA)	Height (m)	Coordinates		
				X (m)	Y (m)	Z (m)
Northeastern Dorm	R1	42.9	21.3	233834.8	898330	25.24
Residences to the East 1	R2	42.6	12.2	233882.8	898285.4	15.85
Residences to the East 2	R3	42.2	12.2	233907.2	898232.6	15.76
Residences to the East 3	R4	42	12.2	233958.5	898174.9	16.27
Madison Park High School	R5	37.8	1.52	233686.6	898087.5	5.56
O'Bryant School Math/Science	R6	42.8	1.52	233862.4	898070.2	5.38

Octave Band Levels

Northeastern Dorm

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	49.1	46.9	45.9	44.1	40.5	38	33	27.8	18.6

Residences to the East 1

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	51.7	49	46	44.5	40.2	37.2	32.1	28	19.7

Residences to the East 2

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	53.2	49.9	46.3	43.9	39.6	35.9	32.3	28	26

Residences to the East 3

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	53.1	50	46.9	43.3	39.9	36	31.7	27.9	23.5

Madison Park High School

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	48.3	45.6	43.1	40.3	34.9	30.8	28.5	23.6	13.6

O'Bryant School Math/Science

Frequency	<u>31.5</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>4000</u>	<u>8000</u>
Sound Level (dB)	53.2	50.8	48.5	45	40.3	36.4	32.1	28	22.7

Sound Source	ID	Sound Power Level (dBA)	Lw / Li Type	Height (m)	Coordinates	
					X (m)	Y (m)
Retail Packaged Unit #1	IntelliPak_1	103	Lw	233841.32	898161.58	27.93
Retail Packaged Unit #2	IntelliPak_2	103	Lw	233848.09	898166.42	27.93
Retail Packaged Unit #3	IntelliPak_3	103	Lw	233854.43	898171.1	27.93
Retail Packaged Unit #4	IntelliPak_4	103	Lw	233861.45	898175.94	27.93
ERV #1	ERV	95.9	Lw	233719.77	898173.51	71.5
ERV #2	ERV	95.9	Lw	233722.32	898170.43	71.5
ERV #3	ERV	95.9	Lw	233724.44	898167.05	71.5
ERV #4	ERV	95.9	Lw	233828.2	898234.73	103.83
ERV #5	ERV	95.9	Lw	233830.62	898231.55	103.83
ERV #6	ERV	95.9	Lw	233863.86	898215.56	44.73
ERV #7	ERV	95.9	Lw	233870.35	898206.81	44.73
ERV #8	ERV	95.9	Lw	233876.58	898198.19	44.73
ERV #9	ERV	95.9	Lw	233883.08	898189.31	44.73
ERV #10	ERV	95.9	Lw	233839.64	898140.7	27.93
ERV #11	ERV	95.9	Lw	233846.58	898145.97	27.93
ERV #12	ERV	95.9	Lw	233853.53	898151.02	27.93
ERV #12	ERV	94.9	Lw	233861.1	898154.49	27.93
ERV #13	ERV	94.9	Lw	233868.78	898160.07	27.93
ERV #14	ERV	94.9	Lw	233876.36	898165.64	27.93
Retail Exhaust Fan 1	Retail_Exhaust	90.8	Lw	233842.57	898129.49	26.93
Retail Exhaust Fan 2	Retail_Exhaust	90.8	Lw	233848.27	898133.54	26.93
Retail Exhaust Fan 3	Retail_Exhaust	90.8	Lw	233846.68	898123.79	26.93
Retail Exhaust Fan 4	Retail_Exhaust	90.8	Lw	233852.38	898128.03	26.93
Retail Exhaust Fan 5	Retail_Exhaust	94.5	Lw	233721.33	898159.03	70.5
Retail Exhaust Fan 6	Retail_Exhaust	94.5	Lw	233724.49	898161.18	70.5
Retail Exhaust Fan 7	Retail_Exhaust	94.5	Lw	233727.43	898163.39	70.5
Retail Exhaust Fan 8	Retail_Exhaust	94.5	Lw	233730.49	898165.71	70.5
Retail Exhaust Fan 9	Retail_Exhaust	94.5	Lw	233733.54	898167.92	70.5
Office Generator Case	O_Generator_Case	82.3	Lw	233731.26	898180.64	71
Office Generator Exhaust	O_Generator_Exhaust	86.2	Lw	233733.96	898182.73	72.5
Hotel Generator Exhaust 1	H_Generator_Exhaust	86.2	Lw	233827.69	898222.44	104.83
Hotel Generator Exhaust 2	H_Generator_Exhaust	86.2	Lw	233836.62	898228.87	104.83
Retail Generator Exhaust 1	Ret_Generator_Exhaust	86.2	Lw	233871.94	898131.58	28.93
Retail Generator Exhaust 2	Ret_Generator_Exhaust	86.2	Lw	233885.33	898141.19	28.93
Hotel Generator Case 1	Hotel_Generator_Case	82.3	Lw	233825.29	898220.58	103.33
Hotel Generator Case 2	Hotel_Generator_Case	82.3	Lw	233833.75	898226.78	103.33
Retail Generator Case 1	Retail_Generator_Case	82.3	Lw	233869.05	898129.18	27.43
Retail Generator Case 2	Retail_Generator_Case	82.3	Lw	233882.5	898139.04	27.43

Area Sources		Sound Power Level (dBA)	Lw / Li Type
Office Cooling Tower Top	O_Cooling_Tower	93	Lw
Residential Cooling Tower Top	R_Cooling_Tower	93.1	Lw
Hotel Cooling Tower Top	H_Cooling_Tower	90	Lw
Retail Cooling Tower Top 1	Ret_Cooling_Tower	87.4	Lw
Retail Cooling Tower Top 2	Ret_Cooling_Tower	87.4	Lw
Retail Cooling Tower Top 3	Ret_Cooling_Tower	87.5	Lw
Retail Cooling Tower Top 4	Ret_Cooling_Tower	87.4	Lw

Vertical Area Sources		Sound Power Level (dBA)	Lw / Li Type
O Penthouse 1	O_Pent_1	68.9	Lw
O Penthouse 2	O_Pent_2	68.7	Lw
O Penthouse 3	O_Pent_3	70.9	Lw
O Penthouse 4	O_Pent_4	68.6	Lw
H Penthouse 1	H_Pent_1	58.1	Lw
H Penthouse 2	H_Pent_2	59.8	Lw
H Penthouse 3	H_Pent_3	58.1	Lw
H Penthouse 4	H_Pent_4	59.8	Lw
Office Cooling Tower Face #1	O_Cooling_Tower	96.5	Lw
Office Cooling Tower Face #2	O_Cooling_Tower	96.5	Lw
Office Cooling Tower Face #3	O_Cooling_Tower	96.5	Lw
Office Cooling Tower Face #4	O_Cooling_Tower	96.5	Lw
Residential Cooling Tower Face	R_Cooling_Tower	96.5	Lw
Residential Cooling Tower Face	R_Cooling_Tower	96.5	Lw
Residential Cooling Tower Face	R_Cooling_Tower	96.5	Lw
Residential Cooling Tower Face	R_Cooling_Tower	96.5	Lw
Hotel Cooling Tower Face #1	H_Cooling_Tower	94.5	Lw
Hotel Cooling Tower Face #2	H_Cooling_Tower	91.5	Lw
Hotel Cooling Tower Face #3	H_Cooling_Tower	94.5	Lw
Hotel Cooling Tower Face #4	H_Cooling_Tower	91.5	Lw
Retail Cooling Tower Face #1	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #2	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #3	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #4	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #5	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #6	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #7	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #8	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #9	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #10	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #11	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #12	Ret_Cooling_Tower	90.9	Lw
Retail Cooling Tower Face #13	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #14	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #15	Ret_Cooling_Tower	90.8	Lw
Retail Cooling Tower Face #16	Ret_Cooling_Tower	90.8	Lw
Penthouse	Penthouse	64	Lw
Penthouse	Penthouse	61.5	Lw
Penthouse	Penthouse	64	Lw
Penthouse	Penthouse	61.5	Lw

APPENDIX 5

STRECH ENERGY CODE ANALYSIS

TREMONT CROSSING

STRETCH ENERGY CODE ANALYSIS & ARTICLE 37 COMPLIANCE

February 9, 2016

The purpose of this document is to present the modeled annual site energy savings for the Tremont Crossing project with respect to the upcoming Massachusetts “Stretch” energy code compliance and to present annual energy cost savings with respect to Boston’s “Article 37” based on LEED v4.

The modeling was accomplished using eQuest, an industry standard software tool. The baseline model is a representation of the ASHRAE 90.1-2013 Appendix G Standard. The proposed model is a representation of the schematic design. A summary of energy savings and assumptions is included below.

The energy conservation measures included in the energy analysis are listed below:

1. Condensing Boilers
2. High Efficiency Heat Pumps
3. Energy Recovery
4. Plate & Frame Heat Exchanger for Free Cooling

The energy modeling results show a projected site energy savings of **17%** and an energy cost savings of **5.5%** over the ASHRAE 90.1-compliant baseline. The “BEPS” and “ES-D” output reports from eQuest are provided at the end of this document. This figure is an estimate of the current energy savings based on the most current design documents. As the design is in progress, these results are subject to change until the final models are complete with full documentation. A summary of the annual energy savings and modeling assumptions is included below.

	ASHRAE 90.1-2013 Baseline	Proposed	Savings
Energy Consumption (MMBtu)	116,604	96,334	17.4%
Energy Cost	\$3,534,576	\$3,339,181	5.52%

The proposed building has an estimated Energy Use Intensity of 45.8 KBTU/SQFT-YR.

Tremont Crossing
 Energy Modeling Assumptions
 Revised: 2/8/2016

	ASHRAE 90.1-2013 Baseline	Design
General Building Information		
Space use type	Residential 15% Hotel 6% Retail 18% Office 14% Museum 1% Parking 28% Student Housing 17%	Residential 15% Hotel 6% Retail 18% Office 14% Museum 1% Parking 28% Student Housing 17%
Conditioned Square Feet	2,100,000 SF	2,100,000 SF
Operating Schedule (HVAC Fans)	24 Hours	24 Hours
Temperature Setpoints	Cooling - 75°F Heating - 70°F	Cooling - 75°F Heating - 70°F
Building Envelope (Construction Assemblies)		
Roofs	R-20 continuous insulation above Deck (U-0.048) Reflectance = 0.3	R-20 continuous insulation above Deck (U-0.048) Reflectance = 0.4
Walls	Steel Framed with R-13 insulation between studs + R-7.5 continuous (U-0.064 overall)	Steel Framed with R-13 insulation between studs + R-7.5 continuous (U-0.064 overall)
Fenestration and Shading		
Vertical fenestration area (of Wall area)	40%	40%
Vertical Glazing U-factor	U-0.45	U-0.45
Vertical Glazing SHGC	0.4	0.4
Fenestration Visual Light Transmittance	N/A	0.5
HVAC (Air-side)		
Primary HVAC Type (All spaces except for guest rooms)	Residential - PTAC Hotel - PTAC Retail - VAV Office - VAV Museum - VAV Student Housing - PTAC	Residential - Water Source Heat Pumps Hotel - Water Source Heat Pumps Retail - Air Handler w/WSHP Office - Air Handler w/WSHP Museum - Air Handler w/WSHP Student Housing - Water Source Heat Pumps
Unitary Efficiency	PTACs: 10.2 EER	N/A
Fan System Operation	Residential, Hotel, Student Housing - On continuously during occupied hours. Cycled to meet load during unoccupied hours. Retail, Office, Museum - On continuously during occupied hours. Cycled to meet loads during unoccupied hours.	Residential, Hotel, Student Housing - On continuously during occupied hours. Cycled to meet load during unoccupied hours. Retail, Office, Museum - On continuously during occupied hours. Cycled to meet loads during unoccupied hours.
Outdoor Air Design Min. Ventilation	Per ASHRAE 62.1-2013	Per ASHRAE 62.1-2013
Economizer High-Limit Shutoff	Outdoor Air Temperature 70F	Outdoor Air Temperature 70F
Design Airflow Rates (Conditioned Spaces)	Autosized based on 20F supply air to room air delta-T	Autosized based on 20F supply air to room air delta-T
Total System Fan Power (Conditioned)	Per ASHRAE 90.1-2010 G3.1.2.9	Per ASHRAE 90.1-2013 G3.1.2.9

Exhaust Air Energy Recovery	Yes (see below)	Yes (see below)
Demand Control Ventilation	N/A	N/A
Supply Air Temperature Reset Parameters	Load Reset on VAV systems from 55F-60F	Constant
HVAC (Water-side)		
Number of Chillers	1	2
Chiller Part-Load Controls	No VSD	N/A
Chiller Capacity (Per Chiller)	≥75 and <150 Tons	300 Tons Each
Chiller Efficiency	0.775 kW/ton	0.669 kw/ton
Chilled Water Loop Supply Temperature	44	44
Chilled Water (CHW) Loop Delta-T	12	12
CHW Loop Temp Reset Parameters	54F @ 60F OA, 44F @ 80F OA	54F @ 60F OA, 44F @ 80F OA
CHW Loop Configuration	Primary/Secondary	Primary Only
Number of Primary CHW Pumps	1	2
Primary CHW Pump Power	22 W/GPM	22 W/GPM
Primary CHW Pump Speed Control	Variable Speed	Variable Speed
Secondary CHW Pump Power	22 W/GPM	N/A
Secondary CHW Pump Speed Control	Variable Speed	N/A
Number of Cooling Towers / Fluid Coolers	2	2
Cooling Tower Fan Control	Two Speed	Variable Speed
Condenser Water Leaving Temperature	85	85
Condenser Water (CW) Loop Delta-T	10	10
CW Loop Temp Reset Parameters	Fixed	65F @ 65F OA, 85F @ 80F
CW Loop Configuration	Primary Only	Primary Only
Number of CW Pumps	2	1
CW Pump Power	19 W/GPM	19 W/GPM
CW Pump Speed Control	One Speed	Variable Speed
Water-side Economizer for Free Cooling	No	Yes
Number of Boilers	2	3
Boiler Part-Load Controls	Staged	Staged
Boiler Capacity (Per Boiler)	N/A	2,500 MBH
Boiler Efficiency	80% Natural Draft	96% Condensing
Boiler Water Loop Supply Temperature	180F	180F
Hot Water (HW) Loop Delta-T	50F	50F
HW Loop Reset Parameters	150F @ 50F OA, 180F @ 20F OA	150F @ 50F OA, 180F @ 20F OA
HW Loop Configuration	Primary Only	Primary Only
Number of Primary HHW Pumps	1	2
Primary HW Pump Power	19W/GPM	19W/GPM
Primary HW Pump Speed Control	Variable Speed	Variable Speed
Energy Recovery Ventilator		
ERV Installed	Yes	Yes
ERV Device Type	Enthalpy Wheel	Enthalpy Wheel
Effectiveness	50%	0.7
Operation Control	Outside Air Exhaust Temperature Differential	Outside Air Exhaust Temperature Differential
Outside/Exhaust Air Delta T	5°F	5-F
Domestic Water Heating		
DHW Equipment Type	Gas Storage	Gas Storage
Equipment Efficiency	80%	96%
Temperature Controls	120F Constant	120F Constant
Lighting		

Automatic Lighting Shutoff Method	Scheduled off during unoccupied hours	Scheduled off during unoccupied hours
Gross Lighted Floor Area	2,100,000 SF	2,100,000 SF
Interior Lighting Power Calc Method	Building Area	Building Area
Interior LPD by Building Area (W/SF)	Residential - 1 w/sf Hotel - 1 w/sf Retail - 1.26 w/sf Office - 0.82 w/sf Museum - 1.02 Student Housing - 1.0 w/sf	5% reduction from Baseline
Miscellaneous		
Receptacle Equipment	1.0 W/sf	1.0 W/sf

BASELINE BEPS REPORT

Tremont Crossing DOE-2.2-48m 2/08/2016 17:13:11 BDL RUN 2

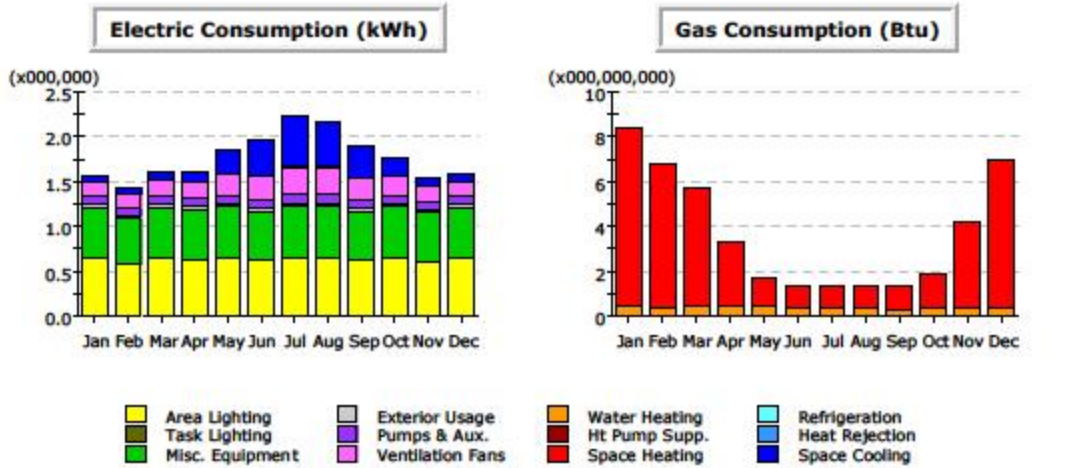
REPORT- BEPS Building Energy Performance WEATHER FILE- Boston MA TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
MBTU	25891.0	0.0	22786.1	0.0	9398.6	72.3	3701.6	9045.1	0.0	0.0	0.0	1438.8	72333.6
FM1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	39788.7	0.0	0.0	0.0	0.0	0.0	0.0	4482.5	0.0	44271.1
MBTU	25891.0	0.0	22786.1	39788.7	9398.6	72.3	3701.6	9045.1	0.0	0.0	4482.5	1438.8	116604.7

TOTAL SITE ENERGY 116604.66 MBTU 55.4 KBTU/SQFT-YR GROSS-AREA 55.4 KBTU/SQFT-YR NET-AREA
 TOTAL SOURCE ENERGY 261272.03 MBTU 124.1 KBTU/SQFT-YR GROSS-AREA 124.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.37
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 32
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 0

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.



Electric Consumption (kWh x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.06	0.06	0.08	0.12	0.27	0.40	0.56	0.90	0.36	0.19	0.09	0.07	2.75
Heat Reject.	-	-	-	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	-	0.02
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	0.18	0.16	0.18	0.19	0.24	0.27	0.30	0.30	0.26	0.22	0.17	0.18	2.65
Pumps & Aux.	0.09	0.08	0.09	0.08	0.09	0.09	0.11	0.10	0.09	0.09	0.08	0.09	1.08
Ext. Usage	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.03	0.03	0.04	0.03	0.04	0.42
Misc. Equip.	0.56	0.51	0.57	0.56	0.57	0.55	0.57	0.57	0.54	0.57	0.54	0.56	6.68
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	0.64	0.58	0.64	0.63	0.65	0.62	0.65	0.65	0.62	0.65	0.61	0.64	7.59
Total	1.57	1.42	1.60	1.61	1.86	1.97	2.23	2.17	1.90	1.75	1.54	1.58	21.19

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	7.99	6.41	5.27	2.83	1.31	0.96	0.96	0.97	1.00	1.57	3.90	6.62	39.79
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.41	0.35	0.43	0.44	0.41	0.35	0.35	0.34	0.31	0.35	0.33	0.39	4.48
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	8.40	6.76	5.70	3.27	1.72	1.31	1.31	1.31	1.31	1.91	4.23	7.01	44.27

PROPOSED BEPS REPORT

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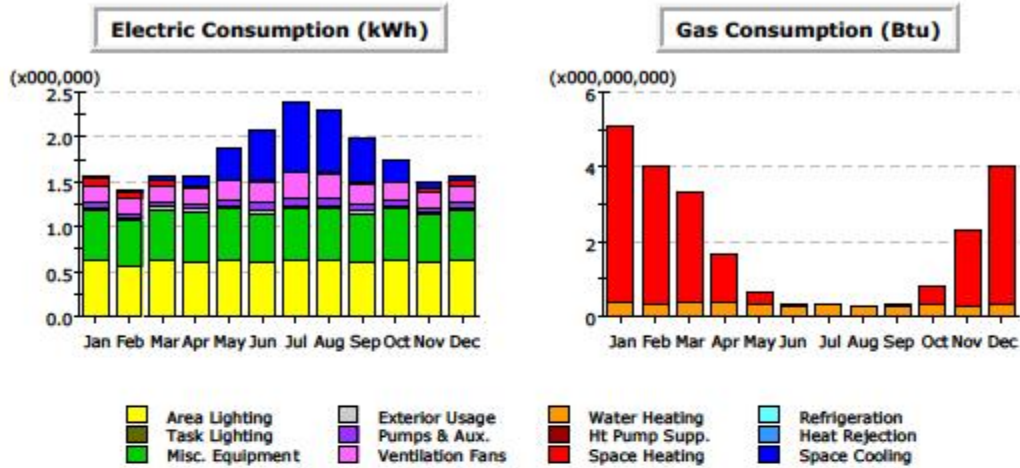
REPORT- BEPS Building Energy Performance WEATHER FILE- Boston MA TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
E1 ELECTRICITY													
MBTU	25019.0	0.0	22786.1	1117.8	11715.5	133.9	2664.2	8620.9	0.0	0.0	0.0	1295.6	73353.0
F1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	19199.4	0.0	0.0	0.0	0.0	0.0	0.0	3782.5	0.0	22981.9
MBTU	25019.0	0.0	22786.1	20317.2	11715.5	133.9	2664.2	8620.9	0.0	0.0	3782.5	1295.6	96334.9

TOTAL SITE ENERGY 96334.86 MBTU 45.8 KBTU/SQFT-YR GROSS-AREA 45.8 KBTU/SQFT-YR NET-AREA
 TOTAL SOURCE ENERGY 243041.06 MBTU 115.4 KBTU/SQFT-YR GROSS-AREA 115.4 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 1.48
 PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
 HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
 HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 130

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.



Electric Consumption (kWh x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.02	0.03	0.05	0.11	0.35	0.56	0.77	0.70	0.50	0.23	0.07	0.04	3.43
Heat Reject.	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.04
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.08	0.06	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.07	0.33
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	0.19	0.17	0.19	0.18	0.22	0.24	0.28	0.27	0.23	0.20	0.18	0.19	2.53
Pumps & Aux.	0.05	0.05	0.05	0.05	0.07	0.08	0.09	0.09	0.08	0.06	0.05	0.05	0.78
Ext. Usage	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.38
Misc. Equip.	0.56	0.51	0.57	0.56	0.57	0.55	0.57	0.57	0.54	0.57	0.54	0.56	6.68
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	0.62	0.56	0.62	0.61	0.63	0.60	0.63	0.63	0.60	0.63	0.59	0.62	7.33
Total	1.56	1.41	1.56	1.55	1.88	2.08	2.99	2.30	1.98	1.73	1.45	1.56	21.49

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	4.75	3.67	2.94	1.28	0.29	0.02	-	0.00	0.04	0.49	2.02	3.71	19.20
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.35	0.33	0.36	0.37	0.34	0.25	0.29	0.28	0.26	0.30	0.28	0.33	3.78
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	5.10	4.00	3.30	1.65	0.63	0.31	0.29	0.28	0.30	0.78	2.30	4.04	22.98

APPENDIX 6

WIND ANALYSIS

Tremont Crossing

Boston, MA

Pedestrian Wind Assessment

RWDI # 1601270

February 5, 2016

SUBMITTED TO

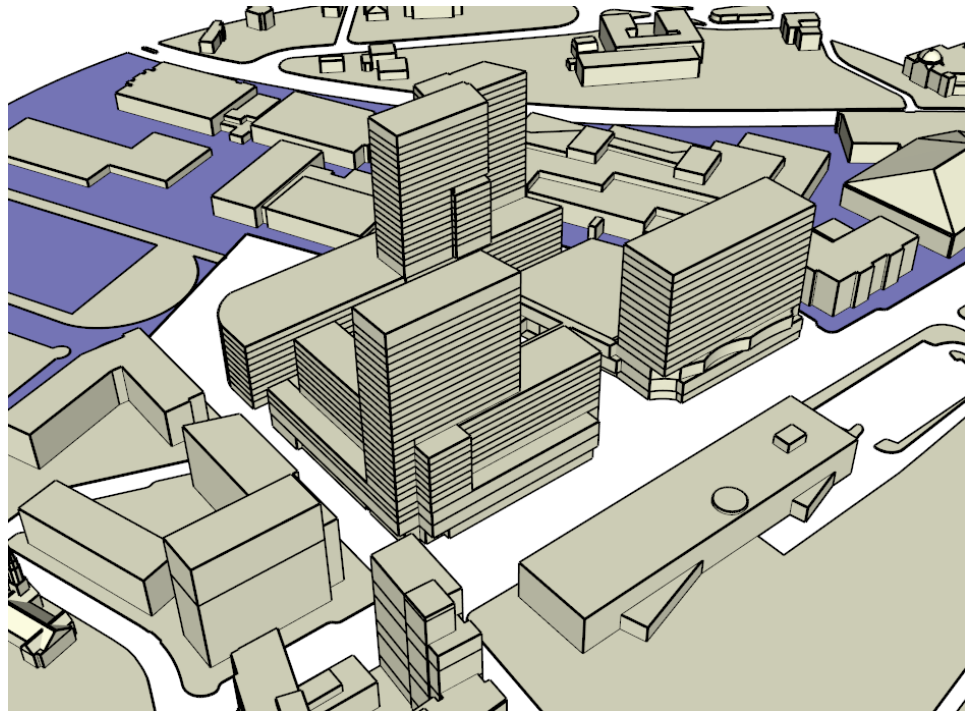
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1. Introduction

Rowan Williams Davies & Irwin Inc. (RWDI) was retained by Feldco Development to assess the potential pedestrian wind conditions for the proposed Tremont Crossing development in Boston, MA (Image 1). The objective of this assessment is to provide a qualitative evaluation of wind comfort conditions on and around the development and recommend mitigation measures, if necessary.

This qualitative assessment is based on the following:

- a review of regional long-term meteorological data;
- our previous wind-tunnel tests on buildings in Boston, including many in the Huntington Avenue/Medical Center/Northeastern University area;
- design drawings received by RWDI on February 1, 2016;
- our engineering judgment and expert knowledge of wind flows around buildings^{1,3}; and
- Use of software developed by RWDI (*Windestimator*²) for estimating the potential wind comfort conditions around generalized building forms.

This qualitative approach provides a screening-level estimation of potential wind conditions. It is our understanding that physical scale model tests will be conducted at a later design stage to quantify these wind conditions and, if needed, to refine wind control solutions.

Note that other wind issues, such as those related to cladding and structural loads, door operability, exhaust re-entrainment, snowdrifts, etc., are not considered in the scope of this assessment.

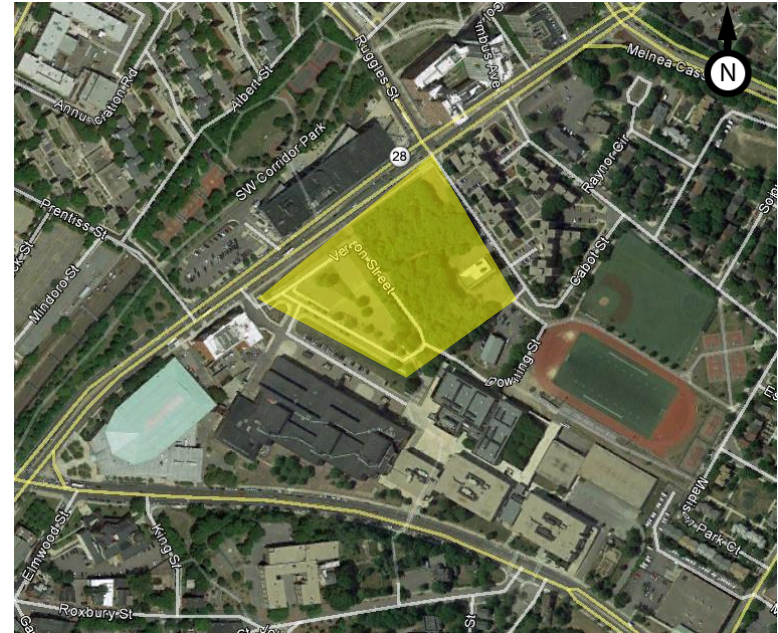


Image 1 - Aerial Photograph of Existing Site and Surroundings
(Courtesy of Google earth™)

1. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.
2. H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004*, Nashville, Tennessee.
3. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", *10th International Conference on Wind Engineering*, Copenhagen, Denmark.

2. Building and Site Information

The proposed development site is located on the south side of Tremont Street between Whittier and Downing Streets in Boston, as shown in the aerial photo in Image 1 and a site plan in Image 2. The immediate surroundings are all low or medium-rise buildings, except a few towers to the north and northeast.

The development can be divided into three blocks. The East Block consists of a hotel tower of 27 stories at the northeast corner of a 3-story podium. The tower tapers down to 11 stories along the streets (left plot in Image 3). The West Block includes a 16-story office tower on a 3-story podium (centre plot in Image 3). The University Housing covers the south portion of the lot, with a 20-story building on the top of a 10-story parking structure.

Pedestrian areas include sidewalks along the existing and new streets, building entrances, an open plaza between the East and West Blocks as well as potential outdoor terraces at various levels.

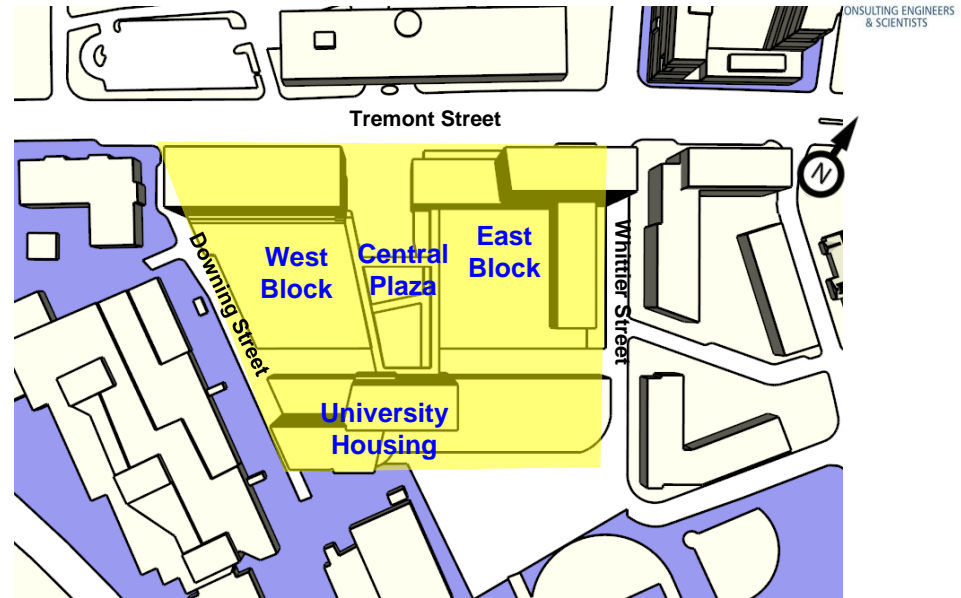


Image 2 – Site Plan

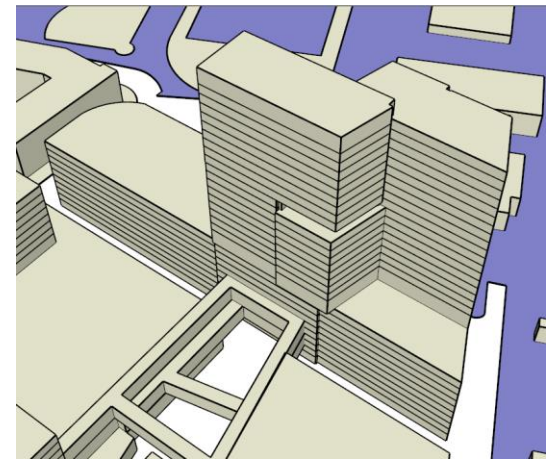
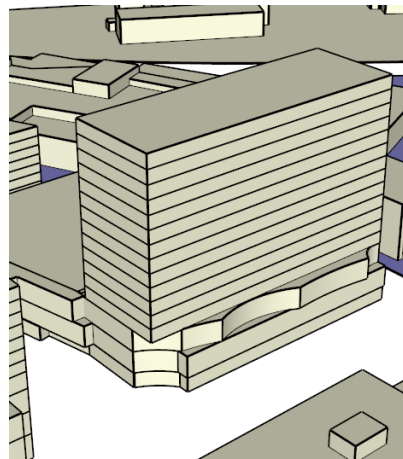
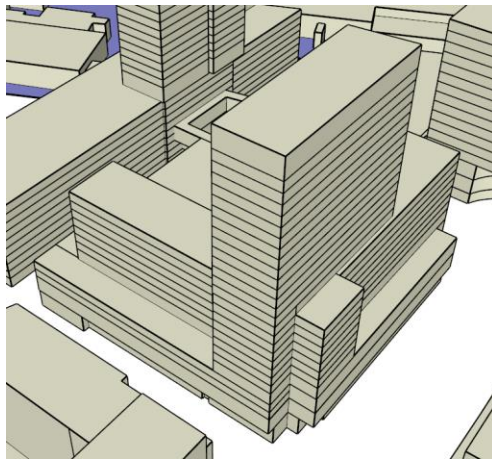


Image 3 –Views of East Block (left), West Block (center) and University Housing (right)

3. Meteorological Data

Wind statistics at Boston-Logan International Airport between 1986 and 2015 were analyzed for the spring (March to May), summer (June to August), fall (September to November) and winter (December to February) seasons. Image 4 graphically depicts the distributions of wind frequency and directionality for these four seasons and for the annual period. When all winds are considered, winds from the northwest and southwest quadrants are predominant. The northeasterly winds are also frequent, especially in the spring.

Strong winds with mean speeds greater than 20 mph (red bands) measured at the airport are prevalently from the northwesterly directions throughout the year, while the southwesterly and northeasterly winds are also frequent.

Therefore, winds from the northwest, southwest and northeast directions are considered most relevant to the current study, while winds from other directions are also considered in our analysis.

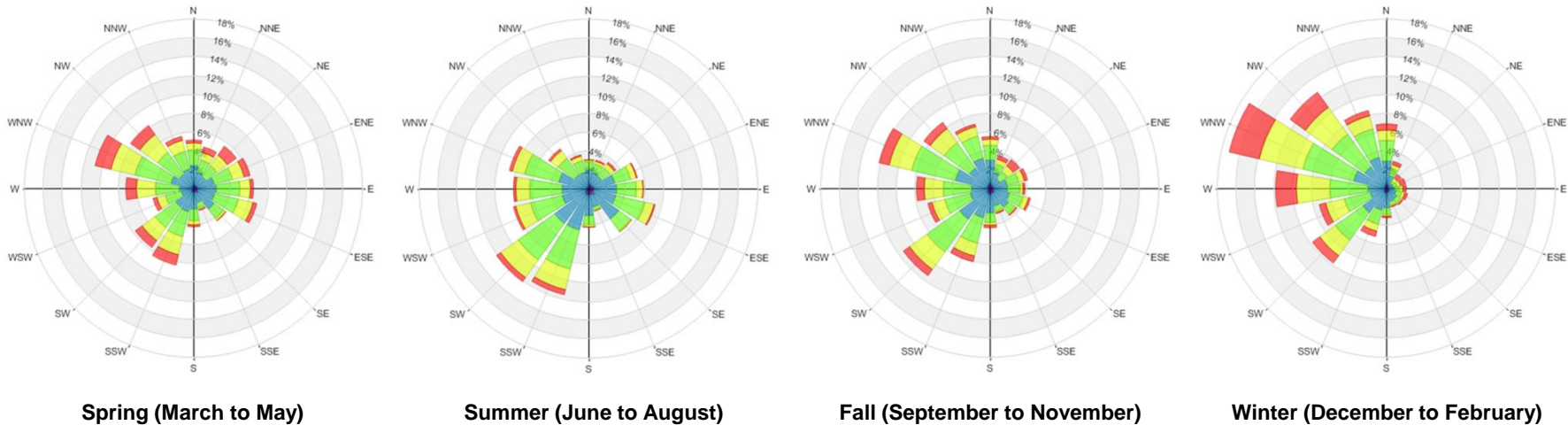
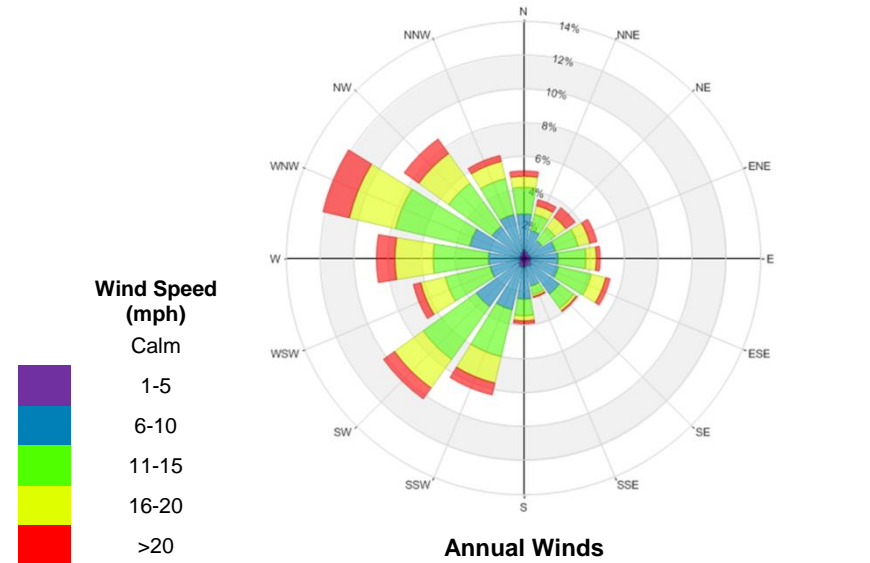


Image 4 - Directional Distribution (%) of Winds (Blowing From) - Boston Logan International Airport (1986 to 2015)

4. Explanation of Wind Criteria

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. The first criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root mean square wind speed) of 31 mph should not be exceeded more than one percent of the time. The second set of criteria used by the BRA to determine the acceptability of specific locations is based on the work of Melbourne⁴. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows:

Table 1: BRA Mean Wind Criteria *

<i>Dangerous</i>	<i>> 27 mph</i>
<i>Uncomfortable for Walking</i>	<i>> 19 and ≤ 27 mph</i>
<i>Comfortable for Walking</i>	<i>> 15 and ≤ 19 mph</i>
<i>Comfortable for Standing</i>	<i>> 12 and ≤ 15 mph</i>
<i>Comfortable for Sitting</i>	<i>< 12 mph</i>

* Applicable to the hourly mean wind speed exceeded one percent of the time.

Pedestrians on sidewalks will be active and wind speeds comfortable for walking are appropriate. Lower wind speeds comfortable for standing are desired for building main entrances where people are apt to linger. For outdoor terraces, if any, low wind speeds comfortable for sitting are desired during the summer. In other seasons, wind conditions in these areas may not be of a serious concern due to limited usage.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BRA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently unsuitable for more passive activities such as sitting. These wind conditions will be altered by the proposed development.

4. Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions", *Journal of Industrial Aerodynamics*, 3 (1978) 241 - 249.

5. PEDESTRIAN WIND CONDITIONS

5.1 Background

Predicting wind speeds and occurrence frequencies is complicated. It involves building geometry and orientation, position and height of surrounding buildings, upstream terrain and the local wind climate. Over the years, RWDI has conducted thousands of wind-tunnel model studies on pedestrian wind conditions around buildings, yielding a broad knowledge base. This knowledge has been incorporated into RWDI's proprietary software that allows, in many situations, for a qualitative, screening-level numerical estimation of pedestrian wind conditions without wind tunnel testing.

The development site currently consists of a parking lot and a treed land. It is sheltered by the existing surrounding buildings in all directions, except for the parking lots and green land to the west and two open sports fields to the east and east-southeast. The existing wind conditions on and around the development site are likely to be comfortable for standing or walking on an annual basis. Slightly higher wind speeds may exist along Tremont Street due to exposure.

The proposed buildings are significantly taller than the existing surroundings, especially to the southwest though northwest, where the prevailing winds are from. Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. Such a Downwashing Flow (Image 5a) is the main cause for increased wind activity around tall buildings at the pedestrian level. Oblique winds also cause wind accelerations around the downwind building corners (5b). When two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to the Channeling Effect (5c). If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity.

Detailed discussions on the potential wind conditions are provided below with the focus on key pedestrian areas on and around each block. Wind control recommendations are provided to improve the wind conditions, where necessary.

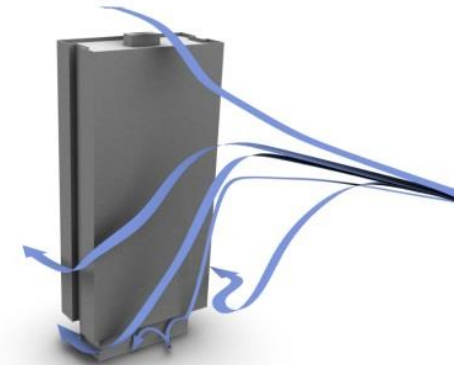


Image 5a - Downwashing Flow

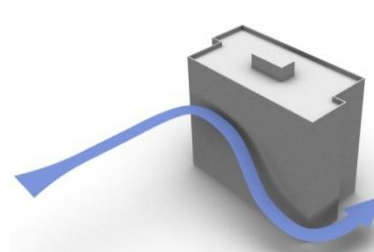


Image 5b - Corner Acceleration

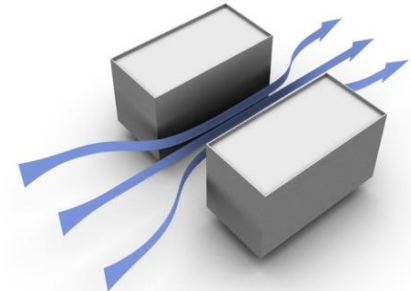


Image 5c - Channeling Effect

5.2 Potential Wind Conditions

As discussed previously, the proposed development consists of buildings significantly taller than their immediate surroundings. They are expected to alter the existing conditions on and around the site.

5.2.1 East Block

The hotel tower on East Block is the tallest building on the development site. It has its long axis in a northeast-southwest direction, which reduces the exposure to winds from these two sectors. The large 3-story podium, setbacks and tapering of the tower and the overhang along Tremont Street are all positive wind control features that should be retained and enhanced in the final design.

However, the prevailing winds from the west through northwest directions will be intercepted by the hotel tower and re-directed down to the grade, resulting in uncomfortable and unacceptable wind conditions at the northeast corner (Location A1 in Image 6), especially during the winter season.

High wind activity is also expected along Tremont Street (A2). The wind speeds are generally suitable for pedestrian walking on sidewalks, but are higher than desired for building entrances.

Higher-than-desired wind speeds are predicted for the podium terrace along Tremont Street (A3), due to its exposure and elevation. Other areas on the podium (A4 in Image 6) are more sheltered by the existing and proposed buildings and are more likely to have wind conditions suitable for passive outdoor activities in the summer.

Whittier Street on the east side of the development (A5) is largely sheltered by the existing and proposed buildings and suitable wind conditions are expected for sidewalks and entrances throughout the year.

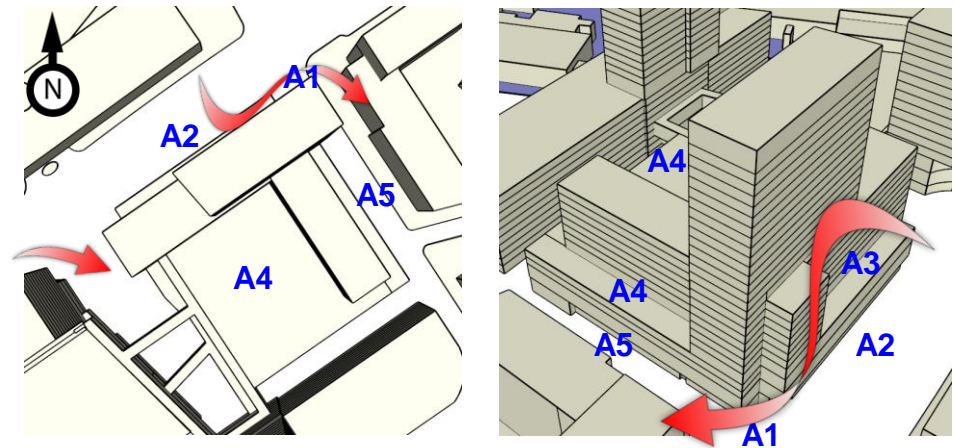


Image 6 – East Block

For the East Block, one of the most effective measures to reduce the wind activity at grade is to setback the hotel tower further from Tremont Street and from the northeast corner of the podium. If this is not feasible, the following wind control measures can be considered and photo examples are provided in Image 9 on Page 10 for reference.

- Locate main entrances away from the northeast building corner (A1);
- Enhance the landscaping design at this corner to include coniferous species and hardscape such as trellises, canopies, screens and street art;
- Recess Tremont Street entrances from the building façade and/or install wind screens on the west side of these entrances; and
- Include tall guiderails, large trellises and landscaping for the podium terrace along Tremont Street (A3).

5.2 Potential Wind Conditions (Continued)

5.2.2 West Block

Compared to the East Block, the office tower on the West Block (Image 7) has the same orientation and also situates on a 3-story podium. The tower is shorter, but wider, and more directly exposed to the prevailing winds from the west through northwest directions.

Therefore, similar wind assessments and recommendations can be provided for the West Block. The northeast corner (B1 in Image 7) is again the focal point with the potential for uncomfortable and unacceptable wind conditions, especially during the winter months. The future wind conditions along Tremont and Downing Streets (B2, B3 and B4) are predicted to be comfortable for walking on an annual basis, but not suitable for main entrances or drop-off areas. Also, wind speeds on any potential terrace on the podium (B5 and B6) are expected to be higher than desired for passive outdoor activities.

To achieve more comfortable wind conditions, the following design features may be considered (see Image 9 for reference), in addition to further setback of the tower from Tremont Street and podium corners.

- If a main entrance has to be placed at the northeast corner of the block (A1), it should be located on the east side of the corner on the concaved facade to reduce the direct exposure to the westerly and northwesterly winds. Additional wind control measures in the form of landscaping, wind screens and canopies will also be beneficial;
- All entrances along the north and west facades should be recessed (like the entrance at B3), or wind screens should be installed on each side of the entrances; and
- If any outdoor terrace is planned for the podium (B5 and B6), significant wind control measures will be required in the form of tall guardrails, wind screens and landscaping.

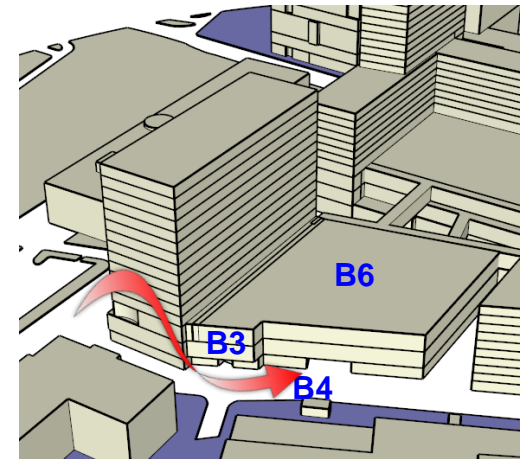
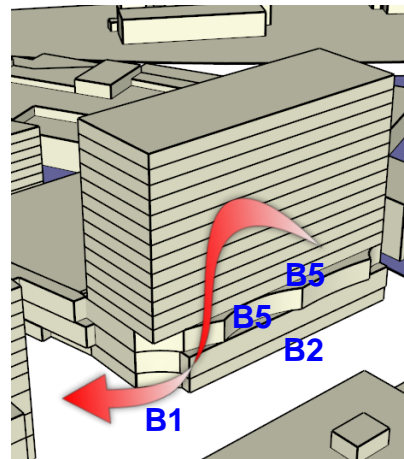
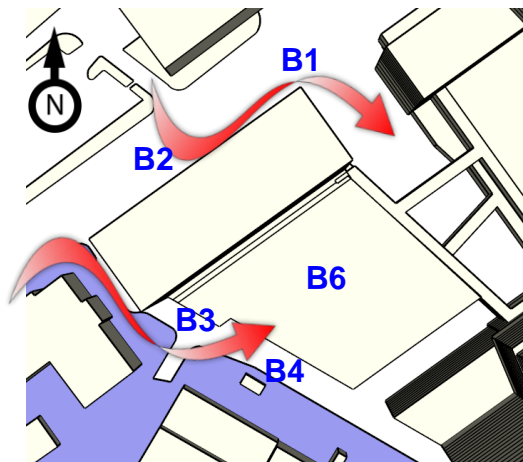


Image 7 – West Block

5.2 Potential Wind Conditions (Continued)

5.2.3 University Housing and Central Plaza

The University Housing tower and parking structure are partially sheltered by the West Block from the prevailing west and northwest winds. Winds deflected down by the tower tend to accelerate to the corners of the parking structure (C3 and C4 in Image 8), while relatively low wind speeds are expected directly in front of the tower (C1). With the proposed bridge structures in place, the resultant wind conditions near Location C1 are likely to be suitable for main entrances. Another location with favorable wind conditions is the center of the east facade of the parking structure (C2), while corners of the parking structure (C3, C4 and C5) potentially may have uncomfortable and unacceptable wind conditions.

Wind speeds are also expected to be high at the north end of the plaza between the East and West Blocks (D1). This issue is expected to be localized, as the back pressure created in front of the University Housing tower will slow down the penetration of wind flows, resulting in suitable wind conditions for the central and south portions of the plaza (D2 and C1).

Several wind control measures can be considered for these two areas (see photos in Image 9 on the next page):

- Install canopies above main entrances and drop-off area around Location C1;
- Recess any main entrances on the new street in front of the University Housing building and include entrance canopies;
- Do not plan any passive pedestrian activity for areas around Location C3, C4 or C5;
- Install tall guardrails if the notch at the middle of the tower (C6) is intended for public outdoor use; and
- Include wind screens and landscaping at the north end of the plaza (D1) along Tremont Street.

Given the local wind climate and the size of the proposed development, wind tunnel tests should be conducted to quantify the wind conditions and to develop wind control solutions.

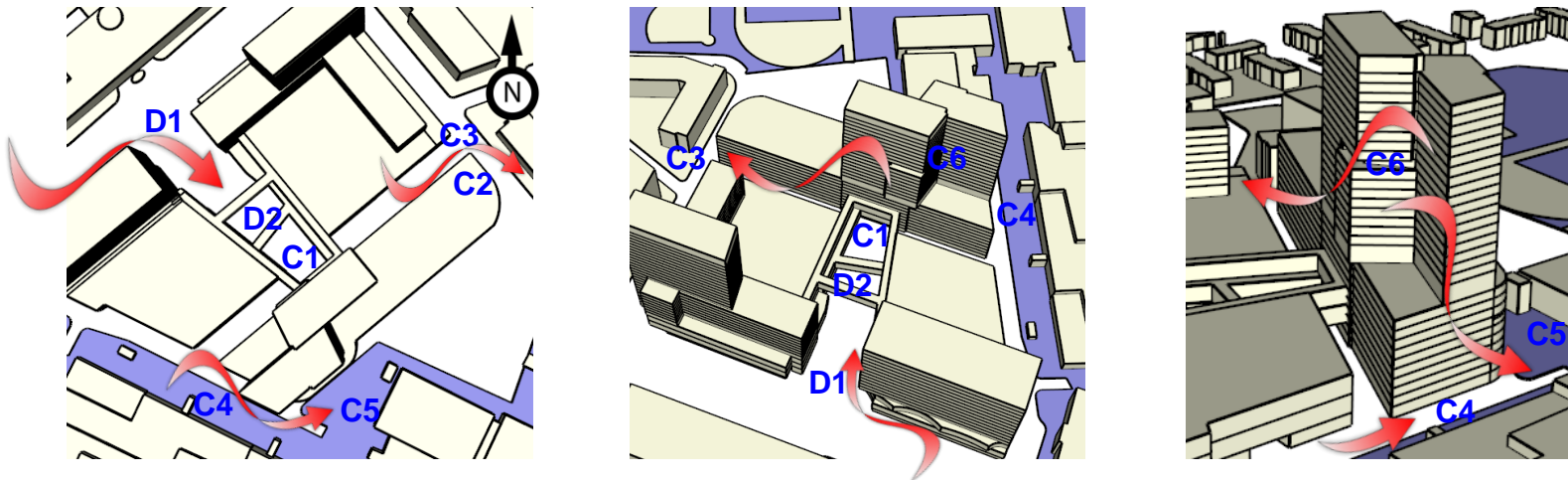


Image 8 – University Housing and Central Plaza

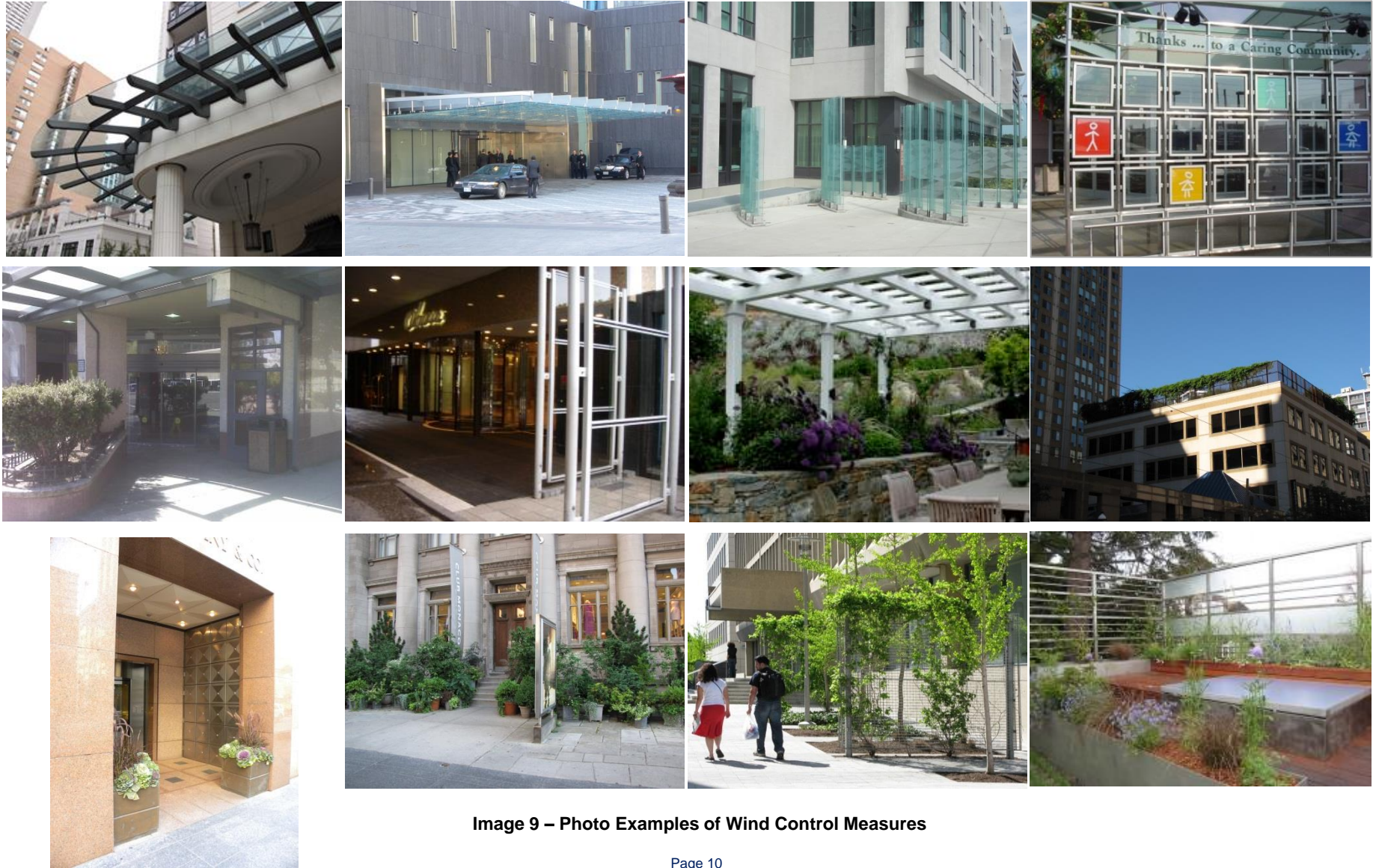


Image 9 – Photo Examples of Wind Control Measures

6. SUMMARY

The proposed development includes several positive wind control features, such as tower setbacks and large podia. As a result, suitable wind conditions are predicted in general on public sidewalks. Due to the local wind climate and low surroundings, uncomfortable and unacceptable wind conditions are expected around the exposed building corners, especially during the winter. Higher-than-desired wind speeds are also predicted at several main entrances and podium terraces. Wind control measures are discussed for these areas in order to improve the wind conditions to appropriate levels.

Given the local wind climate and the size of the proposed development, wind tunnel tests should be conducted at a later design stage to quantify these wind conditions and to refine wind control solutions.

7. APPLICABILITY OF RESULTS

In the event of any significant changes to the design, construction or operation of the building or addition of surroundings in the future, RWDI could provide an assessment of their impact on the design considered in this report. It is the responsibility of others to contact RWDI to initiate this process.

APPENDIX 7

COMMUNITY LETTERS OF SUPPORT

Pathway to Redemption

"A second chance, new beginning"

December 11th - 2015

To whom it may concern:

My name is Robert A. Lewis, I am the founder and Executive Director of Pathway to Redemption;

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. One manner in which the developers of Tremont Crossing have endeavored to achieve this goal is by the inclusion of university housing as an element of the Project's residential program. I support this use and understand that by creating dedicated housing for the City's students, working families will have less competition for a limited supply of middle-income housing and that the students will be in a more controlled, secure and safe environment.

Lastly this project is the life line to a great future for our younger generation to prosper and grow individually and their families.

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,



Robert A. Lewis

1509 Blue Hill Ave, Mattapan, MA

Phone # 857-210-8315

Email: Pathway724@gmail.com

MISSION

Pathway to Redemption, Inc. is a non-profit organization incorporated in the Commonwealth of Massachusetts. Its purpose is to bring spiritual and material support of persons who are citizens returning to our neighborhoods from incarceration. These are our neighbors and they face the barriers of finding employment, housing, and acceptance in the community and in his/ her family.

***Support for the Tremont Crossing Project and for P-3
Partners, LLC***

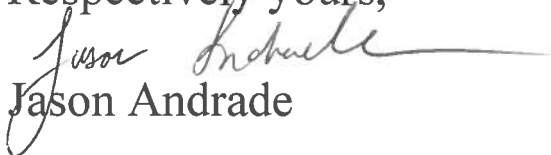
I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans.

As a young entrepreneur from the inner city, recently I had the opportunity to sit down with the Felco team to discuss the development and its potential impact and business opportunities that it will create in Roxbury and surrounding communities.

As a business graduate of Suffolk University and person from this community, the Tremont Crossing Project would present an outstanding business opportunity. Over the past two years I have worked extensively developing a business plan to open a small business in the community of Roxbury. It has been my dream and passion to open a business so as to provide valuable work opportunities and value to the community. I truly believe that it would synergize extremely well with this location and based on the plans of the P-3 partners I cannot see how it would not help in creating a vibrant area of commerce, culture and enhance the overall livability of the community of Roxbury.

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,


Jason Andrade

Support for the Tremont Crossing Project and for P-3 Partners, LLC

I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans.

I have met with the developers of Tremont Crossing and their Community Relations Team and I share their vision of a transformative Project that will become the catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities. I believe that Tremont Crossing will become a monumental addition to the City of Boston and will serve as a new real estate model where commerce and culture support, enhance and complement each other.

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. One manner in which the developers of Tremont Crossing have endeavored to achieve this goal is by the inclusion of university housing as an element of the Project's residential program. I support this use and understand that by creating dedicated housing for the City's students, working families will have less competition for a limited supply of middle-income housing and that the students will be in a more controlled, secure and safe environment.

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,



Affiliation (if any):

Address: 25 Alpine St, Hyde Park, MA 02136

Contact Information (email and/or phone): cassie@52@gmail.com

WesCon

EMBED

Personal Protection, Inc.

"Protection at its Best"

December 13, 2015

To Whom It May Concern:

This communication is forwarded to express my support for the plans P-3 Partners, LLC have proposed for the Tremont Crossing Project on Parcel P-3 in Roxbury. Having met with the Tremont Crossing developers, as well as with Bill Moran & Associates (their Community Relations team), I agree that a project of such magnitude will invigorate stakeholders and subsequently serve as catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities. In addition to demonstrating the benefits of effective collaboration between culture and commerce, I am confident that Tremont Crossing will become a positive Boston landmark for years to come.

While Tremont Crossing is the initial focus of this message, I also wish to commend and support the entities that will make that development a reality. The leaders of Feldco Development and Elma Lewis Partners, which comprise P-3 Partners, have made it clear that they are devoted to the revitalization of that area of Roxbury. When the Museum for the National Center of Afro-American Artists is added to Tremont Crossing, Parcel P-3 will be transformed into a hub of multiculturalism and inclusion as well.

Having grown-up in the Boston area, and managed the provision of security services via this organization for 15 of those years, I am very concerned about the welfare of the Roxbury community. I wholeheartedly believe that the addition of Roxbury Crossing will benefit residents and the city of Boston as well. For all of the reasons listed above, I affirm my support for the development team and the Project.

Respectfully,

Mark A. Conrad
President

Support for the Tremont Crossing Project and for P-3 Partners, LLC

I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans.

I am familiar with the developers of Tremont Crossing through Bill Moran & Associates (their Community Relations team) and I share his vision of a transformative Project that will become a monumental addition to the City of Boston where commerce and culture complement each other. I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. One of the most exciting aspects of the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition the Project has a balanced residential program which seeks to ensure that working families will have access to housing and can afford to live in our City. I look forward to the successful completion of the Tremont Crossing Project and believe that it will make Roxbury a more vital part of the City of Boston.

Margot Tyler
margot.tyler@gmail.com
Roxbury, Massachusetts

Support for the Tremont Crossing Project and for P-3 Partners, LLC

I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans.

I have met with the developers of Tremont Crossing and their Community Relations Team and I share their vision of a transformative Project that will become the catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities. I believe that Tremont Crossing will become a monumental addition to the City of Boston and will serve as a new real estate model where commerce and culture support, enhance and complement each other.

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. One manner in which the developers of Tremont Crossing have endeavored to achieve this goal is by the inclusion of university housing as an element of the Project's residential program. I support this use and understand that by creating dedicated housing for the City's students, working families will have less competition for a limited supply of middle-income housing and that the students will be in a more controlled, secure and safe environment.

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,

Affiliation (if any):

Address:

Contact Information (email and/or phone):

Shane Curran
579 Blue Hill Avenue Dorchester, MA
617 429-0972



VBCDC

Veterans Benefits Clearinghouse Development Corporation

December 31, 2015

Brian Golden, Director
Boston Redevelopment Authority
Boston City Hall
Boston, MA 02108

RE: Support for the Tremont Crossing Project and for P-3 Partners, LLC

Dear Mr. Golden;

I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans. I have met with the developers of Tremont Crossing and Bill Moran & Associates (their Community Relations team) and I share their vision of a transformative Project that will become the catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities. I believe that Tremont Crossing will become a monumental addition to the City of Boston and will serve as a new real estate model where commerce and culture support, enhance and complement each other.

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. One manner in which the developers of Tremont Crossing have endeavored to achieve this goal is by the inclusion of university housing as an element of the Project's residential program. I support this use and understand that by creating dedicated housing for the City's students, working families will have less competition for a limited supply of middle-income housing and that the students will be in a more controlled, secure and safe environment.

495 Blue Hill Avenue, Dorchester, MA 02121
617-445-8262 (Tel) and 617-445-8266 (Fax)

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,



Harold Raymond
President

December 16, 2015
Roxbury Strategic Master Plan Oversight Committee
65 Warren Street
Roxbury, MA 02119

RE: The Tremont Crossing Project and for P-3 Partners, LLC

Dear Roxbury Strategic Master Plan Oversight Committee, I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans. I have met extensively with the developers of Tremont Crossing and Bill Moran and I share their vision of a transformative Project that will become the catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities.

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists as part of a mix use project. In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. I support this use and understand that by creating dedicated housing for the City's working families will provide a stable vivacious healthy community. I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. I enthusiastically endorse the Tremont Crossing Project.

Respectively yours,

Andrea Swain
Executive Director
December 16, 2015
Roxbury Strategic Master Plan Oversight Committee
65 Warren Street
Roxbury, MA 02119

O'ACES BARBERSHOP

Cuts*Fades*Designs*Shaves*Trims & More

Otis Steele, Master Barber/Owner

71 Dudley Street, Roxbury, MA 02119

617-427-5852

Walk-Ins and Appointments

Attn: Tremont Crossing Project

Hello. My name is Mr. Otis Steele and I am the owner of O'Aces Barbershop and O'Aces Unisex Salon. I have been in business since March 15, 1993 during which time I have employed 8 professional barbers and a hair stylist over the last 23 years.

My business and experience over the years have given me the opportunity to assist barbers and hair stylists to achieve their own businesses.

I have been a Roxbury resident for over 50 years. During my tenure in Roxbury, I have seen people leave the city and return with no hope of establishing their own businesses. My ultimate goal is to open a Barbershop/Unisex Salon at your new development which will give jobs to the residents of Roxbury and beyond and to continue to help those that reside in my neighborhood and surrounding areas.

I would like to propose to the committee of the Tremont Crossing Project to open a unisex salon that will consist of 8 barbershop chairs and 4 hair styling chair stations.

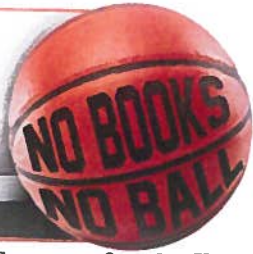
The Tremont Crossing Project will give the people of Roxbury an opportunity for economic growth which will develop more jobs for the city of Roxbury.

Thank you for the opportunity to address your committee and I hope to hear from you in the near future.

Sincerely,



Mr. Otis Steele



NO BOOKS NO BALL

BASKETBALL PROGRAM

Support for the Tremont Crossing Project and for P-3 Partners, LLC

I am writing to express my support for the Tremont Crossing Project on Parcel P-3 in Roxbury and for the dynamic mix of uses that the developer, P-3 Partners, LLC, has included in its plans.

I have met with the developers of Tremont Crossing and Bill Moran & Associates (their Community Relations team) and I share their vision of a transformative Project that will become the catalyst for the continued renaissance of the Lower Roxbury and Dudley Square communities. I believe that Tremont Crossing will become a monumental addition to the City of Boston and will serve as a new real estate model where commerce and culture support, enhance and complement each other.

I am also writing to express my backing of P-3 Partners, which is comprised of Feldco Development Corp and the Elma Lewis Partners. The symbiotic relationship between an experienced real estate development company and a vested community stakeholder is groundbreaking. One of the most unique and exciting aspects of the Tremont Crossing Project is the diversity of the development team and the inclusion of a new Museum for the National Center of Afro-American Artists in the Project's mix of uses.

In addition to the jobs and vibrancy coming from the Project's planned mix of uses, including retail, office and hotel, the Project has a balanced residential program which is aligned with Boston's housing policies, which seek to ensure that working families will have continued access to housing and can afford to live in our City. One manner in which the developers of Tremont Crossing have endeavored to achieve this goal is by the inclusion of university housing as an element of the Project's residential program. I support this use and understand that by creating dedicated housing for the City's students, working families will have less competition for a limited supply of middle-income housing and that the students will be in a more controlled, secure and safe environment.

I look forward to the successful completion of the Tremont Crossing Project and believe that it will elevate Roxbury, inspire its residents and make it a vital and inseparable part of the City of Boston. Given the continued commitment of the entire development team, I would like to affirm my support for them and for the Tremont Crossing Project.

Respectively yours,

PH: 617-828-8816 Email: T-Richl@hotmail.com

"over 20 Yrs of teaching more than just Basketball"



Northeastern

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a vital cultural component. *Tremont Crossing* is a tremendously important development for Roxbury and indeed for Boston. It has the potential to be a jewel in the crown of our great City.

African American Master
Artists in Residence
Program

African American Studies
76 Atherton Street
Jamaica Plain, MA 02130

617.373.3329
fax 617.373.3976

Among the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through *Tremont Crossing*, our cultural facility will celebrate the legacy of one of its most famous daughters—Elma Lewis—who brought it international recognition.

The project team has kept the community abreast of its work and is making every effort to be responsive to community desires.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. This is exactly what we want and need: construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call our own.

Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Gloretta Baynes Cook

Gloretta Baynes Cook
Chair of Artists/AAMARP
gloretta@gmail.com
g.baynes@neu.edu
617-373-3329

To whom it may concern:Sirs/Madams;The Boston Redevelopment Authority...

My name is deta galloway pitts..I am an Artist,and life long adult resident of ROXBURY,JAMAICA PLAIN,AND DORCHESTER.

I HAVE ALSO WORKED DECADES IN THE VARIOUS URBAN HOSPITALS AS A REGISTERED NURSE....

Boston'Suburbs,and Urban Metropolis are beautiful spaces,oasis's,to work,grow in,raise families,and enjoy a cosmology of magical creativity..You all agrees with me this part of America is history laden with Her people's history,,,fierce and awesome in it's powers,to teach,inspire and lead regionally and international in life's bestowing gifts of a gifted and productive people,and their many wares;their prowess in Industry,Science,and Art.

Boston on a whole,packs a Punch...She wins,because she is assertive and strong,with old and new ideas,,she in turn gives to the world,templates to copy and print.I support all efforts to help underpin her firm foundation,as She Asserts,She [unearths](#).realigns,and install symbolic changes in language and in Her Culture under examination,and in displays of her truth . [s.She](#) boldly assigns sensory ways,that is thru the eyes,ears,and in transported facades,by erecting her ideas,bringing these ideas to form,in placement and balance...only good for us!

As Boston enlargens her largesse,she is timely and correct...for all to see themselves in things and [pathways.In](#) contributions,small and large She remains heroic,and transformative...Her shadows too [alerting](#).Boston is focused on things in and around the human and the trans-human..We research our stories to report her purpose..to the few who need the bones of our ancestors i tell them

Finally to honor our great trailblazers,we are doing the right thing at Tremont Crossing,,,

I am in inferest,full support and celebration of the Request concerning Tremont Crossing.

Thank You for adding my voice as artist and Community participator.

Thank you for reading and listening to me,and to the many,yet true voices here and in extensive other - of our Supporters..

On behalf of MNAAA museum,and the tireless and irreplaceable Mr Edmund B,Gaither,director,and friend to all,I submit,this letter of support...

Thanks and Cheers to All of You...

Sincerely,deta galloway pitts;multi-media artist.

6 Humboldt Avenue,Roxbury,Mass

02119....Unit 3

e-mail:deta galloway 007@gmail.com

Tele [15083717632](tel:15083717632).....

Sent from my MetroPCS Android device

Avenue of the Arts
465 Huntington Avenue
Boston, Massachusetts 02115
617 267 9300
www.mfa.org



Museum of Fine Arts Boston

01 April 2015

Mr. Brian Golden
Director, Boston Redevelopment Authority
One City Hall, Ninth Floor
Boston, MA 02201

Dear Mr. Golden,

I am writing to demonstrate my support for the Tremont Crossing project on Parcel P-3 in lower Roxbury. The realization of this project would elevate Roxbury, inspire its residents, and make it a vital cultural and retail destination in Boston.

The Museum of Fine Arts, Boston and the National Center of Afro-American Artists (NCAAA) have had a fruitful partnership for 50 years, collaborating to build, share, and study collections of art by Afro-American artists through exhibitions, acquisitions, and public programs. Together with Elma Lewis Partners and Feldco Developers, the NCAAA is proposing a tremendously important vision for Parcel P-3 called Tremont Crossing: Where Culture and Commerce Connect.

Tremont Crossing is a mixed-use project that will create jobs, economic activity, and a world-class museum for art by Afro-Americans. The new facility will create opportunities for collaboration with the MFA and the community. It will also reinforce the city's commitment to the study, display, and celebration of the arts heritage of the global black world.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. It will create construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace.

The NCAAA and Parcel P-3 partners have deep roots in Roxbury, stretching back to the 1950 founding of the Elma Lewis School of Fine Arts, which eventually became the NCAAA. The project team has a good relationship with the community and has been communicating with and responding to their desires.

Given the demonstrated commitment of the NCAAA and Parcel P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and a celebratory spirit to our community.


Malcolm Rogers
Ann and Graham Gund Director



2343 Washington Street
Roxbury, MA 02119
617-541-4644

April 12, 2015

Mr. Brian Golden
Director
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

RE: Extension of developer designation at Tremont Crossing, Roxbury

Dear Director Golden:

On behalf of Dudley Square Main Streets Inc., we are writing to support extension of Feldco Development Corporation's designation for development of Tremont Crossing on BRA Parcel P3 in Roxbury. With the project's current level of momentum and the obvious benefits it will bring to Roxbury and to one of our beloved local institutions, the National Center for Afro-American Art, we believe it is worthy of extension.

We do, however, wish to state clearly to the BRA that the we believe Tremont Crossing's location, size and high concentration of credit retail tenants will have direct impact on the prospects of the Dudley Square business district. For this reason, we request the following be undertaken by the BRA and Feldco Development Corporation as part of the remaining steps in the Article 80 planning and development review process:

1. Please request that your planners and development review staff work with the City's Transportation Department to make certain that the Feldco Development Corporation's plans deliberately address automobile, bicycle and pedestrian circulation and access to and from Washington Street and Dudley Square through the Madison Park Development. There are no natural linkages or view corridors to Dudley Square for people visiting Tremont Crossing (and

**Roxbury PATH Forward Neighborhood Association
Roxbury, MA 02119**

Brian Golden, Director
Boston Redevelopment Authority
Boston City Hall

April 21, 2015

Dear Mr. Golden:

We are writing to indicate our support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

The project has been under discussion in Roxbury for many years. The *Elma Lewis Partners*, which along with *Feldco Developers* make up the P-3 Partners, have developed a vision for the mixed use project as a vital cultural component evinced in *Tremont Crossing: Where Culture and Commerce Connect*. Tremont Crossing has the potential to be an important development for Roxbury as it reconnects our community to the economic progress occurring in the rest of the City of Boston.

The values expressed in the Roxbury Strategic Master Plan are met in the P-3 project plan. The developers have roots in the community and will create wealth opportunities for residents. The National Center for Afro-American Artists through Elma Lewis Partners has a history of service in Roxbury from the early days when The Elma Lewis School of Fine Arts taught students dance and artistic expression, first in Dudley Square and later on Elm Hill Avenue. It is this spirit and legacy that the P3 project lives up to in renewing the vision of a fine arts program in Roxbury and the promise of a world-class cultural facility and museum. Through Tremont Crossing, Elma Lewis, one of Roxbury's most celebrated residents will be honored.

Those of us who live in Roxbury and have watched the progression of the project and attended monthly Roxbury Strategic Master Plan Oversight Committee meetings support the P3 project. The P3 Partners team have kept the community informed about their progress and have operated in accordance with the goals of Roxbury residents.

Both the retail and restaurant businesses and the new places to live and work will offer new economic development possibilities for our community. These opportunities will be temporary in the form of construction jobs and also permanent career positions, as well as opportunities for local businesses to become established and grow.

We express our full faith and support in the P-3 partners team. It is time for the P3 project to move forward and in doing so; it will be taking the aspirations of Roxbury

residents with it to once again become a vital link and inseparable part of the City of Boston's economic vitality.

Respectfully Yours,

Mary Jane Texeira
Name

17 Montpelier St Rox
address

Shirley Chou
Name

22 Winthrop St Rox
address

Margarine Howard - 85 Winthrop St Roxbury
Name address

Valerie Spence
Name

71 Waverly St, Roxbury
address

Tracy Spence
Name

71 Waverly St. Roxbury
address

Justin Cruz
Name

1 John Eliot Sq. Roxbury
address

Edgar Carrere
Name

1 John Eliot Sq., Roxbury
address

Michael Mastino
Name

801 Centre Street Jamaica Plain
address
02130

V. P. G. P.
Name

43 Westmap St Roxbury, MA
address
02119

Josanna Mullen
Name

85 Moreland St Rox MA
address
02119

Dennis Wheeler
Name

85 MORELAND ST ROX MA
address
02119

MARSHA SMITH
Name

Marsha Smith
address

Karl Payne
Name

95 Moreland St Rox MA
address
02119

J. CRANE
Name

81 MORELAND ST ROX.
address



LETTER OF SUPPORT TREMONT CROSSING:

Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

BOARD OF DIRECTORS

13 April 2015

Co-Chair
Kim Janey
Mass. Advocates for Children

I am writing to provide my support for the Tremont Crossing project on Parcel P-3 in Lower Roxbury.

Co-Chair
Rodney Singleton
Teradyne

I have followed the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through Elma Lewis Partners, and believe in its ability to be a transformative project. With the tagline "Where Culture and Commerce Connect," this mixed-use project will be a catalyst for continued cultural enhancements in Roxbury and across Boston.

Treasurer
Terri Brown
COSEBOC

Clerk
Pamela Jones
Zoo New England

Vernon Barsatee
Exit Bayside Realty

Allen Bush
Berklee School of Music

Mary Churchill
Salem State University

Kory Eng
United Way

Thomas Plant
*Boston Public Health
Commission*

Alma E. Wright
Trotter Elementary School

Among the values highlighted in the Roxbury Strategic Master Plan were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through Tremont Crossing, the cultural facility will also celebrate the legacy of one of its most famous daughters—Elma Lewis—who brought it international recognition.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for Roxbury through employment, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call its own.

Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of Tremont Crossing on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Derek Lumpkins
Executive Director
Discover Roxbury
derek@discoverroxbury.org

Discover Roxbury
183 Roxbury Street
Roxbury, MA 02119
(617) 427-1006
discoverroxbury.org



01 April 2015

Mr. Brian Golden
Director, Boston Redevelopment Authority
One City Hall, Ninth Floor
Boston, MA 02201

Dear Mr. Golden,

I am writing to demonstrate my support for the Tremont Crossing project on Parcel P-3 in lower Roxbury. The realization of this project would elevate Roxbury, inspire its residents, and make it a vital cultural and retail destination in Boston.

The Museum of Fine Arts, Boston and the National Center of Afro-American Artists (NCAAA) have had a fruitful partnership for 50 years, collaborating to build, share, and study collections of art by Afro-American artists through exhibitions, acquisitions, and public programs. Together with Elma Lewis Partners and Feldco Developers, the NCAAA is proposing a tremendously important vision for Parcel P-3 called Tremont Crossing: Where Culture and Commerce Connect.

Tremont Crossing is a mixed-use project that will create jobs, economic activity, and a world-class museum for art by Afro-Americans. The new facility will create opportunities for collaboration with the MFA and the community. It will also reinforce the city's commitment to the study, display, and celebration of the arts heritage of the global black world.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. It will create construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace.

The NCAAA and Parcel P-3 partners have deep roots in Roxbury, stretching back to the 1950 founding of the Elma Lewis School of Fine Arts, which eventually became the NCAAA. The project team has a good relationship with the community and has been communicating with and responding to their desires.

Given the demonstrated commitment of the NCAAA and Parcel P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and a celebratory spirit to our community.

A simple, elegant handwritten flourish consisting of a horizontal line that curves upwards at the right end.

A large, stylized handwritten signature in black ink, appearing to read 'Malcolm Rogers'.

Malcolm Rogers
Ann and Graham Gund Director

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

Mr. Brian Golden
 Director, Boston Redevelopment Authority
 Boston City Hall

April 1, 2015

Dear Mr. Golden:

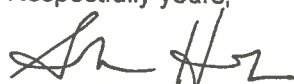
I am writing in strong support of the *Tremont Crossing* project on Parcel P-3 in lower Roxbury. This is a much needed project for the community, as well as for the city and broader New England region, and can serve as a model for inclusive development. I am a proponent of the vision articulated by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a crucial cultural focus combined with dynamic urban placemaking.

Perhaps of greatest importance is that the project team will connect to and build on the strengths of this community—it's cultural and artistic vitality—to facilitate education, arts and wealth opportunities for those of the place. More specifically, the retail component, with restaurants and new places to live and work and produce, will offer real economic development possibilities. The project will create construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace of the community.

With a long and important history of service in Roxbury through the Elma Lewis School of Fine Art, I believe this is just the team to deliver this project. The team has been providing the community with a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. From my experience, the project team has been working to keep the community updated about its work and is making every effort to be responsive to community needs, hopes, and dreams.

I believe that *Tremont Crossing* will be a great addition to the future of this community and region, along with other emerging projects. The mission of our organization, Earthos Institute, is to support the emergence of just, sustaining, resilient places, communities and regions. Bridging design, community, science, and policy, we support cross-sector collaborative teams to catalyze much needed community-to-regional projects and conversations that benefit all into the future. During the past few years, we've been working with NCAAA, and other community leadership, to create the Roxbury Memory Heritage Trail, a 2-mile trail from Franklin Park to Dudley that celebrates the unique stories of Roxbury. Together, these projects will support a place of cultural and economic pride, celebration and inspiration for decades to come.

Respectfully yours,



Sarah Howard, LEED AP, Executive Director



AIA
 Philip Zorhed, AIA, President

Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall
Boston, Ma 02201

April 13, 2015

Dear Mr. Golden,

I am writing in support of the **Tremont Crossing: Where Culture and Commerce Connect** Project on Parcel 3 in Roxbury.

This project will have a tremendous impact on the cultural life of Boston and on Boston's ability to attract a diverse cultural audience from throughout the United States and around the world!

I am the founder and former Executive Director of Discover Roxbury. Discover Roxbury was originally founded in support of METCO students going to school in suburban communities by providing suburban school staff, students and families with a balanced view of Boston neighborhoods of color through tours led by Boston students and parents.

Discover Roxbury quickly grew to embrace a wider audience and to share the many great strengths and assets of Roxbury-its rich history going back to Puritan times, its vibrant art community and its dynamic black community.

The Museum of the National Center of African Artists was probably the most important stop on our tours and programs. Our audience was always incredibly impressed with the exhibits at the museum and with the engaged and inspiring talks that were part of the visit.

Boston does not have a recognizable center for the expression of African American culture, a significant lack for any city and especially for Boston, still working to shed the image of racism that lingers from the bussing events of the 1970's,

Tremont Crossing will be that center, with a highly accessible museum and restaurants that hopefully will provide culinary delights from across the African Diaspora.

At the same time Tremont Crossing will provide housing, retail space and parking (so important for accessibility) which will offer economic opportunities for the community of Roxbury.

I live in Lexington, and I drive to Roxbury often as I now volunteer for the Roxbury Historical Society. Every time I turn right on Tremont from Ruggles I envision the Tremont Crossing Center with a brand new Museum of the National Center rising out of the space that is now scraggly trees and brush. This location is perfect to encourage a wide audience, as it is easy to get to both by public transportation and

car. Some people are still reluctant to go to Roxbury, and Tremont Crossing will certainly help dispel these myths.

I urge you to give Elma Lewis Partners and Feldco Development the opportunity to develop Tremont Crossing for the benefit of the city of Boston.

Thank you,

A handwritten signature in black ink that reads "Marcia Butman". The signature is written in a cursive, flowing style.

Marcia Butman
8 White Pine Lane
Lexington, Ma 02421

April 14, 2015

Brian Golden
Director, BRA/EDIC
One City Hall, Ninth Floor
Boston, MA 02201

RE: Parcel P-3 in Lower Roxbury

Dear Director Golden:

As President of Massachusetts College of Art and Design (MassArt), I write in support of *Tremont Crossing: Where Culture and Commerce Connect* for Parcel P-3 in Lower Roxbury. As the only freestanding, publicly supported college of art and design in the United States, MassArt advocates for access to and equity in art, design, and art education. The energy and passion for the arts in the wider community is a reflection of our mission and history and a tangible civic asset.

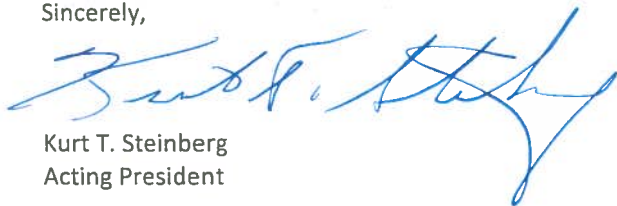
As part of our community involvement, my staff has followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. This vision is expressed in *Tremont Crossing*, a mixed-use project with a vital cultural component. *Tremont Crossing* is an important development not just for Roxbury, but also for the entire city. It has the potential to be a jewel in Boston's crown.

Among the values highlighted in the *Roxbury Strategic Master Plan* is the expectation that the developers of Parcel P-3 have roots in the community and create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury stretching back to 1950 through the Elma Lewis School of Fine Arts. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through *Tremont Crossing*, this cultural facility will celebrate the legacy of one of Boston's most famous daughters—Elma Lewis—who brought it international recognition.

The project team has kept the community abreast of its work and is making efforts to be responsive to community desires. The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. This is what we want and need: construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call our own.

Along with the NCAAA and the P-3 Team, our college community appreciates the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 plans on elevating Roxbury, inspiring its residents, and making it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team and their devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm our support for P-3 Partners and urge you to bring new life, activity, growth and celebratory spirit to our community.

Sincerely,



Kurt T. Steinberg
Acting President

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

March 31, 2015

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) with *Elma Lewis Partners* (ELP) to its current design by P-3 Partners which includes *Feldco Development* and *ELP*. *Tremont Crossing* is a tremendously important development for our community because it brings a mix of commercial uses to Roxbury—including shopping, market-rate housing and office space—while also providing a vital cultural component in the NCAAA. In its entirety, this active and vibrant development has the potential to be a jewel in the crown of our great City.

Among the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In that spirit, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic development.

The project team has kept the community abreast of its work and is making every effort to be responsive to our desires.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. This is exactly what we want and need: construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call our own.

Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I want to offer my continued support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Shakin Alleyne

ADDRESS:

14 Dalrymple street Jamaica Plain

Ma.

EMAIL:

S. Alleyne 2007@gmail.com

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a vital cultural component. *Tremont Crossing* is a tremendously important development for Roxbury and indeed for Boston. It has the potential to be a jewel in the crown of our great City.

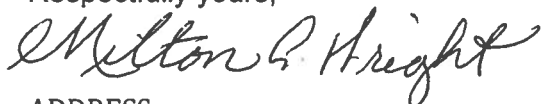
Among the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through *Tremont Crossing*, our cultural facility will celebrate the legacy of one of its most famous daughters—Elma Lewis—who brought it international recognition.

The project team has kept the community abreast of its work and is making every effort to be responsive to community desires.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. This is exactly what we want and need: construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call our own.

Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,



ADDRESS:

118 Summit Street
Hyde Park, MA 02136

EMAIL: *miltonwrightjobe@yahoo.com*

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

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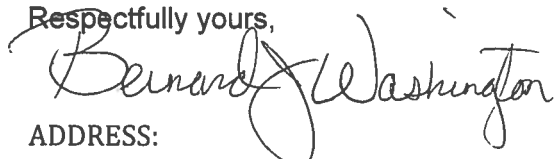
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Respectfully yours,



ADDRESS:

10 Craigmere Terrace
Mattapan, MA 02126

EMAIL:

berniewashington@hotmail.com

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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ADDRESS:

P.O. Box 190014
Roxbury, MA 02119

EMAIL:

ralphz@vol.com

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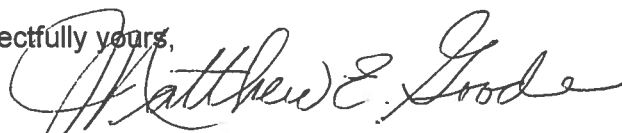
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ADDRESS:

64 Crawford St.
Roxbury, MA 02121

EMAIL:

megoode81@gmail.com

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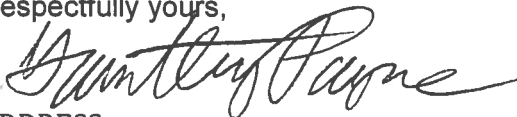
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ADDRESS:

261 Worwell Street
Dorchester, MA 02124

04-10-2015
EMAIL: grantdexpayne@gmail.com

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Cicely Payne

ADDRESS:

91 Colorado St

Mattapan, MA 02126

EMAIL:

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ADDRESS:

EMAIL:

Selassie@me.com



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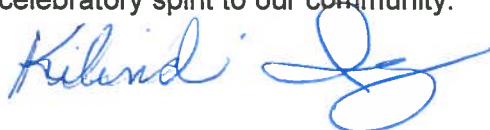
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ADDRESS: 17427 MAINE

EMAIL:

kiliindi@hotmail.com

Detroit, Mich

48212

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ADDRESS:

250 Walnut Ave #
Roxbury, MA 02119

EMAIL:

J.AntWann250@gmail.com

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ADDRESS:

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EMAIL:

Jalibah21@gmail.com

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C. ROBERT SPRINGER

ADDRESS:

41 GEORGIA ST # 3
BOSTON, MA 02121

EMAIL: MISTER.SPRINGER@GMAIL.COM

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ADDRESS:

23 Hane St.
Dorchester, MA 02125

EMAIL: hbrooks777@gmail.com

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BOSTON, MA

EMAIL:

SHANELL.M.LYONS@GMAIL.COM

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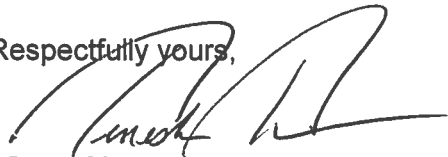
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Respectfully yours,

ADDRESS:



tedee21288.t@gmail.com

EMAIL:

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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Respectfully yours,

Cyrus Weston

ADDRESS:

CW

EMAIL: *CyrusWeston@msn.com*

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Respectfully yours,



ADDRESS:

Copeland St
Roxbury Mass
02119

EMAIL:

P/2007@aol.com

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Boston City Hall

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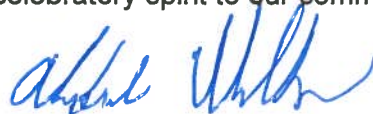
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Respectfully yours,



ADDRESS: 7 Frawley St.
Boston MA. Apt 14
02115

EMAIL: lovemotherearth33@gmail.com

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Respectfully yours,

Chichi Uche

ADDRESS:

44 Millet Street
Apt #2 Dorchester
02124 Boston MA

EMAIL:

chicniuche55@gmail.com

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Respectfully yours,

Tomica Robin

ADDRESS: *46 Topliff street*
apt # 1
02122 Dorchester Ma

EMAIL: *Tomica Robin@gmail.c*

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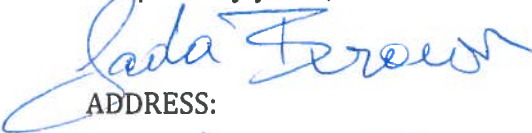
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ADDRESS:

13 Lind Ter
Randolph MA 02368

EMAIL: jbrown@missionhillsech.org

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NADTRA ALLEYNE

ADDRESS:

14 KINGS DALE ST
APT #1 02124

EMAIL:

NALLEYNETFP@GMAIL.COM

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

March 31, 2015

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

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ADDRESS:

34 RUE BOURBON
JUAN CARLOS PINA
FRANCE

EMAIL: MACOL@TISCALI.IT

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Respectfully yours, *Bennie McNeill*

ADDRESS: *25 Ditson, St. Apt. 104* EMAIL:
Dorchester, Mass. 02122

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Daniel Smith

ADDRESS:

30 Huntington St.
Dorchester MA 02121

EMAIL:

dane.smith65@gmail.com

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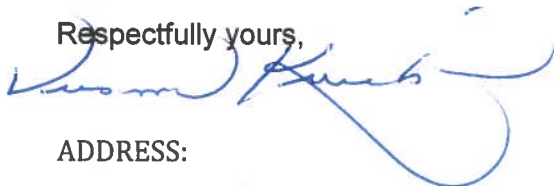
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ADDRESS:

162 SOVER STREET
DORCHESTER MASSACHUSETTS 02121

EMAIL:

VUSA77@verizon.net

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ADDRESS:

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02119

EMAIL:

nlawrence@
bostonpublicschools.org

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a vital cultural component. *Tremont Crossing* is a tremendously important development for Roxbury and indeed for Boston. It has the potential to be a jewel in the crown of our great City.

Among the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through *Tremont Crossing*, our cultural facility will celebrate the legacy of one of its most famous daughters—Elma Lewis—who brought it international recognition.

The project team has kept the community abreast of its work and is making every effort to be responsive to community desires.

The retail component, with restaurants and new places to live and work, will offer real economic development possibilities for our community. This is exactly what we want and need: construction and permanent jobs, enhanced business opportunities, greater integration within the regional economy, and an active marketplace to call our own.

Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Allison Mererding

ADDRESS: 30 Hitchens Street
Dorchester MA 02121

EMAIL: *allison.ding@gmail.com*

Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall
Boston, Ma 02201

April 13, 2015

Dear Mr. Golden,

I am writing in support of the **Tremont Crossing: Where Culture and Commerce Connect** Project on Parcel 3 in Roxbury.

This project will have a tremendous impact on the cultural life of Boston and on Boston's ability to attract a diverse cultural audience from throughout the United States and around the world!

I am the founder and former Executive Director of Discover Roxbury. Discover Roxbury was originally founded in support of METCO students going to school in suburban communities by providing suburban school staff, students and families with a balanced view of Boston neighborhoods of color through tours led by Boston students and parents.

Discover Roxbury quickly grew to embrace a wider audience and to share the many great strengths and assets of Roxbury-its rich history going back to Puritan times, its vibrant art community and its dynamic black community.

The Museum of the National Center of African Artists was probably the most important stop on our tours and programs. Our audience was always incredibly impressed with the exhibits at the museum and with the engaged and inspiring talks that were part of the visit.

Boston does not have a recognizable center for the expression of African American culture, a significant lack for any city and especially for Boston, still working to shed the image of racism that lingers from the bussing events of the 1970's,

Tremont Crossing will be that center, with a highly accessible museum and restaurants that hopefully will provide culinary delights from across the African Diaspora.

At the same time Tremont Crossing will provide housing, retail space and parking (so important for accessibility) which will offer economic opportunities for the community of Roxbury.

I live in Lexington, and I drive to Roxbury often as I now volunteer for the Roxbury Historical Society. Every time I turn right on Tremont from Ruggles I envision the Tremont Crossing Center with a brand new Museum of the National Center rising out of the space that is now scraggly trees and brush. This location is perfect to encourage a wide audience, as it is easy to get to both by public transportation and

car. Some people are still reluctant to go to Roxbury, and Tremont Crossing will certainly help dispel these myths.

I urge you to give Elma Lewis Partners and Feldco Development the opportunity to develop Tremont Crossing for the benefit of the city of Boston.

Thank you,

Marcia Butman

Marcia Butman
8 White Pine Lane
Lexington, Ma 02421

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

Dear Mr. Golden:

My name is Carl Todisco, and I am a fourth-generation resident of Roxbury. I am writing to demonstrate my support for the Tremont Crossing project on Parcel P-3 in Lower Roxbury. Having seen Roxbury through bad and good times with urban renewal and the rebirth of Dudley, I support this project completely. It is exactly what Roxbury needs, and it is exactly what Roxbury has needed for a very, very long time.


The National Center of Afro-American Artists has been working with Feldco Developers to express a vision for Tremont Crossing as a place for both culture and commerce. The vital condition is that this vision will mix the two – and the value generated by this combination will trickle down both economically and culturally for the whole Roxbury community.

The project will include a major museum of African American artists that will be bolstered by retail and residential components. The retail will include restaurants and places to work, positive economic influences for the neighborhood and in-line with what the community really wants. The residential will mix affordable and market rate units, bringing a better quality of life to this stretch of Tremont.

These changes are exactly what we need: jobs, places for work and life, opportunities for growth, and links to the city at large.

I very much appreciate the way the team working on this proposal for Parcel P-3 have identified the needs of the community and expressed them in their vision for the work to be done. Please let me assure you once again that I affirm my highest support for the P-3 project, and I urge you to back it too, to encourage new life and growth for our neighborhood and to make a new important cultural destination for all visitors to Boston.

Sincerely,


Carl Todisco

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Marionette Fennell -
Patterson

ADDRESS:

10 Ellingwood St
Boston, MA 02110
617-697-4719

EMAIL: MarionettePatterson
@Comcast.net

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Boston City Hall

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Respectfully yours,

Carmen Storms

ADDRESS:

1050 Tremont St #808

EMAIL:

*Roxbury Mass
02120*

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Respectfully yours,



ADDRESS:

EMAIL:

bill.singleton@gmail.com

Bill Singleton
88 HAMMOND ST
BOSTON MA 02120
617-821-9475

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Respectfully yours,

Ricardo Locais

ADDRESS: 757 Dorchester ave
508 326-6929

EMAIL: Ricardoaprielocais@

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OLAIEYE COMMUNICATIONS INC.

71 Windsor Street · Boston · Massachusetts · 02120

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

Date: March 30, 2015

As a resident of Lower Roxbury as it is being called these days, and as a former member of the RSMOC, I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in Lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a vital cultural component. *Tremont Crossing* is a tremendously important development for Roxbury and indeed for Boston. It has the potential to be a jewel in the crown of our great City.

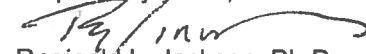
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Along with the NCAAA and the P-3 Team, I appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,


Reginald L. Jackson, Ph.D.
Prof. Emeritus, Simmons College

ADDRESS:
71 Windsor St
Roxbury, MA 02120

EMAIL:
Reginald.jackson@simmons.edu
Phone : 857.389.8986

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

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Boston City Hall

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Respectfully yours,



ADDRESS:

EMAIL:

Gilen E. Alleyne
70 Bloomfield Street
Dorchester, MA 02124

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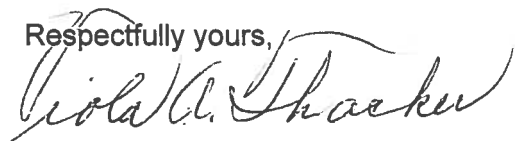
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Respectfully yours,



ADDRESS:

EMAIL:

Viola A. Thacker
364 Walnut Avenue
Roxbury, MA 02119-1136

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To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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Respectfully yours,

Mimi Jones 3/31/2015

ADDRESS:

102 Cedar Street
Roxbury, MA
02119-1431

EMAIL: jones102@yahood.com

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Respectfully yours,  3/31/15

ADDRESS:

180 Howard Ave
Dorchester, MA
02125

EMAIL: Boobeebread@gmail.com

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Two of the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through *Elma Lewis Partners (ELP)*, has a history of service in Roxbury through the *Elma Lewis School of Fine Arts* stretching back to 1950. In the spirit of such service and rootedness, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic activity. Through *Tremont Crossing*, our cultural facility will celebrate the legacy of one of its most famous daughters—*Elma Lewis*—who brought it international recognition.

The project team has kept the community abreast of its work through community forums and is making every effort to be responsive to community desires.

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Along with the NCAAA and the P-3 Team, I deeply appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the *Roxbury Master Plan*, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,

Susan Thompson

ADDRESS:

*23 Elm Hill Park
Dorchester, Ma 02121*

EMAIL:

s.g.thompson@verizon.net

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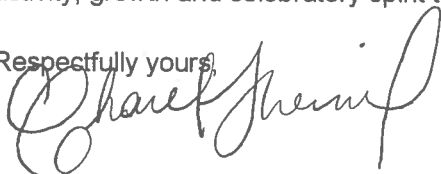
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Respectfully yours,



ADDRESS:

24 Saint Rose Street Apt #2
Jamaica Plain, MA 02130

EMAIL: CHHervil@massart.edu

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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Michael Baksh@gmail

ADDRESS:

EMAIL:

~~316 Huntington~~
Boston

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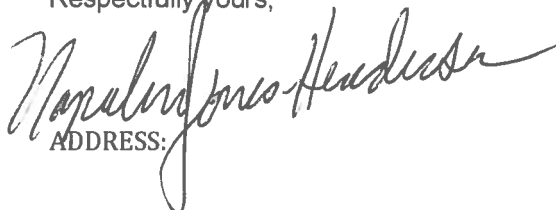
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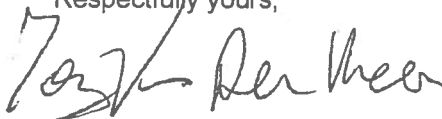
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ADDRESS:

3 Clarkson St.
Boston, MA 02125

EMAIL:

Tmenelik@yahoo.com

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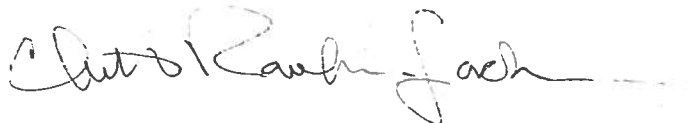
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ADDRESS:

71 WINDSOR ST
Boston MA 02120

EMAIL:

christlerawlins@hotmail.com

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William Thompson

ADDRESS:

23 ELM HILL PK.
BOSTON MA. 02121

EMAIL:

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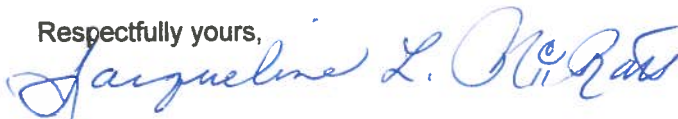
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ADDRESS:

35 Rutland St.
Boston MA 02118-315

EMAIL: cleoph@verizon.net

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ADDRESS:

Charmy Jean Balforte
74 Cottage St.

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Charmy.Balforte@umass.edu

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Sadie Barboza

ADDRESS: Boston, MA
12 Greenwood Ave #1
Hyde Park MA, 02136

EMAIL: Sadie.barboza.ool@umt

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Jada Evans

ADDRESS:

18 Sturtevant Ave
Norwood, MA

EMAIL:

Jada.c.evans@gmail.com

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ADDRESS: 141 Sea St. Apt. 406
Quincy, MA 02169

EMAIL: askia.hansonool@umb.edu

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Joseph Chevalier

ADDRESS:

26 Gaston street
Boston MA 02121

EMAIL:

Joseph.Chevalier001@umb.edu

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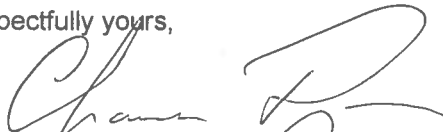
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Along with the NCAAA and the P-3 Team, I deeply appreciate the ways in which the successful realization of *Tremont Crossing* on Parcel P-3 will elevate Roxbury, inspire its residents, and make it a vital and inseparable part of the City of Boston. Given the demonstrated commitment of the P-3 Team, and its devotion to the goals of the community as expressed in the Roxbury Master Plan, I reaffirm my support for P-3 Partners and its effort to urge you to bring new life, activity, growth and celebratory spirit to our community.

Respectfully yours,



ADDRESS: Charleen Pierre
30 Concord Drive
Brockton MA, 02301

EMAIL: charleepierre@gmail.com



Northeastern

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) for Parcel P-3 through *Elma Lewis Partners*, which along with *Feldco Developers*, makes up P-3 Partners. That vision is expressed in *Tremont Crossing: Where Culture and Commerce Connect*, a mixed-use project with a vital cultural component. *Tremont Crossing* is a tremendously important development for Roxbury and indeed for Boston. It has the potential to be a jewel in the crown of our great City.

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Respectfully yours,

Gloretha Baynes Cook
Chair of Artists/AAMARP
gloretha@gmail.com
g.baynes@neu.edu
617-373-3329

African American Master
Artists in Residence
Program

African American Studies
76 Atherton Street
Jamaica Plain, MA 02130

617.373.3329
fax 617.373.3976

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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ADDRESS:

4 YARBROUKE ST
BOSTON MA

EMAIL:



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Boston City Hall

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Respectfully yours,



ADDRESS:

79 Kenwood St
DOR MA 02124

EMAIL: DAVISDESIGNS5@yahoo.com

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Boston City Hall

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Respectfully yours,

Darlene Smart

ADDRESS: 41 Hartford St
Dorchester MA 02125

EMAIL: *darlene.ps23@gmail*

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Boston City Hall

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Respectfully yours,

ZINA WORLEY
ADDRESS:
38 WAUMBACK ST
DOR. MA 02121

EMAIL: CHAUNCEYPINCE@GMAIL.COM

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

March 31, 2015

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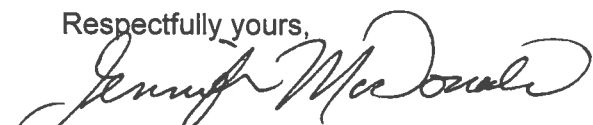
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Respectfully yours,



ADDRESS:

24 THWING ST.
ROXBURY, MA 02119

EMAIL: Jmaryma@aol.com

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Director, Boston Redevelopment Authority
Boston City Hall

March 31, 2015

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Respectfully yours,

ADDRESS:


105 Harrishof Street
Roxbury, MA 02121

EMAIL:

marisaluse@gmail.com

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Respectfully yours,

ADDRESS: Patricia Odom
69 Birchcroft Rd.
Hyde Park, MA
02136

EMAIL: Patriciaodom@comcast.net

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Director, Boston Redevelopment Authority
Boston City Hall

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Respectfully yours,

Yvonne M. Williams

ADDRESS:

*9 Robin Hood Street
Dorchester, MA 01915*

EMAIL:

yvonwil@hotmail.com

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Arnold R. Davis
ADDRESS: 480 Georgetown Dr
Bos MA 02136

EMAIL: *Arnold@Comcast-Net*

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Nicole Gittens

ADDRESS:

112 TEN HILLS RD
SOMERVILLE, MA 02145

EMAIL:

gittensnicole@gmail.com

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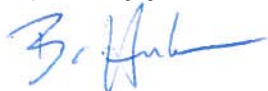
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EMAIL:



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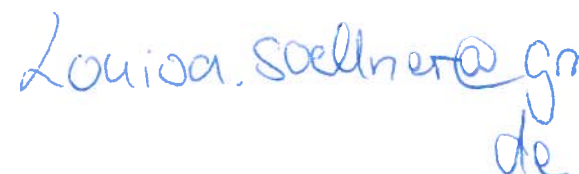
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Director, Boston Redevelopment Authority
Boston City Hall

March 31, 2015

I am writing to demonstrate my support for the *Tremont Crossing* project on Parcel P-3 in lower Roxbury.

I have followed with great interest the vision put forward by the National Center of Afro-American Artists (NCAAA) with *Elma Lewis Partners*(ELP) to its current design by P-3 Partners which includes *Feldco Development* and *ELP*. *Tremont Crossing* is a tremendously important development for our community because it brings a mix of commercial uses to Roxbury—including shopping, market-rate housing and office space—while also providing a vital cultural component in the NCAAA. In its entirety, this active and vibrant development has the potential to be a jewel in the crown of our great City.

Among the values highlighted in the *Roxbury Strategic Master Plan* were that the developers of Parcel P-3 would have roots in the community, and would create wealth opportunities. The NCAAA, through Elma Lewis Partners (ELP), has a history of service in Roxbury through the Elma Lewis School of Fine Arts stretching back to 1950. In that spirit, the P-3 team is living up to its promise of providing a world-class museum and cultural facility, and the means to sustain its operations by way of ordinary economic development.

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Respectfully yours,



ADDRESS:

14 Kingscourt
Dorchester, MA 02124-1808

EMAIL:

SUPPORT TREMONT CROSSING: WHERE CULTURE AND COMMERCE CONNECT

To: Brian Golden
Director, Boston Redevelopment Authority
Boston City Hall

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ADDRESS:

135 MLK BLVD
ROX, MA. 02119

EMAIL: MFIRMIN213@gmail.com

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Respectfully yours,

Nita L. Payne

ADDRESS:

*261 Novell St
Dor., Mass 02124*

EMAIL:

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Director, Boston Redevelopment Authority
Boston City Hall

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Charles C. Payne

ADDRESS: *261 Powell Street* EMAIL:

Dorchester Mass 02124-1849

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Bonny F. White

ADDRESS:
*100 Taunton Ave.
Hyde Park, Mass. 02136*

EMAIL:

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Paula Bar

ADDRESS:

135 Martin Luther King Blvd
Roxbury, Mass
617-959-0795

EMAIL:

02119

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Reggie Duma

ADDRESS:

116 CHITTENDEN RD
HYDE PARK, MA
02121

EMAIL:

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Respectfully yours,



ADDRESS:

SCOTT WEBSTER
1 ELMWOOD ST
ROXBURY CROSSING MA 02130

EMAIL:

SCOTTWEBSTER@GMAIL.COM

APPENDIX 8

CLIMATE CHANGE CHECKLIST

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at <http://www.cityofboston.gov/climate>

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (<http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/>)
3. Army Corps of Engineers guidance on sea level rise (<http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf>)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (<http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf>)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 ([http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf](http://www.bostonredevelopmentauthority.org/planning/Hotspot%20of%20Accelerated%20Sea-level%20Rise%202012.pdf))
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 ([http://www.greenribboncommission.org/downloads/Building Resilience in Boston SML.pdf](http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf))

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current [Climate Change Preparedness & Resiliency Checklist](#).

Climate Change Resiliency and Preparedness Checklist

A.1 - Project Information

Project Name:	Tremont Crossing
Project Address Primary:	Tremont Street and Whittier Street
Project Address Additional:	Parcel P-3
Project Contact (name / Title / Company / email / phone):	Jeffrey Feldman, Feldco Development, jfeldman@feldwest.com , 617.982.6962

A.2 - Team Description

Owner / Developer:	P-3 Partners, LLC
Architect:	Cambridge Seven Associates
Engineer (building systems):	WSP Parsons Brinckerhoff
Sustainability / LEED:	Cambridge Seven Associates
Permitting:	Feldco Development
Construction Management:	TBD
Climate Change Expert:	N/A

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

PNF / Expanded PNF Submission	Draft / Final <u>Project Impact Report Submission</u>	BRA Board Approved	Notice of Project Change
Planned Development Area	BRA Final Design Approved	Under Construction	Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Residential, Hotel, Retail, Office, Parking Garage and Museum & Art Studio.
List the First Floor Uses:	Retail, Office, Parking Garage and Residential, Hotel, Museum lobbies.

What is the principal Construction Type – select most appropriate type?

Wood Frame	Masonry	Steel Frame w/ concrete deck	Concrete (parking garage)
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Describe the building?

Site Area:	315810 SF	Building Area:	1,923,700 GSF
Building Height:	Up to 344.0 Ft.	Number of Stories:	3-26 Flrs.
First Floor Elevation (reference Boston City Base):	18' – 28' Elev.	Are there below grade spaces/levels, if yes how many:	No / Number of Levels

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	New Construction	Core & Shell	Healthcare	Schools
	Retail	Homes Midrise	Homes	Other
Select LEED Outcome:	Certified	Silver	Gold	Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	Yes / No	Certified:	Yes / No

A.6 - Building Energy

What are the base and peak operating energy loads for the buildings?

Electric:	26,000 (kW)	Heating:	50 (MMBtu/hr)
What is the planned building Energy Use Intensity:	45 (kbut/SF/year)	Cooling:	4000(Tons)

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	Total - 4250 (kW)	Heating:	150 (KW)
		Cooling:	54(Tons)

What is nature and source of your back-up / emergency generators?

Electrical Generation:	4250 (kW)	Fuel Source:	Diesel
System Type and Number of Units:	Combustion Engine	Gas Turbine	Combine Heat and Power 3(Units)

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	10 Years	25 Years	50 Years	75 Years
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What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	10 Years	25 Years	50 Years	75 Years
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What time span of future Climate Conditions was considered?

Select most appropriate:	10 Years	25 Years	50 Years	75 Years
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Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

7/87 Deg.

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

91 Deg.	1.5 Days	1 Event / yr.
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What Drought characteristics will be used for project planning – Duration and Frequency?

45-60 Days	1 Events / yr.
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What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

44 Inches / yr.	4.6 Inches	0.1 Events / yr.
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What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

105 Peak Wind	3 Seconds Hours	0.02 Events / yr.
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B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:

17%

How is performance determined:

e-Qeust

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:

High performance building envelop	High performance lighting & controls	Building day lighting	EnergyStar equip. / appliances
High performance HVAC equipment	Energy recovery ventilation	No active cooling	No active heating

Describe any added measures:

--

What are the insulation (R) values for building envelop elements?

Roof:	R = 21	Walls / Curtain Wall Assembly:	R = 15.5
Foundation:	R = N/A	Basement / Slab:	R = 33.3
Windows:	R = 1.81 / U = .55	Doors:	R = 3 / U = .33

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

On-site clean energy / CHP system(s)	Building-wide power dimming	Thermal energy storage systems	Ground source heat pump
On-site Solar PV	On-site Solar Thermal	Wind power	None

Describe any added measures:

N/A

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:

Connected to local	Building will be	Connected to	Distributed
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distributed electrical	Smart Grid ready	distributed steam, hot, chilled water	thermal energy ready
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Will the building remain operable without utility power for an extended period?

Yes / No	If yes, for how long:	.5Days
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If Yes, is building "Islandable?"

NO

If Yes, describe strategies:

--

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:

Solar oriented – longer south walls	Prevailing winds oriented	External shading devices	Tuned glazing,
Building cool zones	Operable windows	Natural ventilation	Building shading
Potable water for drinking / food preparation	Potable water for sinks / sanitary systems	Waste water storage capacity	High Performance Building Envelop

Describe any added measures:

--

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:

High reflective paving materials	Shade trees & shrubs	High reflective roof materials	Vegetated roofs
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Describe other strategies:

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What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:

On-site retention systems & ponds	Infiltration galleries & areas	vegetated water capture systems	Vegetated roofs
--	---	---------------------------------	-----------------

Describe other strategies:

--

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:

Hardened building structure & elements	Buried utilities & hardened infrastructure	Hazard removal & protective landscapes	Soft & permeable surfaces (water infiltration)
--	---	--	--

Describe other strategies:

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C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

Yes / No

Describe site conditions? **Site is within a low risk flood zone (Zone X, Unshaded).**

Site Elevation – Low/High Points: **18'-28' Boston City Base Elev.(Ft.)**

Building Proximity to Water: **2,750 Ft.**

Is the site or building located in any of the following?

Coastal Zone:	Yes / No	Velocity Zone:	Yes / No
Flood Zone:	Yes / No	Area Prone to Flooding:	Yes / No

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	Yes / No	Future floodplain delineation updates:	Yes / No
--------------------------	-----------------	--	-----------------

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

2700 +/- Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. Otherwise you have completed the questionnaire; thank you!

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	Ft.	Frequency of storms:	per year
-----------------	------------	----------------------	-----------------

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	Boston City Base Elev.(Ft.)	First Floor Elevation:	Boston City Base Elev. (Ft.)
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Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

Yes / No	If Yes, to what elevation	Boston City Base Elev. (Ft.)
If Yes, describe:		

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

Systems located above 1 st Floor.	Water tight utility conduits	Waste water back flow prevention	Storm water back flow prevention
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Were the differing effects of fresh water and salt water flooding considered:

Yes / No

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No

If yes, to what height above 100 Year Floodplain:

Boston City Base Elev. (Ft.)

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

Yes / No

If Yes, describe:

--

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No

If Yes, for how long:

days

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

--

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:

Yes / No	Hardened / Resilient Ground Floor Construction	Temporary shutters and or barricades	Resilient site design, materials and construction
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Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:

Yes / No	Surrounding site elevation can be raised	Building ground floor can be raised	Construction been engineered
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Describe additional strategies:

--

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:

Yes / No	Solar PV	Solar Thermal	Clean Energy / CHP System(s)
	Potable water storage	Wastewater storage	Back up energy systems & fuel

Describe any specific or additional strategies:

--

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

APPENDIX 9

ACCESSIBILITY CHECKLIST

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
 - a. http://www.ada.gov/2010ADASTandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
 - a. <http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html>
3. Boston Complete Street Guidelines
 - a. <http://bostoncompletestreets.org/>
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
 - a. <http://www.cityofboston.gov/Disability>
5. City of Boston – Public Works Sidewalk Reconstruction Policy
 - a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
 - a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
 - a. http://www.mbta.com/about_the_mbta/accessibility/

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Project Information

Project Name:	Tremont Crossing
Project Address Primary:	Tremont Street and Whittier Street, Boston, MA
Project Address Additional:	Parcel P-3
Project Contact (name / Title / Company / email / phone):	Jeffrey Feldman, Feldco Development, jfeldman@feldwest.com, 617.982.6962

Team Description

Owner / Developer:	P-3 Partners, LLC
Architect:	Cambridge Seven Associates
Engineer (building systems):	WSP Parsons Brinckerhoff
Sustainability / LEED:	Cambridge Seven Associates
Permitting:	Feldco Development
Construction Management:	TBD

Project Permitting and Phase

At what phase is the project – at time of this questionnaire?

PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BRA Board Approved
BRA Design Approved	Under Construction	Construction just completed:

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Building Classification and Description

What are the principal Building Uses - select all appropriate uses?

Residential – One to Three Unit	Residential - Multi-unit, Four +	Institutional	Education
Commercial	Office	Retail	Assembly
Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other (Hotel and Parking)
Retail, Office, Parking Garage and Residential, Hotel, Museum lobbies.			

First Floor Uses (List)

What is the Construction Type – select most appropriate type?

Wood Frame	Masonry	Steel Frame w/ Concrete Deck	Concrete (Parking Structure)
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Describe the building?

Site Area:	315,810 SF	Building Area:	1,923,700 GSF
Building Height:	Up to 344 Ft.	Number of Stories:	3-26 Flrs.
First Floor Elevation:	18' – 28' Elev.	Are there below grade spaces:	Yes / No

Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and proximate institutions such as, but not limited to hospitals, elderly and disabled housing, and general neighborhood information. The proponent should identify how the area surrounding the development is accessible for people with mobility impairments and should analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the development neighborhood and identifying characteristics.

The Tremont Crossing project is a mixed-use, transit-oriented development proposed in Boston's Roxbury neighborhood on 7.25 acres of primarily vacant land with exception of an existing building and parking field. The project is bounded by Tremont Street to the northwest, Whittier Street to the northeast, Downing Street to the southeast, the Whittier Street Health Center to the southwest, and the Madison Park Technical Vocational High School to the southwest.

List the surrounding ADA compliant MBTA transit lines and the proximity

Roxbury Crossing Station (Subway and Bus) – 1200 ft.

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to the development site: Commuter rail, subway, bus, etc.

Museum of Fine Arts Station (Subway and Bus) – 2000 ft.
Ruggles Station (Commuter rail, Subway and Bus) – 800 ft.
Bus Routes on Tremont Street: #15, 22, 23, 28, 44, 45

List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.

Boston Police HQ, Northeastern University, Reggie Lewis Track, John O’Bryant School of Math and Science, and Madison Park High School.

Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.

It is unknown whether the Project Site is on a priority accessible route, however the project is located on Tremont Street which is heavily traveled corridor and have applied the Downtown Mixed-Use Complete Street standards for its accessible route design. The Project Site is proximate to the following: Boston Police HQ, Northeastern University, Reggie Lewis Track, John O’Bryant School of Math and Science, and Madison Park High School.

Surrounding Site Conditions – Existing:

This section identifies the current condition of the sidewalks and pedestrian ramps around the development site.

Are there sidewalks and pedestrian ramps existing at the development site?

Yes.

If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.

The existing sidewalks and pedestrian ramps are in fair condition.

Are the sidewalks and pedestrian ramps existing-to-remain? **If yes**, have the sidewalks and pedestrian ramps been verified as compliant? **If yes**, please provide surveyors report.

No, the Proponent will replace all sidewalks and pedestrian ramps adjacent to and within the Project Site.

Is the development site within a historic district? **If yes**, please identify.

No.

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Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortably pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org

If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.

What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.

List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the City of Boston Public Improvement Commission?

<p>Yes.</p>
<p>A Downtown Mixed-use was applied to Tremont Street. A Neighborhood Connector was applied to Whittier Street. The principal components and widths of a Neighborhood Connector Road were also applied to the internal site driveways, South and East Drive, where feasible. The shared street provision was applied to the plaza driveway.</p>
<p><u>Public Ways:</u></p> <p>Tremont Street: Pedestrian Zone is 10 ft. wide and Greenscape/Furnishing Zone is approximately 6 ft. wide.</p> <p>Whittier Street: Pedestrian Zone is 6 ft. wide and Greenscape/Furnishing Zone is approximately 5 ft. wide.</p> <p><u>Private Driveways:</u></p> <p>South and East Drive: Pedestrian Zone ranges from 5-10 ft. wide and Greenscape/Furnishing Zone ranges from 2.5-8 ft. wide.</p>
<p>Minimum 5 feet wide concrete sidewalks will be installed both on private property and existing rights-of-way. The proposed sidewalk along Tremont Street will be within the existing right-of-way. The proposed sidewalk along Whittier Street will be within a new easement granted to the City to accommodate both pedestrians and the proposed vehicular roadway widening. Both public ways also include the preferred width for added greenscape and furnishings.</p>
<p>The Proponent does not presently anticipate seeking pedestrian easements within the project site, beyond widening Whittier Street, but the Proponent anticipates that all private driveways on the project site will comply with applicable requirements related to accessibility.</p>

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Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?

No.

If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?

N/A

Proposed Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability Handicap Parking Regulations.

What is the total number of parking spaces provided at the development site parking lot or garage?

Approximately 1550 spaces on site (street parking) and within structured garage areas and street parking.

What is the total number of accessible spaces provided at the development site?

Approximately 26 accessible spaces.

Will any on street accessible parking spaces be required? **If yes**, has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?

Yes, on-street accessible parking will be provided along Tremont Street and along the project driveways. Final locations and counts will be coordinated with the Commission for Persons with Disabilities and City of Boston Transportation Department.

Where is accessible visitor parking located?

See attached diagram Appendix 9_Exhibit A, B, C, D and E.

Has a drop-off area been identified? **If yes**, will it be accessible?

Yes, an accessible drop-off area will be provided along East Drive and within the pedestrian plaza area.

Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations. Please include route distances.

See attached diagram Appendix 9_Exhibit A, B, C, D and E.

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Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.

See attached diagram Appendix 9_Exhibit A, B, C, D and E.

Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.

The accessible entries to all buildings will have a flush condition.

Are the accessible entrance and the standard entrance integrated?

Yes.

If no above, what is the reason?

N/A

Will there be a roof deck or outdoor courtyard space? **If yes**, include diagram of the accessible route.

Yes. The roof areas will be dedicated to individual use groups and will be accessible to each use group.

Has an accessible routes way-finding and signage package been developed? **If yes**, please describe.

Not determined at this time.

Accessible Units: (If applicable)

In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

What is the total number of proposed units for the development?

Proposed units at this time include 200 hotel guest rooms and 700 residential units.

How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?

At this time all 700 residential units are for rent. The market value versus affordable breakdown has not been determined.

How many accessible units are being proposed?

Not determined at this time.

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Please provide plan and diagram of the accessible units.

Not determined at this time.

How many accessible units will also be affordable? If none, please describe reason.

Not determined at this time.

Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.

No.

Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor’s Commission for Persons with Disabilities Advisory Board?

Not at this time.

Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?

The Advisory Board has not reviewed the project at this time.

Thank you for completing the Accessibility Checklist!

For questions or comments about this checklist or accessibility practices, please contact:

kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities

Figure 1 – Site Accessible Routes - Roads & Driveways

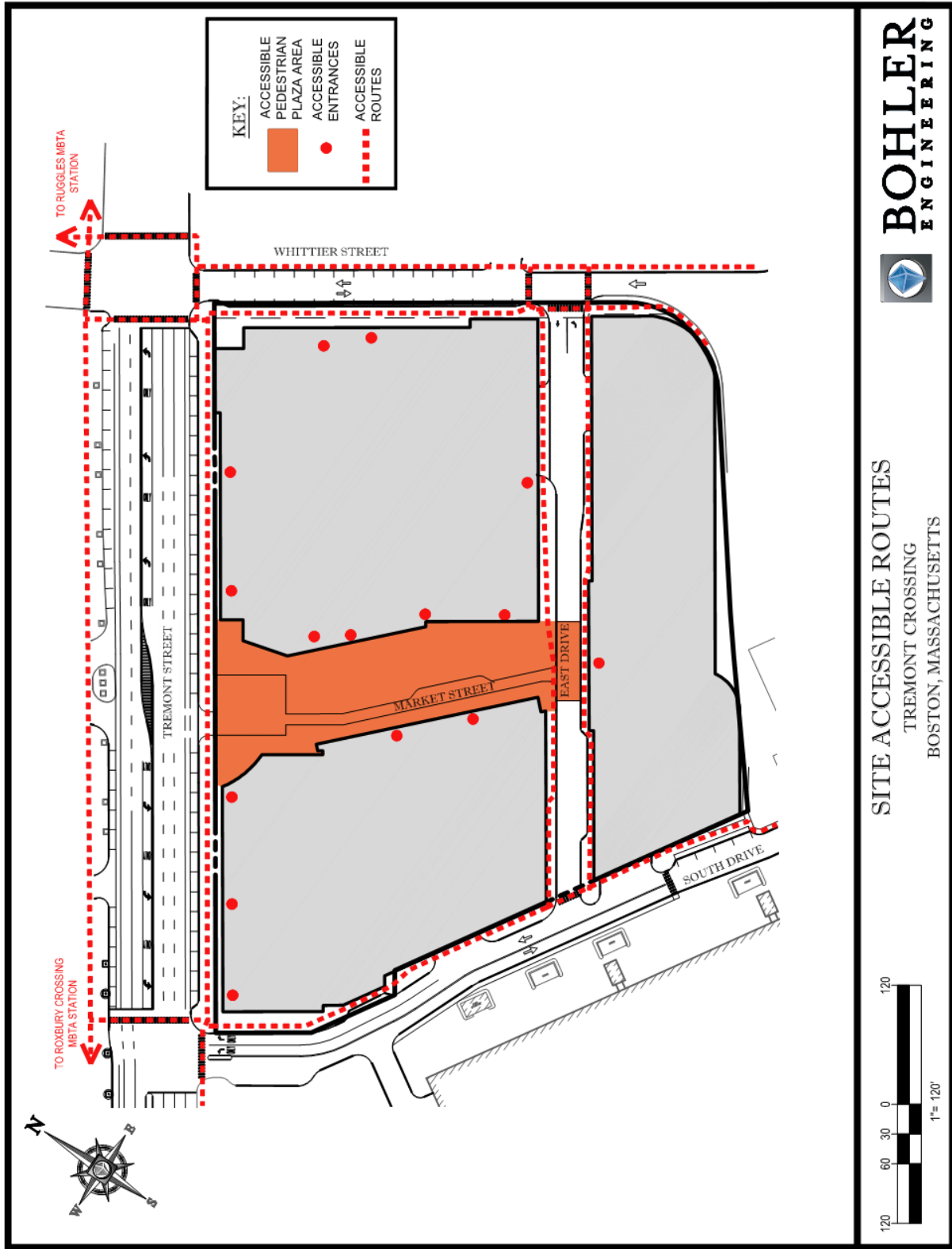


Figure 2 - Accessible Parking & Drop-Off Locations

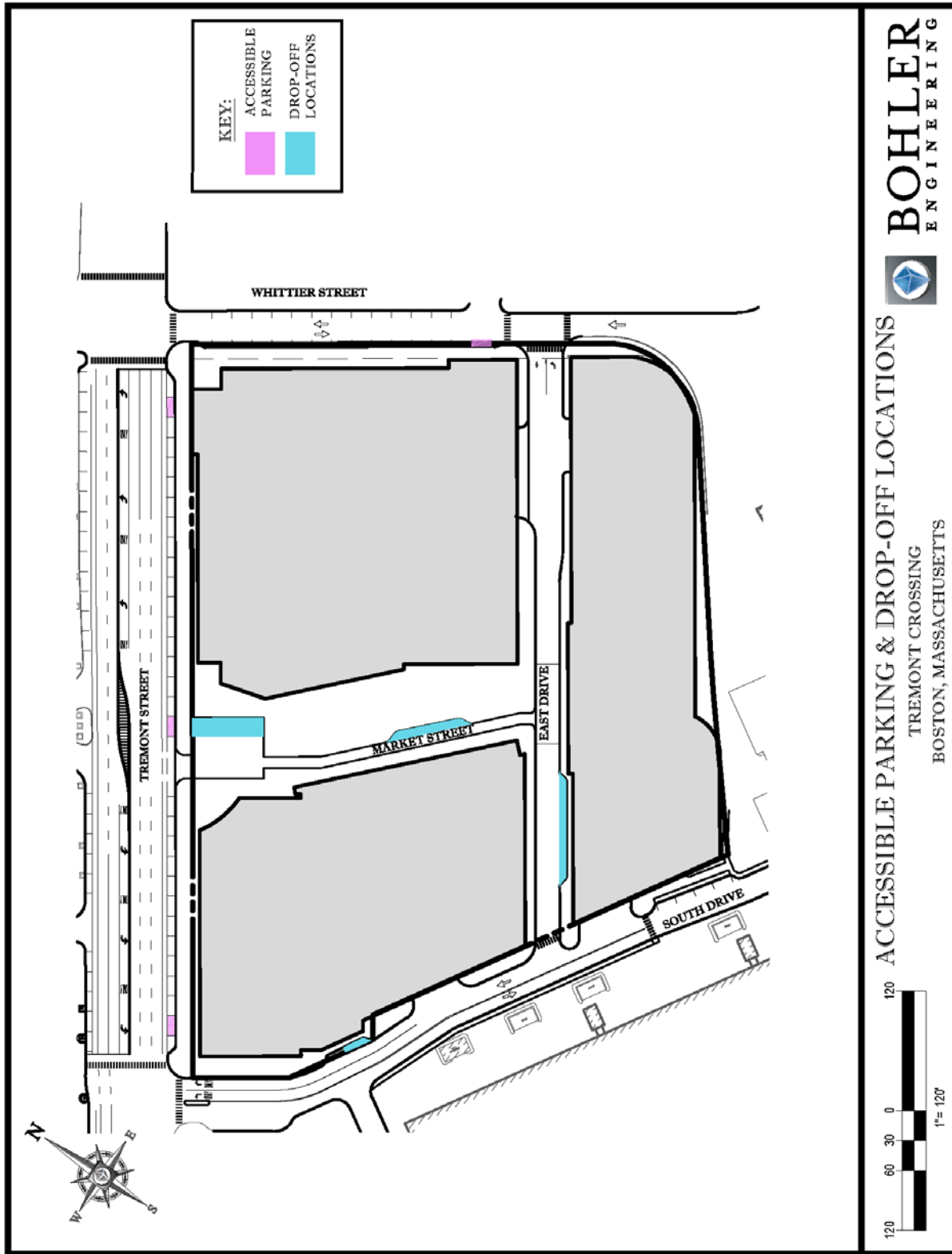


Figure 3 - Site Accessible Routes

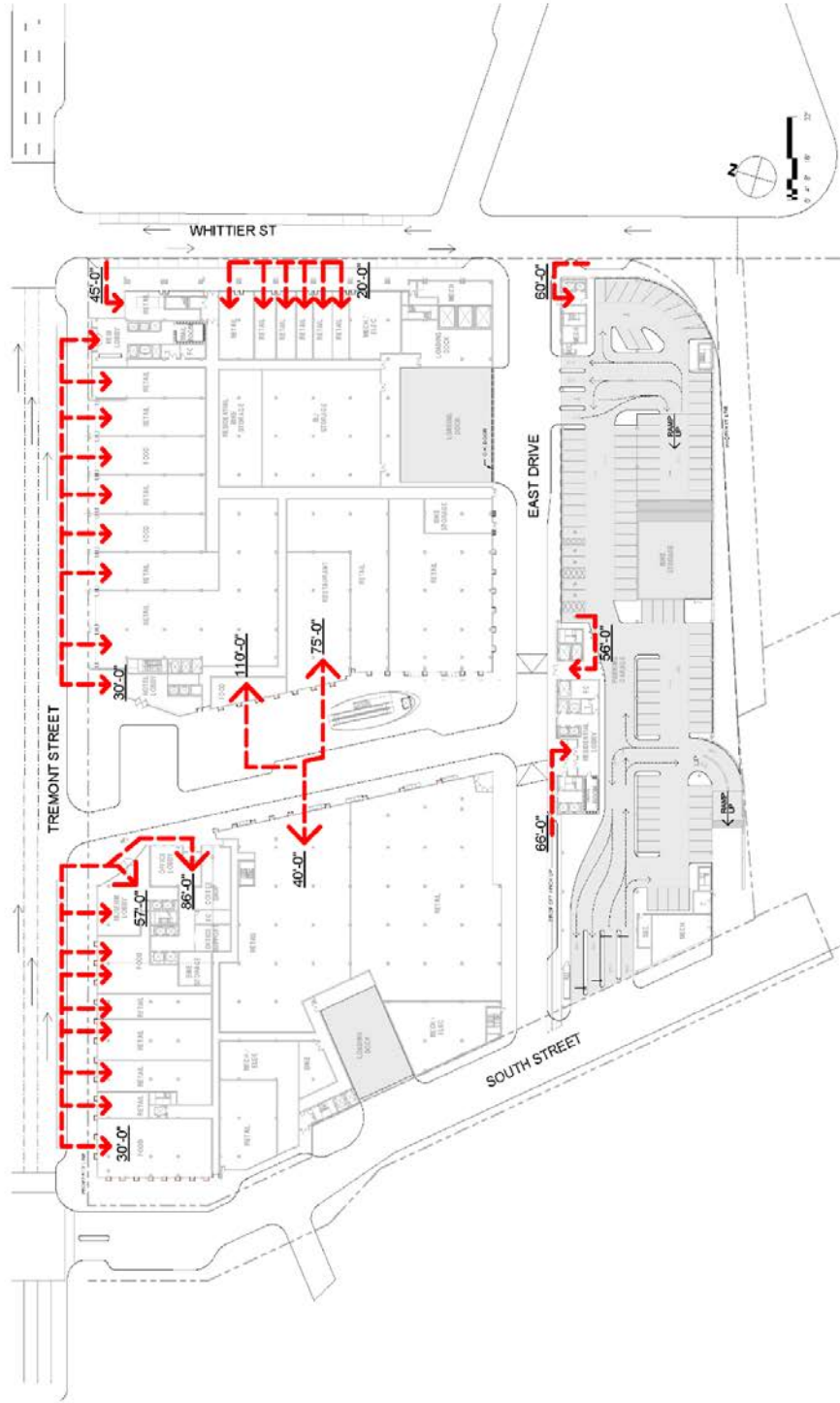


Figure 4 - Site Accessible Routes

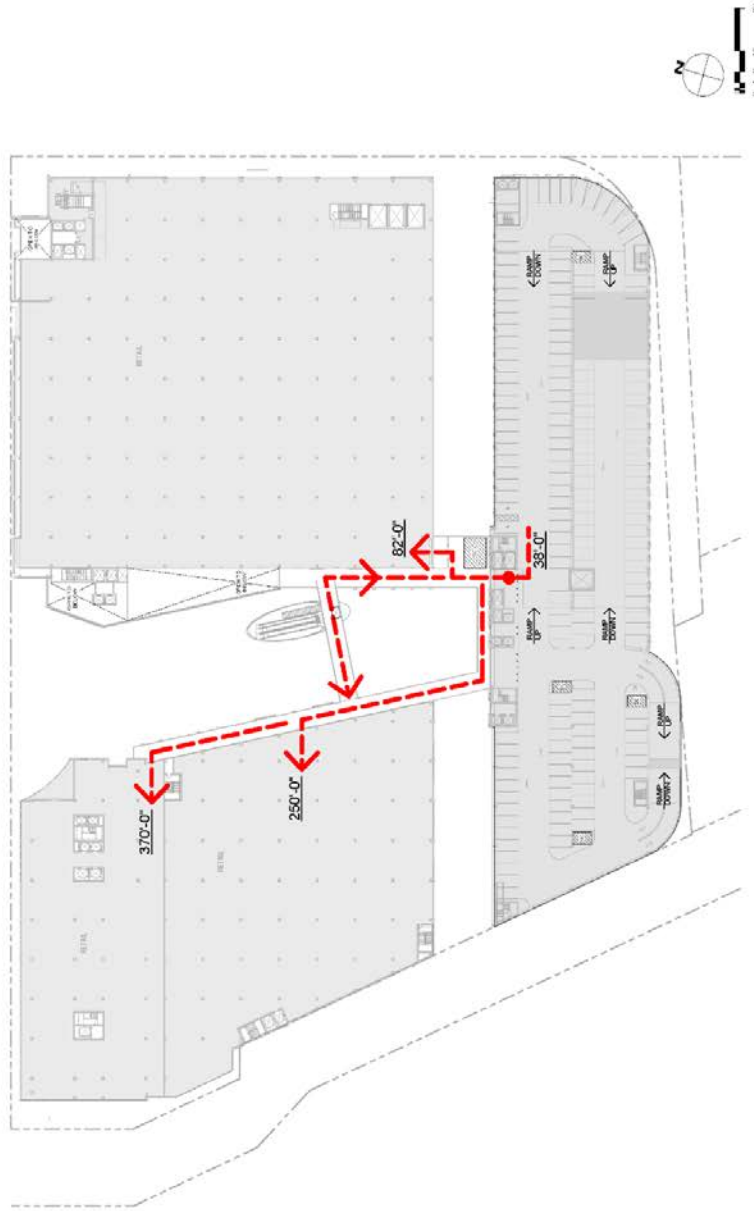


Figure 5 - Site Accessible Routes

