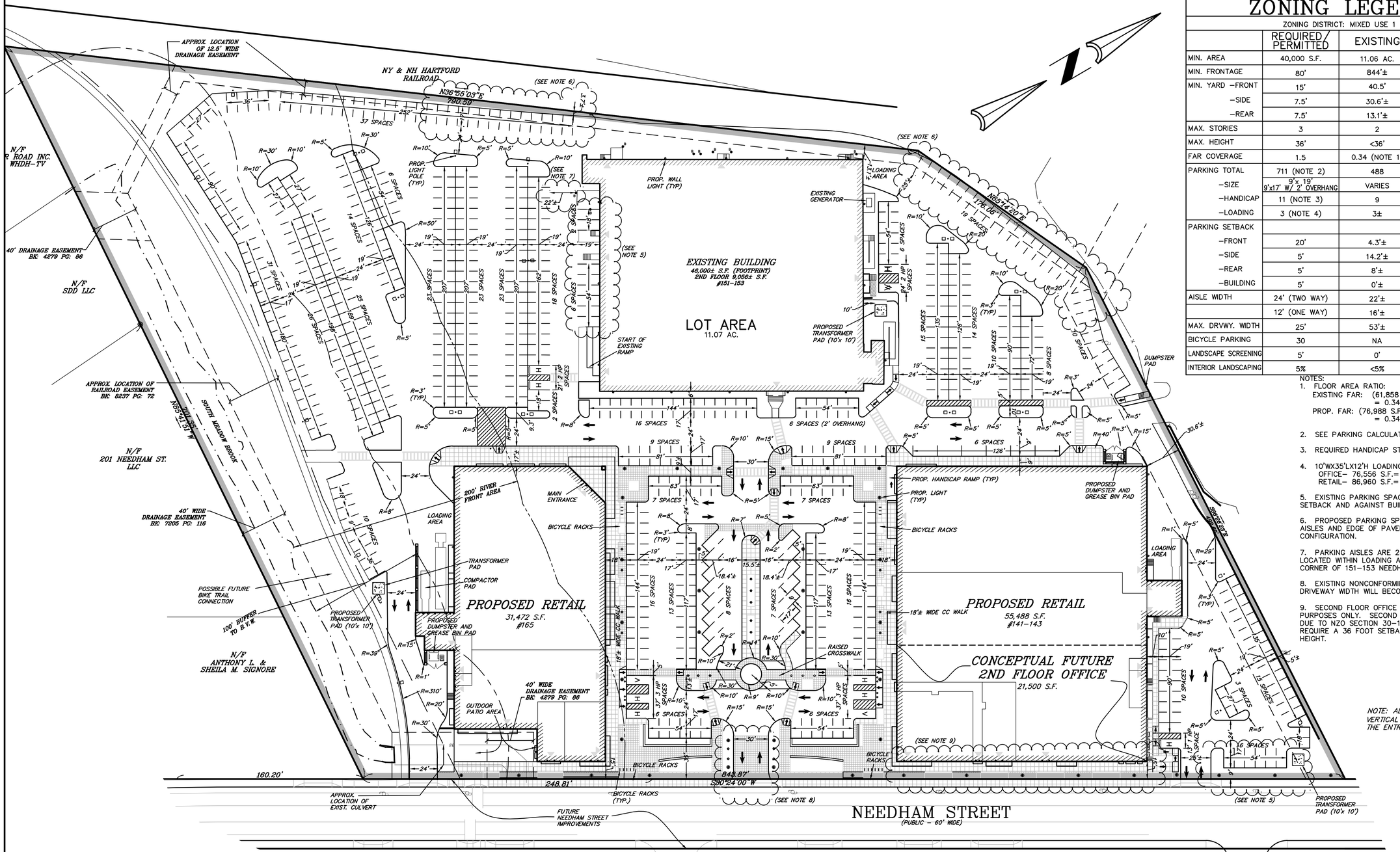
Appendix A Site Plan



ZONING LEGEND

ZONING DISTRICT: MIXED USE 1

	REQUIRED / PERMITTED	EXISTING	PROVIDED	COMPLIANCE
MIN. AREA	40,000 S.F.	11.06 AC.	11.06 AC.	YES
MIN. FRONTAGE	80'	844'±	844'±	YES
MIN. YARD –FRONT	15'	40.5'	15' (NOTE 9)	YES
–SIDE	7.5'	30.6'±	30.6'±	YES
–REAR	7.5'	13.1'±	13.1'±	YES
MAX. STORIES	3	2	2	YES
MAX. HEIGHT	36'	<36'	36'	YES
FAR COVERAGE	1.5	0.34 (NOTE 1)	0.34 (NOTE 1)	YES
PARKING TOTAL	711 (NOTE 2)	488	518	SPECIAL PERMIT
–SIZE	9'x 19' 9'x17' W/ 2' OVERHANG	VARIES	9'x 19' 9'x17' W/ 2' OVERHANG 8'x 21' (PARALLEL)	YES
–HANDICAP	11 (NOTE 3)	9	11	YES
–LOADING	3 (NOTE 4)	3±	3±	YES
PARKING SETBACK				
–FRONT	20'	4.3'±	4.3'± (NOTE 5)	EXISTING NON CONFORMING
–SIDE	5'	14.2'±	0'± (NOTE 6)	SPECIAL PERMIT
–REAR	5'	8'±	3.7'± (NOTE 6)	SPECIAL PERMIT
–BUILDING	5'	0'±	0'± (NOTE 5)	EXISTING NON CONFORMING
AISLE WIDTH	24' (TWO WAY)	22'±	22'± (NOTE 7)	EXISTING NON CONFORMING
	12' (ONE WAY)	16'±	>12'	YES
MAX. DRVWY. WIDTH	25'	53'±	30' (NOTE 8)	EXISTING NON CONFORMING
BICYCLE PARKING	30	NA	30	YES
LANDSCAPE SCREENING	5'	0'	0' (NOTE 5 & 6)	EXISTING NON CONFORMING
INTERIOR LANDSCAPING	5%	<5%	>5%±	YES

NOTES:

1. FLOOR AREA RATIO:
   EXISTING FAR: (61,858 S.F. + 55,056 S.F. + 46,910 S.F.)/11.07 AC = 0.34
   PROP. FAR: (76,988 S.F. + 55,056 S.F. + 31,472± S.F.)/11.07 AC = 0.34
2. SEE PARKING CALCULATIONS ATTACHED.
3. REQUIRED HANDICAP STALLS: 2% OF STALLS
4. 10'WX35'LX12'H LOADING SPACES REQUIRED:
   OFFICE– 76,556 S.F.= 1 SPACE
   RETAIL– 86,960 S.F.= 2 SPACES
5. EXISTING PARKING SPACES ARE LOCATED WITHIN FRONT YARD SETBACK AND AGAINST BUILDING.
6. PROPOSED PARKING SPACES ARE LOCATED ALONG EXISTING DRIVE AISLES AND EDGE OF PAVEMENT FOR MORE EFFICIENT PARKING CONFIGURATION.
7. PARKING AISLES ARE 24' WIDE WITH EXCEPTION OF EXISTING AISLE LOCATED WITHIN LOADING AREA AND BOLLARD TO THE SOUTHWEST CORNER OF 151–153 NEEDHAM ST.
8. EXISTING NONCONFORMING DRIVEWAY WIDTH WILL BE REDUCED. DRIVEWAY WIDTH WILL BECOME LESS NONCONFORMING.
9. SECOND FLOOR OFFICE SHOWN FOR FUTURE PLANNING/INFORMATIONAL PURPOSES ONLY. SECOND FLOOR OFFICE IS NOT PROPOSED AT THIS TIME DUE TO NZO SECTION 30–15, TABLE 3, FOOTNOTE 9 WHICH WOULD REQUIRE A 36 FOOT SETBACK FOR A 2 STORY BUILDING OF 36 FEET HEIGHT.

NOTE: ALL CURBING IS CONCRETE CURB (CC). VERTICAL GRANITE CURB (VGC) IS TO BE USED AT THE ENTRANCE OF THE PROPERTY.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

EXISTING LEGEND

— · — · —	EDGE OF WETLANDS
— — — —	100' BUFFER TO B.V.W.
— — — —	200' RIVERFRONT AREA
	PROPERTY LINE
——— ———	EASEMENT

PROPOSED LEGEND

H	HANDICAP SPACE
V	VAN HANDICAP SPACE
→	HANDICAP RAMP
	UTILITY POLE
→	TRAFFIC FLOW
	PARKING LOT LIGHT POLE
•	PEDESTRIAN LIGHT POLE
•	BUILDING LIGHT

DRAFT
01/06/15

SCALE 1" = 40'				
DATE 01/09/15	REV	DATE	REVISION	BY
SHEET 4 OF 8				
PLAN NO. 2013-075-LA00				
DISK REF NO. F:\P\2013-075				
DRAWN BY CJL				
CHKD BY DAM				
APPD BY DNK				

CROSSPOINT ASSOCIATES, INC.
131, 141–143, 151–153, 165, 173, & 181 NEEDHAM ST.
NEWTON, MASSACHUSETTS

LAYOUT AND ZONING PLAN

SHEET NO. 4

KELLY ENGINEERING GROUP, INC.
CIVIL ENGINEERING CONSULTANTS
0 CAMPANELLI DRIVE · BRAINTREE MA · 02184
PHONE: 781 843 4333 FAX: 781 843 0028

Appendix B Traffic Count Data

Location:	South Site Entrance			South Park Drive			Middle Park Lot			North Park Drive			Back Park Drive			Business Park Totals			
Date	Trips In	Trips Out	Total	Trips In	Trips Out	Total	Trips In	Trips Out	Total	Trips In	Trips Out	Total	Trips In	Trips Out	Total	Trips In	Trips Out	Total	
4/1/2014	256	342	598	337	276	613	27	28	55	141	117	258	76	94	170	761	781	1542	
4/2/2014	273	349	622	337	308	645	33	32	65	142	95	237	74	93	167	785	803	1588	
4/3/2014	252	336	588	328	275	603	26	26	52	133	103	236	74	96	170	739	762	1501	
Avg./Day	**260**	**342**	**603**	**334**	**286**	**620**	**29**	**29**	**57**	**139**	**105**	**244**	**75**	**94**	**169**	**762**	**782**	**1544**	
Daily Peaks																			**Hourly**
4/1/2014																			**Total**
7:00 AM	5	0	5	2	0	2	0	0	0	0	2	2	1	0	1	7	1	8	66
7:15 AM	4	1	5	8	1	9	0	0	0	1	0	1	3	0	3	13	-1	12	89
7:30 AM	7	3	10	6	0	6	1	0	1	2	0	2	0	1	1	16	4	20	112
7:45 AM	4	3	7	17	2	19	1	0	1	2	0	2	3	0	3	24	2	26	165
8:00 AM	2	1	3	15	3	18	4	0	**4**	5	2	7	1	0	1	26	5	31	**201**
8:15 AM	13	1	14	16	4	20	3	0	3	2	0	2	4	0	4	34	1	35	
8:30 AM	21	2	**23**	30	9	**39**	3	0	3	11	1	12	5	1	**6**	65	8	**73**	
8:45 AM	20	1	21	27	2	29	1	0	1	10	3	**13**	2	0	2	58	4	62	
4:00 PM	4	15	19	5	5	10	0	0	0	0	4	4	1	3	4	9	26	35	106
4:15 PM	3	6	9	2	3	5	0	1	1	0	2	2	1	3	4	5	14	19	153
4:30 PM	2	10	12	2	11	13	0	0	0	0	2	2	1	2	3	4	24	28	189
4:45 PM	1	7	8	4	6	10	0	1	1	1	3	4	2	3	5	6	18	24	211
5:00 PM	1	31	**32**	4	23	**27**	0	1	1	2	7	9	1	14	**15**	7	75	**82**	**237**
5:15 PM	2	17	19	2	17	19	0	0	0	3	7	10	1	8	9	7	48	55	
5:30 PM	1	19	20	1	12	13	0	1	1	0	11	**11**	3	8	11	2	48	50	
5:45 PM	4	24	28	1	5	6	0	3	**3**	2	8	10	0	3	3	7	43	50	
4/2/2014																			
7:00 AM	4	0	4	3	2	5	0	0	0	1	1	2	1	0	1	8	2	10	58
7:15 AM	3	1	4	5	1	6	3	0	3	1	1	2	2	0	2	12	1	13	78
7:30 AM	4	1	5	7	3	10	0	0	0	2	0	2	2	0	2	13	2	15	122
7:45 AM	6	0	6	11	3	14	2	0	2	1	1	2	4	0	4	20	0	20	166
8:00 AM	11	1	12	13	6	19	2	0	2	2	0	2	5	0	**5**	28	2	30	**215**
8:15 AM	17	3	20	25	7	**32**	2	0	2	3	1	4	1	0	1	47	10	57	
8:30 AM	19	1	20	29	3	**32**	1	0	1	8	0	8	2	0	2	57	2	59	
8:45 AM	24	4	**28**	21	3	24	3	1	**4**	14	2	**16**	4	1	**5**	62	7	**69**	
4:00 PM	0	10	10	2	4	6	0	1	1	1	3	4	2	0	2	3	16	19	120
4:15 PM	2	9	11	3	5	8	0	1	1	0	2	2	1	1	2	5	17	22	167
4:30 PM	1	11	12	2	10	12	0	1	1	4	3	7	0	3	3	7	28	35	198
4:45 PM	4	12	16	8	12	**20**	1	0	1	1	2	3	0	4	4	14	30	44	211
5:00 PM	1	27	**28**	5	14	19	0	2	**2**	2	4	6	0	11	**11**	8	58	**66**	**215**
5:15 PM	1	19	20	2	11	13	0	1	1	3	10	**13**	0	6	6	6	47	53	
5:30 PM	2	26	**28**	2	13	15	0	0	0	1	4	5	5	5	10	5	43	48	
5:45 PM	1	20	21	2	9	11	0	2	**2**	2	5	7	2	9	**11**	5	43	48	
4/3/2014																			
7:00 AM	2	1	3	1	1	2	0	0	0	1	0	1	1	0	1	4	1	5	63
7:15 AM	7	0	7	4	1	5	2	0	2	1	1	2	1	0	1	14	1	15	103
7:30 AM	2	0	2	9	1	10	0	0	0	5	1	6	3	1	4	16	0	16	137
7:45 AM	6	2	8	10	2	12	3	0	3	4	1	5	1	0	1	23	4	27	185
8:00 AM	10	5	15	26	5	31	4	0	**4**	1	0	1	6	0	**6**	41	4	45	**222**
8:15 AM	13	2	15	23	7	30	2	0	2	4	0	4	3	1	4	42	7	49	
8:30 AM	17	5	**22**	31	3	**34**	3	0	3	6	1	7	3	1	4	57	7	**64**	
8:45 AM	17	1	18	29	4	33	3	1	**4**	8	0	**8**	1	2	3	57	7	64	
4:00 PM	1	5	6	2	7	9	0	2	2	0	1	1	1	2	3	3	16	19	102
4:15 PM	1	9	10	2	7	9	0	0	0	1	1	2	2	0	2	4	15	19	152
4:30 PM	2	11	13	1	4	5	0	3	**3**	0	2	2	0	1	1	3	21	24	187
4:45 PM	1	19	20	5	11	16	0	1	1	0	3	3	2	2	4	6	34	40	217
5:00 PM	3	22	25	6	19	**25**	0	1	1	1	5	6	0	12	12	10	59	**69**	**220**
5:15 PM	2	25	**27**	4	7	11	0	0	0	0	12	**12**	0	4	4	6	48	54	
5:30 PM	2	16	18	3	11	14	0	3	**3**	3	2	5	0	14	**14**	8	46	54	
5:45 PM	1	23	24	2	5	7	1	1	2	2	4	6	0	4	4	6	37	43	

Avg. Peaks	South Site Entrance	South Park Drive	Middle Park Lot	North Park Drive	Back Park Drive	Business Park Totals			
7:00 AM	4	3	0	2	1	8	62		
7:15 AM	5	7	2	2	2	13	90		
7:30 AM	6	9	0	3	2	17	124		
7:45 AM	7	15	2	3	3	24	172		
8:00 AM	10	23	**3**	3	**4**	35	**213**	**8-9AM**	
8:15 AM	16	27	2	3	3	47			
8:30 AM	**22**	**35**	2	9	**4**	**8:30 AM**	**65**		
8:45 AM	22	29	**3**	**12**	3	65			
4:00 PM	12	8	1	3	3	24	109		
4:15 PM	10	7	1	2	3	20	157		
4:30 PM	12	10	1	4	2	29	191		
4:45 PM	15	15	1	3	4	36	213		
5:00 PM	**28**	**24**	1	7	**13**	**5:00 PM**	**72**	**224**	**5-6PM**
5:15 PM	22	14	0	**12**	6	54			
5:30 PM	22	14	1	7	12	51			
5:45 PM	24	8	**2**	8	6	47			

Location:	Loop Drive		
Date	Trips In	Trips Out	Total
4/1/2014			
4:00 PM	0	2	2
4:15 PM	1	1	2
4:30 PM	3	2	**5**
4:45 PM	0	1	1
5:00 PM	0	0	0
5:15 PM	0	0	0
5:30 PM	0	0	0
5:45 PM	0	0	0

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

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

144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

SB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/11/1														
4	42	0	0	0	0	0	0	0	0	0	0	0	0	42
01:00	36	0	1	0	0	0	0	0	0	0	0	0	0	37
02:00	6	2	0	0	0	0	0	0	0	0	0	0	0	8
03:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
04:00	27	2	0	0	0	0	0	0	0	0	0	0	0	29
05:00	57	1	3	0	0	0	0	0	0	0	0	0	0	61
06:00	244	11	0	0	0	0	0	0	0	0	0	0	0	255
07:00	549	17	2	0	0	0	0	0	0	0	0	0	0	568
08:00	739	14	2	0	0	0	0	0	0	0	0	0	0	755
09:00	596	36	4	0	0	0	0	0	0	0	0	0	0	636
10:00	558	26	6	0	0	0	0	0	0	0	0	0	0	590
11:00	610	25	4	0	0	0	0	0	0	0	0	0	0	639
12 PM	648	34	7	0	0	0	0	0	0	0	0	0	0	689
13:00	658	20	1	0	0	0	0	0	0	0	0	0	0	679
14:00	600	26	4	0	0	0	0	0	0	0	0	0	0	630
15:00	650	35	2	0	0	0	0	0	0	0	0	0	0	687
16:00	669	22	3	0	0	0	0	0	0	0	0	0	0	694
17:00	611	10	1	0	0	0	0	0	0	0	0	0	0	622
18:00	670	13	0	0	0	0	0	0	0	0	0	0	0	683
19:00	563	0	0	0	0	0	0	0	0	0	0	0	0	563
20:00	368	1	0	0	0	0	0	0	0	0	0	0	0	369
21:00	224	0	0	0	0	0	0	0	0	0	0	0	0	224
22:00	131	0	0	0	0	0	0	0	0	0	0	0	0	131
23:00	91	0	0	0	0	0	0	0	0	0	0	0	0	91
Total	9356	296	40	0	0	0	0	0	0	0	0	0	0	9692
Percent	96.5%	3.1%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	09:00	10:00											08:00
Vol.	739	36	6											755
PM Peak	18:00	15:00	12:00											16:00
Vol.	670	35	7											694

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

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

144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

SB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/12/1														
4	43	0	0	0	0	0	0	0	0	0	0	0	0	43
01:00	22	0	0	0	0	0	0	0	0	0	0	0	0	22
02:00	10	2	0	0	0	0	0	0	0	0	0	0	0	12
03:00	12	1	0	0	0	0	0	0	0	0	0	0	0	13
04:00	30	3	0	0	0	0	0	0	0	0	0	0	0	33
05:00	74	9	2	0	0	0	0	0	0	0	0	0	0	85
06:00	267	26	2	0	0	0	0	0	0	0	0	0	0	295
07:00	564	11	4	0	0	0	0	0	0	0	0	0	0	579
08:00	737	19	3	0	0	0	0	0	0	0	0	0	0	759
09:00	662	37	1	0	0	0	0	0	0	0	0	0	0	700
10:00	647	25	4	0	0	0	0	0	0	0	0	0	0	676
11:00	632	17	5	0	0	0	0	0	0	0	0	0	0	654
12 PM	725	21	2	0	0	0	0	0	0	0	0	0	0	748
13:00	665	21	1	0	0	0	0	0	0	0	0	0	0	687
14:00	641	28	2	0	0	0	0	0	0	0	0	0	0	671
15:00	652	31	1	0	0	0	0	0	0	0	0	0	0	684
16:00	648	19	4	0	0	0	0	0	0	0	0	0	0	671
17:00	631	13	1	0	0	0	0	0	0	0	0	0	0	645
18:00	612	16	1	0	0	0	0	0	0	0	0	0	0	629
19:00	543	2	0	0	0	0	0	0	0	0	0	0	0	545
20:00	360	5	0	0	0	0	0	0	0	0	0	0	0	365
21:00	260	1	0	0	0	0	0	0	0	0	0	0	0	261
22:00	181	0	0	0	0	0	0	0	0	0	0	0	0	181
23:00	121	0	0	0	0	0	0	0	0	0	0	0	0	121
Total	9739	307	33	0	0	0	0	0	0	0	0	0	0	10079
Percent	96.6%	3.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	09:00	11:00											08:00
Vol.	737	37	5											759
PM Peak	12:00	15:00	16:00											12:00
Vol.	725	31	4											748

Needham Street
north of Site Drive South
City, State: Newton, MA
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

SB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/13/1														
4	59	1	0	0	0	0	0	0	0	0	0	0	0	60
01:00	40	0	0	0	0	0	0	0	0	0	0	0	0	40
02:00	15	0	1	0	0	0	0	0	0	0	0	0	0	16
03:00	11	1	0	0	0	0	0	0	0	0	0	0	0	12
04:00	20	3	0	0	0	0	0	0	0	0	0	0	0	23
05:00	39	2	8	0	0	0	0	0	0	0	0	0	0	49
06:00	114	3	0	0	0	0	0	0	0	0	0	0	0	117
07:00	210	8	0	0	0	0	0	0	0	0	0	0	0	218
08:00	363	7	0	0	0	0	0	0	0	0	0	0	0	370
09:00	520	10	0	0	0	0	0	0	0	0	0	0	0	530
10:00	664	9	0	0	0	0	0	0	0	0	0	0	0	673
11:00	708	6	0	0	0	0	0	0	0	0	0	0	0	714
12 PM	722	8	0	0	0	0	0	0	0	0	0	0	0	730
13:00	812	8	0	0	0	0	0	0	0	0	0	0	0	820
14:00	798	3	1	0	0	0	0	0	0	0	0	0	0	802
15:00	717	7	0	0	0	0	0	0	0	0	0	0	0	724
16:00	686	1	1	0	0	0	0	0	0	0	0	0	0	688
17:00	626	2	1	0	0	0	0	0	0	0	0	0	0	629
18:00	458	0	0	0	0	0	0	0	0	0	0	0	0	458
19:00	346	0	0	0	0	0	0	0	0	0	0	0	0	346
20:00	291	1	0	0	0	0	0	0	0	0	0	0	0	292
21:00	172	6	0	0	0	0	0	0	0	0	0	0	0	178
22:00	160	0	0	0	0	0	0	0	0	0	0	0	0	160
23:00	156	0	0	0	0	0	0	0	0	0	0	0	0	156
Total	8707	86	12	0	0	0	0	0	0	0	0	0	0	8805
Percent	98.9%	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	09:00	05:00											11:00
Vol.	708	10	8											714
PM Peak	13:00	12:00	14:00											13:00
Vol.	812	8	1											820

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

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

144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

NB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/11/1														
4	41	0	0	0	0	0	0	0	0	0	0	0	0	41
01:00	17	1	2	0	0	0	0	0	0	0	0	0	0	20
02:00	12	1	0	0	0	0	0	0	0	0	0	0	0	13
03:00	7	1	1	0	0	0	0	0	0	0	0	0	0	9
04:00	37	3	0	0	0	0	0	0	0	0	0	0	0	40
05:00	172	12	9	0	0	0	0	0	0	0	0	0	0	193
06:00	484	21	6	0	0	0	0	0	0	0	0	0	0	511
07:00	742	35	6	0	0	0	0	0	0	0	0	0	0	783
08:00	706	41	2	0	0	0	0	0	0	0	0	0	0	749
09:00	679	29	5	0	0	0	0	0	0	0	0	0	0	713
10:00	654	26	7	0	0	0	0	0	0	0	0	0	0	687
11:00	657	24	4	0	0	0	0	0	0	0	0	0	0	685
12 PM	741	19	4	0	0	0	0	0	0	0	0	0	0	764
13:00	751	23	3	0	0	0	0	0	0	0	0	0	0	777
14:00	706	11	2	0	0	0	0	0	0	0	0	0	0	719
15:00	691	10	0	0	0	0	0	0	0	0	0	0	0	701
16:00	771	13	0	0	0	0	0	0	0	0	0	0	0	784
17:00	839	8	0	0	0	0	0	0	0	0	0	0	0	847
18:00	811	10	1	0	0	0	0	0	0	0	0	0	0	822
19:00	567	3	1	0	0	0	0	0	0	0	0	0	0	571
20:00	424	0	0	0	0	0	0	0	0	0	0	0	0	424
21:00	278	0	0	0	0	0	0	0	0	0	0	0	0	278
22:00	137	3	0	0	0	0	0	0	0	0	0	0	0	140
23:00	69	0	0	0	0	0	0	0	0	0	0	0	0	69
Total	10993	294	53	0	0	0	0	0	0	0	0	0	0	11340
Percent	96.9%	2.6%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	05:00											07:00
Vol.	742	41	9											783
PM Peak	17:00	13:00	12:00											17:00
Vol.	839	23	4											847

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION
D A T A
INDUSTRIES, LLC
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

NB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/12/1														
4	43	1	0	0	0	0	0	0	0	0	0	0	0	44
01:00	21	0	1	0	0	0	0	0	0	0	0	0	0	22
02:00	9	1	1	0	0	0	0	0	0	0	0	0	0	11
03:00	6	1	1	0	0	0	0	0	0	0	0	0	0	8
04:00	33	6	0	0	0	0	0	0	0	0	0	0	0	39
05:00	165	13	11	0	0	0	0	0	0	0	0	0	0	189
06:00	497	22	7	0	0	0	0	0	0	0	0	0	0	526
07:00	733	43	8	0	0	0	0	0	0	0	0	0	0	784
08:00	696	36	2	0	0	0	0	0	0	0	0	0	0	734
09:00	683	23	5	0	0	0	0	0	0	0	0	0	0	711
10:00	695	19	3	0	0	0	0	0	0	0	0	0	0	717
11:00	714	17	7	0	0	0	0	0	0	0	0	0	0	738
12 PM	742	25	0	0	0	0	0	0	0	0	0	0	0	767
13:00	775	25	3	0	0	0	0	0	0	0	0	0	0	803
14:00	794	19	2	0	0	0	0	0	0	0	0	0	0	815
15:00	781	20	1	0	0	0	0	0	0	0	0	0	0	802
16:00	784	8	3	0	0	0	0	0	0	0	0	0	0	795
17:00	869	9	3	0	0	0	0	0	0	0	0	0	0	881
18:00	719	4	0	0	0	0	0	0	0	0	0	0	0	723
19:00	575	5	0	0	0	0	0	0	0	0	0	0	0	580
20:00	383	1	0	0	0	0	0	0	0	0	0	0	0	384
21:00	305	1	0	0	0	0	0	0	0	0	0	0	0	306
22:00	192	0	0	0	0	0	0	0	0	0	0	0	0	192
23:00	116	0	0	0	0	0	0	0	0	0	0	0	0	116
Total	11330	299	58	0	0	0	0	0	0	0	0	0	0	11687
Percent	96.9%	2.6%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	05:00											07:00
Vol.	733	43	11											784
PM Peak	17:00	12:00	13:00											17:00
Vol.	869	25	3											881

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

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144047 A Class
Site Code: 195310953
Date Start: 11-Sep-14

NB

Start Time	Cars	Medium Heavy	Large Heavy	Total										
09/13/1														
4	48	2	0	0	0	0	0	0	0	0	0	0	0	50
01:00	22	1	2	0	0	0	0	0	0	0	0	0	0	25
02:00	18	0	0	0	0	0	0	0	0	0	0	0	0	18
03:00	13	1	3	0	0	0	0	0	0	0	0	0	0	17
04:00	21	1	4	0	0	0	0	0	0	0	0	0	0	26
05:00	57	4	8	0	0	0	0	0	0	0	0	0	0	69
06:00	137	10	1	0	0	0	0	0	0	0	0	0	0	148
07:00	286	16	0	0	0	0	0	0	0	0	0	0	0	302
08:00	432	16	0	0	0	0	0	0	0	0	0	0	0	448
09:00	554	7	2	0	0	0	0	0	0	0	0	0	0	563
10:00	667	14	0	0	0	0	0	0	0	0	0	0	0	681
11:00	816	1	0	0	0	0	0	0	0	0	0	0	0	817
12 PM	819	5	0	0	0	0	0	0	0	0	0	0	0	824
13:00	796	6	0	0	0	0	0	0	0	0	0	0	0	802
14:00	873	6	0	0	0	0	0	0	0	0	0	0	0	879
15:00	859	4	1	0	0	0	0	0	0	0	0	0	0	864
16:00	865	6	0	0	0	0	0	0	0	0	0	0	0	871
17:00	906	4	0	0	0	0	0	0	0	0	0	0	0	910
18:00	675	1	0	0	0	0	0	0	0	0	0	0	0	676
19:00	492	3	0	0	0	0	0	0	0	0	0	0	0	495
20:00	314	12	0	0	0	0	0	0	0	0	0	0	0	326
21:00	237	5	0	0	0	0	0	0	0	0	0	0	0	242
22:00	206	1	0	0	0	0	0	0	0	0	0	0	0	207
23:00	162	0	0	0	0	0	0	0	0	0	0	0	0	162
Total	10275	126	21	0	0	0	0	0	0	0	0	0	0	10422
Percent	98.6%	1.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	07:00	05:00											11:00
Vol.	816	16	8											817
PM Peak	17:00	20:00	15:00											17:00
Vol.	906	12	1											910

Needham Street
north of Site Drive South
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144047 A Volume
Site Code: 195310953
Date Start: 11-Sep-14

Start	SB				NB				Combined				11-Sep-14
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Thu
12:00	17		168		8		200		25		368		
12:15	10		172		13		185		23		357		
12:30	8		178		9		193		17		371		
12:45	7	42	171	689	11	41	186	764	18	83	357	1453	
01:00	9		175		5		215		14		390		
01:15	12		155		9		169		21		324		
01:30	14		175		5		189		19		364		
01:45	2	37	174	679	1	20	204	777	3	57	378	1456	
02:00	3		155		5		162		8		317		
02:15	0		167		1		189		1		356		
02:30	1		145		5		196		6		341		
02:45	4	8	163	630	2	13	172	719	6	21	335	1349	
03:00	3		177		4		173		7		350		
03:15	3		159		1		184		4		343		
03:30	3		177		3		175		6		352		
03:45	1	10	174	687	1	9	169	701	2	19	343	1388	
04:00	4		179		6		167		10		346		
04:15	5		163		5		222		10		385		
04:30	9		169		12		192		21		361		
04:45	11	29	183	694	17	40	203	784	28	69	386	1478	
05:00	6		146		34		202		40		348		
05:15	13		131		37		223		50		354		
05:30	18		169		57		213		75		382		
05:45	24	61	176	622	65	193	209	847	89	254	385	1469	
06:00	45		163		80		215		125		378		
06:15	52		173		98		217		150		390		
06:30	68		179		173		195		241		374		
06:45	90	255	168	683	160	511	195	822	250	766	363	1505	
07:00	125		151		188		179		313		330		
07:15	114		164		210		162		324		326		
07:30	159		126		194		125		353		251		
07:45	170	568	122	563	191	783	105	571	361	1351	227	1134	
08:00	184		106		193		131		377		237		
08:15	177		93		186		114		363		207		
08:30	209		98		180		96		389		194		
08:45	185	755	72	369	190	749	83	424	375	1504	155	793	
09:00	169		63		180		82		349		145		
09:15	149		57		171		74		320		131		
09:30	162		43		175		70		337		113		
09:45	156	636	61	224	187	713	52	278	343	1349	113	502	
10:00	119		53		168		50		287		103		
10:15	142		31		182		36		324		67		
10:30	151		24		167		26		318		50		
10:45	178	590	23	131	170	687	28	140	348	1277	51	271	
11:00	177		26		155		19		332		45		
11:15	143		27		169		23		312		50		
11:30	153		21		192		18		345		39		
11:45	166	639	17	91	169	685	9	69	335	1324	26	160	
Total	3630		6062		4444		6896		8074		12958		
Percent	45.0%		46.8%		55.0%		53.2%						
Day Total		9692				11340				21032			
Peak	08:00	-	00:15	-	07:15	-	05:15	-	08:00	-	05:30	-	-	-
Vol.	755	-	696	-	788	-	860	-	1504	-	1535	-	-	-
P.H.F.	0.903		0.978		0.938		0.964		0.967		0.984			

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION
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INDUSTRIES, LLC
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Email: datarequests@pdillc.com

144047 A Volume
Site Code: 195310953
Date Start: 11-Sep-14

Start	SB				NB				Combined				12-Sep-14
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Fri
12:00	10		190		10		197		20		387		
12:15	14		202		11		205		25		407		
12:30	10		169		10		190		20		359		
12:45	9	43	187	748	13	44	175	767	22	87	362	1515	
01:00	9		152		8		228		17		380		
01:15	6		166		2		179		8		345		
01:30	6		168		11		213		17		381		
01:45	1	22	201	687	1	22	183	803	2	44	384	1490	
02:00	6		180		1		186		7		366		
02:15	1		160		2		206		3		366		
02:30	3		159		4		200		7		359		
02:45	2	12	172	671	4	11	223	815	6	23	395	1486	
03:00	5		152		4		213		9		365		
03:15	2		151		1		185		3		336		
03:30	2		175		2		209		4		384		
03:45	4	13	206	684	1	8	195	802	5	21	401	1486	
04:00	4		178		2		186		6		364		
04:15	5		149		6		206		11		355		
04:30	8		165		13		200		21		365		
04:45	16	33	179	671	18	39	203	795	34	72	382	1466	
05:00	7		153		27		217		34		370		
05:15	16		162		38		232		54		394		
05:30	29		165		46		227		75		392		
05:45	33	85	165	645	78	189	205	881	111	274	370	1526	
06:00	53		166		83		218		136		384		
06:15	65		157		114		191		179		348		
06:30	73		169		169		165		242		334		
06:45	104	295	137	629	160	526	149	723	264	821	286	1352	
07:00	97		151		180		169		277		320		
07:15	129		148		212		145		341		293		
07:30	169		112		201		126		370		238		
07:45	184	579	134	545	191	784	140	580	375	1363	274	1125	
08:00	172		106		180		110		352		216		
08:15	171		92		184		102		355		194		
08:30	189		83		199		99		388		182		
08:45	227	759	84	365	171	734	73	384	398	1493	157	749	
09:00	176		70		177		87		353		157		
09:15	189		70		192		86		381		156		
09:30	169		62		173		73		342		135		
09:45	166	700	59	261	169	711	60	306	335	1411	119	567	
10:00	182		49		167		70		349		119		
10:15	167		53		196		55		363		108		
10:30	169		33		184		41		353		74		
10:45	158	676	46	181	170	717	26	192	328	1393	72	373	
11:00	180		40		168		45		348		85		
11:15	181		32		173		26		354		58		
11:30	129		25		185		21		314		46		
11:45	164	654	24	121	212	738	24	116	376	1392	48	237	
Total	3871		6208		4523		7164		8394		13372		
Percent	46.1%		46.4%		53.9%		53.6%						
Day Total		10079				11687				21766			
Peak	08:30	-	12:00	-	07:00	-	05:15	-	08:30	-	05:15	-	-	-
Vol.	781	-	748	-	784	-	882	-	1520	-	1540	-	-	-
P.H.F.	0.860		0.926		0.925		0.950		0.955		0.977			

Needham Street
north of Site Drive South
City, State: Newton, MA
Client: Stantec/ S. Wood

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144047 A Volume
Site Code: 195310953
Date Start: 11-Sep-14

Start	SB				NB				Combined				13-Sep-14
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Sat
12:00	13		172		17		208		30		380		
12:15	18		184		13		205		31		389		
12:30	18		194		10		196		28		390		
12:45	11	60	180	730	10	50	215	824	21	110	395	1554	
01:00	12		205		4		211		16		416		
01:15	9		195		7		200		16		395		
01:30	10		222		10		190		20		412		
01:45	9	40	198	820	4	25	201	802	13	65	399	1622	
02:00	1		199		4		213		5		412		
02:15	6		211		4		219		10		430		
02:30	4		197		4		220		8		417		
02:45	5	16	195	802	6	18	227	879	11	34	422	1681	
03:00	1		201		5		223		6		424		
03:15	2		194		2		221		4		415		
03:30	5		165		5		215		10		380		
03:45	4	12	164	724	5	17	205	864	9	29	369	1588	
04:00	4		169		0		228		4		397		
04:15	4		187		5		203		9		390		
04:30	6		153		6		226		12		379		
04:45	9	23	179	688	15	26	214	871	24	49	393	1559	
05:00	5		163		7		230		12		393		
05:15	11		168		17		240		28		408		
05:30	11		150		24		228		35		378		
05:45	22	49	148	629	21	69	212	910	43	118	360	1539	
06:00	15		120		20		171		35		291		
06:15	24		122		42		188		66		310		
06:30	40		104		42		176		82		280		
06:45	38	117	112	458	44	148	141	676	82	265	253	1134	
07:00	46		105		40		137		86		242		
07:15	39		84		82		121		121		205		
07:30	64		80		93		103		157		183		
07:45	69	218	77	346	87	302	134	495	156	520	211	841	
08:00	78		96		96		84		174		180		
08:15	73		71		103		102		176		173		
08:30	96		60		124		72		220		132		
08:45	123	370	65	292	125	448	68	326	248	818	133	618	
09:00	131		51		130		71		261		122		
09:15	117		43		129		58		246		101		
09:30	128		43		143		61		271		104		
09:45	154	530	41	178	161	563	52	242	315	1093	93	420	
10:00	166		38		152		73		318		111		
10:15	173		46		166		58		339		104		
10:30	175		36		178		41		353		77		
10:45	159	673	40	160	185	681	35	207	344	1354	75	367	
11:00	167		52		186		51		353		103		
11:15	174		45		213		46		387		91		
11:30	185		39		204		35		389		74		
11:45	188	714	20	156	214	817	30	162	402	1531	50	318	
Total	2822		5983		3164		7258		5986		13241		
Percent	47.1%		45.2%		52.9%		54.8%						
Day Total		8805				10422				19227			
Peak	11:00	-	01:30	-	11:00	-	04:45	-	11:00	-	02:15	-	-	-
Vol.	714	-	830	-	817	-	912	-	1531	-	1693	-	-	-
P.H.F.	0.949		0.935		0.954		0.950		0.952		0.984			

N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

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

File Name : 144047 A
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	13	100	2	0	6	5	7	0	12	197	26	0	22	13	24	0	427
07:15 AM	12	101	3	0	8	18	13	0	14	210	30	0	20	32	26	0	487
07:30 AM	20	133	9	0	6	35	29	0	19	189	18	0	23	25	27	0	533
07:45 AM	24	139	5	0	6	38	28	0	18	204	46	0	23	20	25	0	576
Total	69	473	19	0	26	96	77	0	63	800	120	0	88	90	102	0	2023
08:00 AM	27	132	4	0	11	37	18	0	15	211	28	0	40	27	27	0	577
08:15 AM	26	130	4	0	8	45	29	0	9	200	29	0	32	27	35	0	574
08:30 AM	26	144	5	0	13	36	32	0	19	201	40	0	33	22	26	0	597
08:45 AM	11	146	7	0	13	26	39	0	19	199	36	0	24	20	29	0	569
Total	90	552	20	0	45	144	118	0	62	811	133	0	129	96	117	0	2317
Grand Total	159	1025	39	0	71	240	195	0	125	1611	253	0	217	186	219	0	4340
Apprch %	13	83.8	3.2	0	14	47.4	38.5	0	6.3	81	12.7	0	34.9	29.9	35.2	0	
Total %	3.7	23.6	0.9	0	1.6	5.5	4.5	0	2.9	37.1	5.8	0	5	4.3	5	0	
Cars	152	988	37	0	69	233	191	0	120	1529	244	0	214	175	203	0	4155
% Cars	95.6	96.4	94.9	0	97.2	97.1	97.9	0	96	94.9	96.4	0	98.6	94.1	92.7	0	95.7
Heavy Vehicles	7	37	2	0	2	7	4	0	5	82	9	0	3	11	16	0	185
% Heavy Vehicles	4.4	3.6	5.1	0	2.8	2.9	2.1	0	4	5.1	3.6	0	1.4	5.9	7.3	0	4.3

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	24	139	5	0	168	6	38	28	0	72	18	204	46	0	268	23	20	25	0	68	576
08:00 AM	27	132	4	0	163	11	37	18	0	66	15	211	28	0	254	40	27	27	0	94	577
08:15 AM	26	130	4	0	160	8	45	29	0	82	9	200	29	0	238	32	27	35	0	94	574
08:30 AM	26	144	5	0	175	13	36	32	0	81	19	201	40	0	260	33	22	26	0	81	597
Total Volume	103	545	18	0	666	38	156	107	0	301	61	816	143	0	1020	128	96	113	0	337	2324
% App. Total	15.5	81.8	2.7	0		12.6	51.8	35.5	0		6	80	14	0		38	28.5	33.5	0		
PHF	.954	.946	.900	.000	.951	.731	.867	.836	.000	.918	.803	.967	.777	.000	.951	.800	.889	.807	.000	.896	.973
Cars	99	519	16	0	634	38	150	105	0	293	57	783	137	0	977	128	94	105	0	327	2231
% Cars	96.1	95.2	88.9	0	95.2	100	96.2	98.1	0	97.3	93.4	96.0	95.8	0	95.8	100	97.9	92.9	0	97.0	96.0
Heavy Vehicles	4	26	2	0	32	0	6	2	0	8	4	33	6	0	43	0	2	8	0	10	93
% Heavy Vehicles	3.9	4.8	11.1	0	4.8	0	3.8	1.9	0	2.7	6.6	4.0	4.2	0	4.2	0	2.1	7.1	0	3.0	4.0

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 A
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	12	96	2	0	6	5	7	0	12	192	26	0	20	11	22	0	411
07:15 AM	11	99	3	0	7	17	13	0	13	195	29	0	19	27	24	0	457
07:30 AM	19	130	9	0	5	35	29	0	19	172	17	0	23	24	24	0	506
07:45 AM	22	128	4	0	6	35	28	0	16	196	45	0	23	20	24	0	547
Total	64	453	18	0	24	92	77	0	60	755	117	0	85	82	94	0	1921
08:00 AM	27	127	4	0	11	36	18	0	14	203	28	0	40	25	23	0	556
08:15 AM	25	127	4	0	8	43	29	0	8	189	27	0	32	27	33	0	552
08:30 AM	25	137	4	0	13	36	30	0	19	195	37	0	33	22	25	0	576
08:45 AM	11	144	7	0	13	26	37	0	19	187	35	0	24	19	28	0	550
Total	88	535	19	0	45	141	114	0	60	774	127	0	129	93	109	0	2234
Grand Total	152	988	37	0	69	233	191	0	120	1529	244	0	214	175	203	0	4155
Apprch %	12.9	83.9	3.1	0	14	47.3	38.7	0	6.3	80.8	12.9	0	36.1	29.6	34.3	0	
Total %	3.7	23.8	0.9	0	1.7	5.6	4.6	0	2.9	36.8	5.9	0	5.2	4.2	4.9	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	27	127	4	0	158	11	36	18	0	65	14	203	28	0	245	40	25	23	0	88	556
08:15 AM	25	127	4	0	156	8	43	29	0	80	8	189	27	0	224	32	27	33	0	92	552
08:30 AM	25	137	4	0	166	13	36	30	0	79	19	195	37	0	251	33	22	25	0	80	576
08:45 AM	11	144	7	0	162	13	26	37	0	76	19	187	35	0	241	24	19	28	0	71	550
Total Volume	88	535	19	0	642	45	141	114	0	300	60	774	127	0	961	129	93	109	0	331	2234
% App. Total	13.7	83.3	3	0		15	47	38	0		6.2	80.5	13.2	0		39	28.1	32.9	0		
PHF	.815	.929	.679	.000	.967	.865	.820	.770	.000	.938	.789	.953	.858	.000	.957	.806	.861	.826	.000	.899	.970

PRECISION
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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 A
Site Code : 19531095
Start Date : 9/11/2014

Groups Printed- Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	1	4	0	0	0	0	0	0	0	5	0	0	2	2	2	0	16
07:15 AM	1	2	0	0	1	1	0	0	1	15	1	0	1	5	2	0	30
07:30 AM	1	3	0	0	1	0	0	0	0	17	1	0	0	1	3	0	27
07:45 AM	2	11	1	0	0	3	0	0	2	8	1	0	0	0	1	0	29
Total	5	20	1	0	2	4	0	0	3	45	3	0	3	8	8	0	102
08:00 AM	0	5	0	0	0	1	0	0	1	8	0	0	0	2	4	0	21
08:15 AM	1	3	0	0	0	2	0	0	1	11	2	0	0	0	2	0	22
08:30 AM	1	7	1	0	0	0	2	0	0	6	3	0	0	0	1	0	21
08:45 AM	0	2	0	0	0	0	2	0	0	12	1	0	0	1	1	0	19
Total	2	17	1	0	0	3	4	0	2	37	6	0	0	3	8	0	83
Grand Total	7	37	2	0	2	7	4	0	5	82	9	0	3	11	16	0	185
Apprch %	15.2	80.4	4.3	0	15.4	53.8	30.8	0	5.2	85.4	9.4	0	10	36.7	53.3	0	
Total %	3.8	20	1.1	0	1.1	3.8	2.2	0	2.7	44.3	4.9	0	1.6	5.9	8.6	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	1	2	0	0	3	1	1	0	0	2	1	15	1	0	17	1	5	2	0	8	30
07:30 AM	1	3	0	0	4	1	0	0	0	1	0	17	1	0	18	0	1	3	0	4	27
07:45 AM	2	11	1	0	14	0	3	0	0	3	2	8	1	0	11	0	0	1	0	1	29
08:00 AM	0	5	0	0	5	0	1	0	0	1	1	8	0	0	9	0	2	4	0	6	21
Total Volume	4	21	1	0	26	2	5	0	0	7	4	48	3	0	55	1	8	10	0	19	107
% App. Total	15.4	80.8	3.8	0		28.6	71.4	0	0		7.3	87.3	5.5	0		5.3	42.1	52.6	0		
PHF	.500	.477	.250	.000	.464	.500	.417	.000	.000	.583	.500	.706	.750	.000	.764	.250	.400	.625	.000	.594	.892

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File Name : 144047 A
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	5
07:15 AM	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	3
07:30 AM	0	0	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	3	8
07:45 AM	1	3	0	0	4	0	0	0	1	1	0	2	1	0	0	0	0	0	0	0	13
Total	1	4	0	3	4	0	0	0	4	2	0	4	1	0	0	0	1	0	0	5	29
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
08:15 AM	0	0	0	0	0	0	0	0	1	0	0	2	0	0	1	0	0	1	0	5	10
08:30 AM	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	3
08:45 AM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	4
Total	0	2	0	0	0	0	0	0	2	1	0	2	0	0	1	0	0	1	0	10	19
Grand Total	1	6	0	3	4	0	0	0	6	3	0	6	1	0	1	0	1	1	0	15	48
Apprch %	7.1	42.9	0	21.4	28.6	0	0	0	66.7	33.3	0	75	12.5	0	12.5	0	5.9	5.9	0	88.2	
Total %	2.1	12.5	0	6.2	8.3	0	0	0	12.5	6.2	0	12.5	2.1	0	2.1	0	2.1	2.1	0	31.2	

	Needham Street From North						Christina Street From East						Needham Street From South						Oak Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	0	0	0	2	0	2	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	3	3	8
07:45 AM	1	3	0	0	4	8	0	0	0	1	1	2	0	2	1	0	0	3	0	0	0	0	0	0	13
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
08:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	1	3	0	0	1	0	5	6	10
Total Volume	1	3	0	2	4	10	0	0	0	4	2	6	0	4	1	0	1	6	0	0	1	0	10	11	33
% App. Total	10	30	0	20	40		0	0	0	66.7	33.3		0	66.7	16.7	0	16.7		0	0	9.1	0	90.9		
PHF	.250	.250	.000	.250	.250	.313	.000	.000	.000	.500	.500	.500	.000	.500	.250	.000	.250	.500	.000	.000	.250	.000	.500	.458	.635

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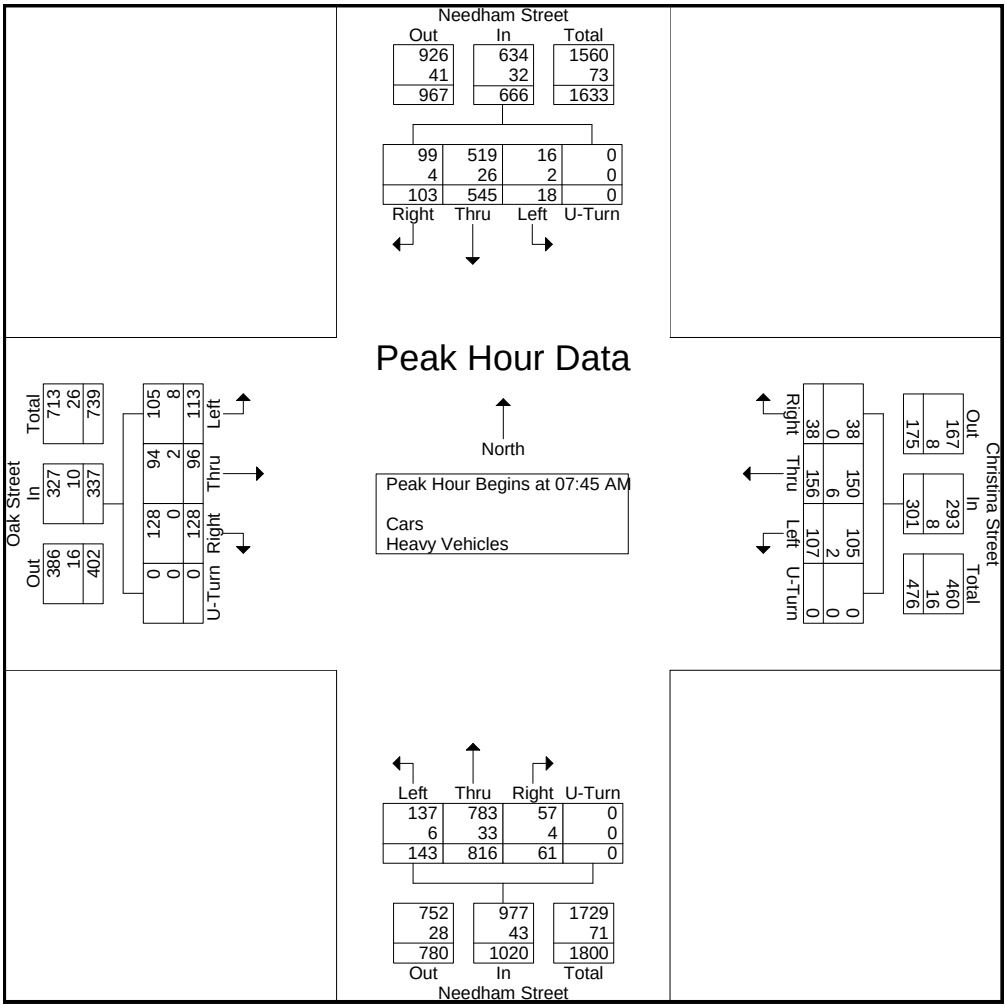
	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	24	139	5	0	168	6	38	28	0	72	18	204	46	0	268	23	20	25	0	68	576
08:00 AM	27	132	4	0	163	11	37	18	0	66	15	211	28	0	254	40	27	27	0	94	577
08:15 AM	26	130	4	0	160	8	45	29	0	82	9	200	29	0	238	32	27	35	0	94	574
08:30 AM	26	144	5	0	175	13	36	32	0	81	19	201	40	0	260	33	22	26	0	81	597
Total Volume	103	545	18	0	666	38	156	107	0	301	61	816	143	0	1020	128	96	113	0	337	2324
% App. Total	15.5	81.8	2.7	0		12.6	51.8	35.5	0		6	80	14	0		38	28.5	33.5	0		
PHF	.954	.946	.900	.000	.951	.731	.867	.836	.000	.918	.803	.967	.777	.000	.951	.800	.889	.807	.000	.896	.973
Cars	99	519	16	0	634	38	150	105	0	293	57	783	137	0	977	128	94	105	0	327	2231
% Cars	96.1	95.2	88.9	0	95.2	100	96.2	98.1	0	97.3	93.4	96.0	95.8	0	95.8	100	97.9	92.9	0	97.0	96.0
Heavy Vehicles	4	26	2	0	32	0	6	2	0	8	4	33	6	0	43	0	2	8	0	10	93
% Heavy Vehicles	3.9	4.8	11.1	0	4.8	0	3.8	1.9	0	2.7	6.6	4.0	4.2	0	4.2	0	2.1	7.1	0	3.0	4.0



N/S: Needham Street
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Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	16	161	9	0	13	29	43	0	15	149	29	0	43	18	31	0	556
04:15 PM	28	164	3	0	11	34	30	0	5	168	29	0	45	15	26	0	558
04:30 PM	33	162	7	0	11	23	31	0	16	170	28	0	45	28	22	0	576
04:45 PM	31	170	11	0	19	26	42	0	21	145	36	0	38	24	36	0	599
Total	108	657	30	0	54	112	146	0	57	632	122	0	171	85	115	0	2289
05:00 PM	37	157	6	0	11	20	46	0	20	171	41	0	34	38	26	0	607
05:15 PM	27	163	15	0	6	35	43	0	25	179	39	0	45	42	36	0	655
05:30 PM	31	170	8	0	8	37	37	0	31	174	41	0	42	47	43	0	669
05:45 PM	29	168	5	0	9	34	44	0	40	182	30	0	28	39	35	0	643
Total	124	658	34	0	34	126	170	0	116	706	151	0	149	166	140	0	2574
Grand Total	232	1315	64	0	88	238	316	0	173	1338	273	0	320	251	255	0	4863
Apprch %	14.4	81.6	4	0	13.7	37.1	49.2	0	9.7	75	15.3	0	38.7	30.4	30.9	0	
Total %	4.8	27	1.3	0	1.8	4.9	6.5	0	3.6	27.5	5.6	0	6.6	5.2	5.2	0	
Cars	229	1281	62	0	83	236	311	0	171	1321	270	0	317	248	250	0	4779
% Cars	98.7	97.4	96.9	0	94.3	99.2	98.4	0	98.8	98.7	98.9	0	99.1	98.8	98	0	98.3
Heavy Vehicles	3	34	2	0	5	2	5	0	2	17	3	0	3	3	5	0	84
% Heavy Vehicles	1.3	2.6	3.1	0	5.7	0.8	1.6	0	1.2	1.3	1.1	0	0.9	1.2	2	0	1.7

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	37	157	6	0	200	11	20	46	0	77	20	171	41	0	232	34	38	26	0	98	607
05:15 PM	27	163	15	0	205	6	35	43	0	84	25	179	39	0	243	45	42	36	0	123	655
05:30 PM	31	170	8	0	209	8	37	37	0	82	31	174	41	0	246	42	47	43	0	132	669
05:45 PM	29	168	5	0	202	9	34	44	0	87	40	182	30	0	252	28	39	35	0	102	643
Total Volume	124	658	34	0	816	34	126	170	0	330	116	706	151	0	973	149	166	140	0	455	2574
% App. Total	15.2	80.6	4.2	0		10.3	38.2	51.5	0		11.9	72.6	15.5	0		32.7	36.5	30.8	0		
PHF	.838	.968	.567	.000	.976	.773	.851	.924	.000	.948	.725	.970	.921	.000	.965	.828	.883	.814	.000	.862	.962
Cars	124	647	34	0	805	32	126	168	0	326	115	699	150	0	964	148	166	138	0	452	2547
% Cars	100	98.3	100	0	98.7	94.1	100	98.8	0	98.8	99.1	99.0	99.3	0	99.1	99.3	100	98.6	0	99.3	99.0
Heavy Vehicles	0	11	0	0	11	2	0	2	0	4	1	7	1	0	9	1	0	2	0	3	27
% Heavy Vehicles	0	1.7	0	0	1.3	5.9	0	1.2	0	1.2	0.9	1.0	0.7	0	0.9	0.7	0	1.4	0	0.7	1.0

PRECISION
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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 AA
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	16	153	9	0	11	28	43	0	14	146	28	0	43	16	28	0	535
04:15 PM	27	158	3	0	11	33	30	0	5	166	29	0	44	14	26	0	546
04:30 PM	32	157	6	0	10	23	29	0	16	169	27	0	45	28	22	0	564
04:45 PM	30	166	10	0	19	26	41	0	21	141	36	0	37	24	36	0	587
Total	105	634	28	0	51	110	143	0	56	622	120	0	169	82	112	0	2232
05:00 PM	37	154	6	0	11	20	46	0	20	168	41	0	34	38	25	0	600
05:15 PM	27	160	15	0	6	35	42	0	25	178	38	0	44	42	36	0	648
05:30 PM	31	167	8	0	7	37	37	0	30	173	41	0	42	47	42	0	662
05:45 PM	29	166	5	0	8	34	43	0	40	180	30	0	28	39	35	0	637
Total	124	647	34	0	32	126	168	0	115	699	150	0	148	166	138	0	2547
Grand Total	229	1281	62	0	83	236	311	0	171	1321	270	0	317	248	250	0	4779
Apprch %	14.6	81.5	3.9	0	13.2	37.5	49.4	0	9.7	75	15.3	0	38.9	30.4	30.7	0	
Total %	4.8	26.8	1.3	0	1.7	4.9	6.5	0	3.6	27.6	5.6	0	6.6	5.2	5.2	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	37	154	6	0	197	11	20	46	0	77	20	168	41	0	229	34	38	25	0	97	600
05:15 PM	27	160	15	0	202	6	35	42	0	83	25	178	38	0	241	44	42	36	0	122	648
05:30 PM	31	167	8	0	206	7	37	37	0	81	30	173	41	0	244	42	47	42	0	131	662
05:45 PM	29	166	5	0	200	8	34	43	0	85	40	180	30	0	250	28	39	35	0	102	637
Total Volume	124	647	34	0	805	32	126	168	0	326	115	699	150	0	964	148	166	138	0	452	2547
% App. Total	15.4	80.4	4.2	0		9.8	38.7	51.5	0		11.9	72.5	15.6	0		32.7	36.7	30.5	0		
PHF	.838	.969	.567	.000	.977	.727	.851	.913	.000	.959	.719	.971	.915	.000	.964	.841	.883	.821	.000	.863	.962

N/S: Needham Street
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File Name : 144047 AA
Site Code : 19531095
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Groups Printed- Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	8	0	0	2	1	0	0	1	3	1	0	0	2	3	0	21
04:15 PM	1	6	0	0	0	1	0	0	0	2	0	0	1	1	0	0	12
04:30 PM	1	5	1	0	1	0	2	0	0	1	1	0	0	0	0	0	12
04:45 PM	1	4	1	0	0	0	1	0	0	4	0	0	1	0	0	0	12
Total	3	23	2	0	3	2	3	0	1	10	2	0	2	3	3	0	57
05:00 PM	0	3	0	0	0	0	0	0	0	3	0	0	0	0	1	0	7
05:15 PM	0	3	0	0	0	0	1	0	0	1	1	0	1	0	0	0	7
05:30 PM	0	3	0	0	1	0	0	0	1	1	0	0	0	0	1	0	7
05:45 PM	0	2	0	0	1	0	1	0	0	2	0	0	0	0	0	0	6
Total	0	11	0	0	2	0	2	0	1	7	1	0	1	0	2	0	27
Grand Total	3	34	2	0	5	2	5	0	2	17	3	0	3	3	5	0	84
Apprch %	7.7	87.2	5.1	0	41.7	16.7	41.7	0	9.1	77.3	13.6	0	27.3	27.3	45.5	0	
Total %	3.6	40.5	2.4	0	6	2.4	6	0	2.4	20.2	3.6	0	3.6	3.6	6	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. 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	8	0	0	8	2	1	0	0	3	1	3	1	0	5	0	2	3	0	5	21
04:15 PM	1	6	0	0	7	0	1	0	0	1	0	2	0	0	2	1	1	0	0	2	12
04:30 PM	1	5	1	0	7	1	0	2	0	3	0	1	1	0	2	0	0	0	0	0	12
04:45 PM	1	4	1	0	6	0	0	1	0	1	0	4	0	0	4	1	0	0	0	1	12
Total Volume	3	23	2	0	28	3	2	3	0	8	1	10	2	0	13	2	3	3	0	8	57
% App. Total	10.7	82.1	7.1	0		37.5	25	37.5	0		7.7	76.9	15.4	0		25	37.5	37.5	0		
PHF	.750	.719	.500	.000	.875	.375	.500	.375	.000	.667	.250	.625	.500	.000	.650	.500	.375	.250	.000	.400	.679

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Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	2	1	6
04:15 PM	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	6
04:30 PM	0	0	0	0	0	0	1	0	1	3	1	0	0	0	0	0	1	0	1	0	8
04:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	2	5
Total	0	2	0	1	1	1	1	0	2	5	2	0	0	0	0	0	1	0	6	3	25
05:00 PM	0	0	0	1	2	0	0	0	4	1	0	0	0	0	0	0	0	0	0	1	9
05:15 PM	0	1	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	2	1	8
05:30 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	1	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	1	1	1	8
Total	1	3	0	2	4	0	0	0	5	4	0	0	0	1	0	0	0	1	3	3	27
Grand Total	1	5	0	3	5	1	1	0	7	9	2	0	0	1	0	0	1	1	9	6	52
Apprch %	7.1	35.7	0	21.4	35.7	5.6	5.6	0	38.9	50	66.7	0	0	33.3	0	0	5.9	5.9	52.9	35.3	
Total %	1.9	9.6	0	5.8	9.6	1.9	1.9	0	13.5	17.3	3.8	0	0	1.9	0	0	1.9	1.9	17.3	11.5	

	Needham Street From North						Christina Street From East						Needham Street From South						Oak Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	0	0	0	0	0	0	1	0	1	3	5	1	0	0	0	0	1	0	1	0	1	0	2	8
04:45 PM	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	1	2	3	5
05:00 PM	0	0	0	1	2	3	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	1	1	9
05:15 PM	0	1	0	0	1	2	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	2	1	3	8
Total Volume	0	1	0	1	3	5	0	1	0	5	9	15	1	0	0	0	0	1	0	1	0	4	4	9	30
% App. Total	0	20	0	20	60		0	6.7	0	33.3	60		100	0	0	0	0		0	11.1	0	44.4	44.4		
PHF	.000	.250	.000	.250	.375	.417	.000	.250	.000	.313	.750	.750	.250	.000	.000	.000	.000	.250	.000	.250	.000	.500	.500	.750	.833

N/S: Needham Street
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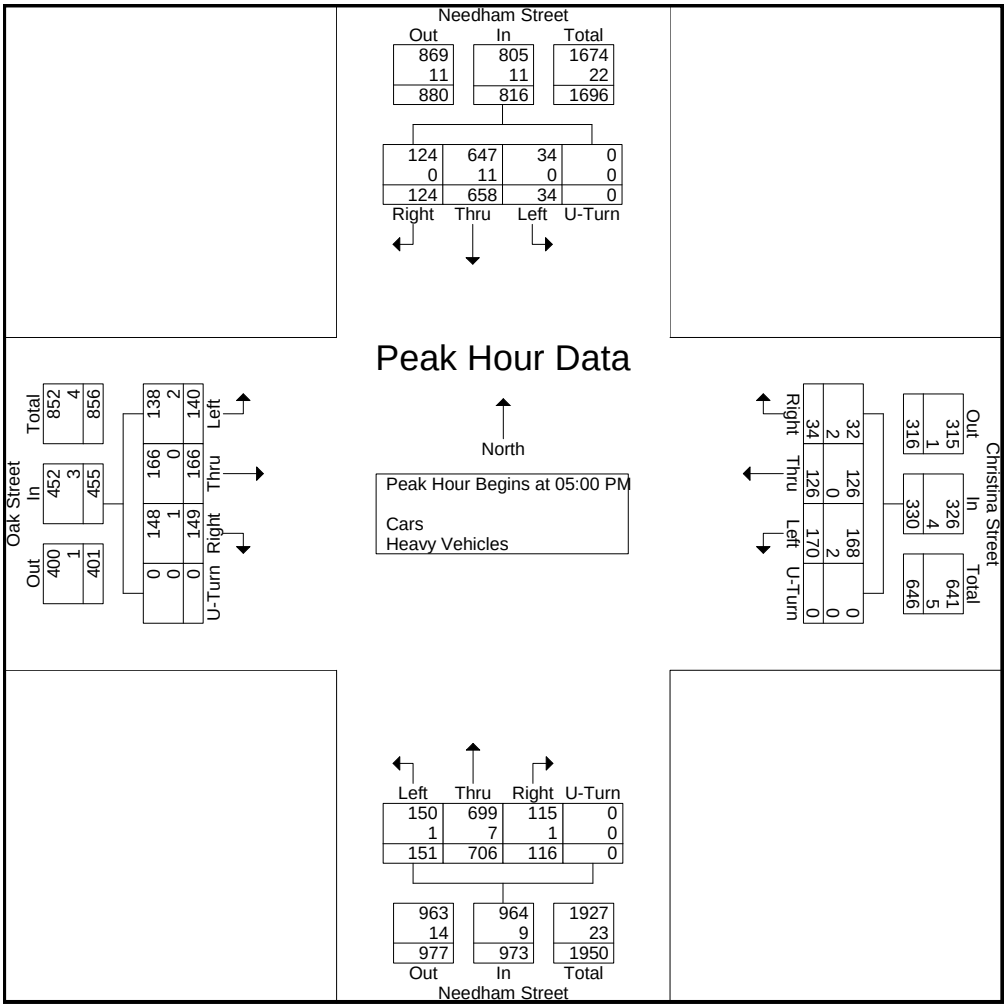
	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	37	157	6	0	200	11	20	46	0	77	20	171	41	0	232	34	38	26	0	98	607
05:15 PM	27	163	15	0	205	6	35	43	0	84	25	179	39	0	243	45	42	36	0	123	655
05:30 PM	31	170	8	0	209	8	37	37	0	82	31	174	41	0	246	42	47	43	0	132	669
05:45 PM	29	168	5	0	202	9	34	44	0	87	40	182	30	0	252	28	39	35	0	102	643
Total Volume	124	658	34	0	816	34	126	170	0	330	116	706	151	0	973	149	166	140	0	455	2574
% App. Total	15.2	80.6	4.2	0		10.3	38.2	51.5	0		11.9	72.6	15.5	0		32.7	36.5	30.8	0		
PHF	.838	.968	.567	.000	.976	.773	.851	.924	.000	.948	.725	.970	.921	.000	.965	.828	.883	.814	.000	.862	.962
Cars	124	647	34	0	805	32	126	168	0	326	115	699	150	0	964	148	166	138	0	452	2547
% Cars	100	98.3	100	0	98.7	94.1	100	98.8	0	98.8	99.1	99.0	99.3	0	99.1	99.3	100	98.6	0	99.3	99.0
Heavy Vehicles	0	11	0	0	11	2	0	2	0	4	1	7	1	0	9	1	0	2	0	3	27
% Heavy Vehicles	0	1.7	0	0	1.3	5.9	0	1.2	0	1.2	0.9	1.0	0.7	0	0.9	0.7	0	1.4	0	0.7	1.0



N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 B
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Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	1	111	0	0	2	0	1	0	0	166	5	0	4	0	8	0	298
07:15 AM	3	102	0	0	1	1	3	0	0	193	0	0	4	0	8	0	315
07:30 AM	2	159	2	0	3	0	2	0	0	195	2	0	5	0	6	0	376
07:45 AM	2	168	0	0	1	1	4	0	2	168	2	0	5	0	4	0	357
Total	8	540	2	0	7	2	10	0	2	722	9	0	18	0	26	0	1346
08:00 AM	1	191	0	0	0	0	4	0	1	175	3	0	4	0	7	0	386
08:15 AM	3	185	0	0	2	0	3	0	0	179	4	0	1	0	8	0	385
08:30 AM	1	217	0	0	0	0	7	0	1	165	6	0	7	0	6	0	410
08:45 AM	2	203	0	0	3	0	3	0	0	153	4	0	5	0	6	0	379
Total	7	796	0	0	5	0	17	0	2	672	17	0	17	0	27	0	1560
Grand Total	15	1336	2	0	12	2	27	0	4	1394	26	0	35	0	53	0	2906
Apprch %	1.1	98.7	0.1	0	29.3	4.9	65.9	0	0.3	97.9	1.8	0	39.8	0	60.2	0	
Total %	0.5	46	0.1	0	0.4	0.1	0.9	0	0.1	48	0.9	0	1.2	0	1.8	0	
Cars	11	1300	2	0	12	2	27	0	4	1324	22	0	34	0	46	0	2784
% Cars	73.3	97.3	100	0	100	100	100	0	100	95	84.6	0	97.1	0	86.8	0	95.8
Heavy Vehicles	4	36	0	0	0	0	0	0	0	70	4	0	1	0	7	0	122
% Heavy Vehicles	26.7	2.7	0	0	0	0	0	0	0	5	15.4	0	2.9	0	13.2	0	4.2

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. 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	191	0	0	192	0	0	4	0	4	1	175	3	0	179	4	0	7	0	11	386
08:15 AM	3	185	0	0	188	2	0	3	0	5	0	179	4	0	183	1	0	8	0	9	385
08:30 AM	1	217	0	0	218	0	0	7	0	7	1	165	6	0	172	7	0	6	0	13	410
08:45 AM	2	203	0	0	205	3	0	3	0	6	0	153	4	0	157	5	0	6	0	11	379
Total Volume	7	796	0	0	803	5	0	17	0	22	2	672	17	0	691	17	0	27	0	44	1560
% App. Total	0.9	99.1	0	0		22.7	0	77.3	0		0.3	97.3	2.5	0		38.6	0	61.4	0		
PHF	.583	.917	.000	.000	.921	.417	.000	.607	.000	.786	.500	.939	.708	.000	.944	.607	.000	.844	.000	.846	.951
Cars	5	778	0	0	783	5	0	17	0	22	2	639	15	0	656	17	0	23	0	40	1501
% Cars	71.4	97.7	0	0	97.5	100	0	100	0	100	100	95.1	88.2	0	94.9	100	0	85.2	0	90.9	96.2
Heavy Vehicles	2	18	0	0	20	0	0	0	0	0	0	33	2	0	35	0	0	4	0	4	59
% Heavy Vehicles	28.6	2.3	0	0	2.5	0	0	0	0	0	0	4.9	11.8	0	5.1	0	0	14.8	0	9.1	3.8

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Groups Printed- Cars

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	109	0	0	2	0	1	0	0	161	4	0	4	0	7	0	288
07:15 AM	2	99	0	0	1	1	3	0	0	181	0	0	4	0	6	0	297
07:30 AM	2	156	2	0	3	0	2	0	0	186	1	0	5	0	6	0	363
07:45 AM	2	158	0	0	1	1	4	0	2	157	2	0	4	0	4	0	335
Total	6	522	2	0	7	2	10	0	2	685	7	0	17	0	23	0	1283
08:00 AM	0	185	0	0	0	0	4	0	1	169	2	0	4	0	5	0	370
08:15 AM	3	182	0	0	2	0	3	0	0	170	3	0	1	0	7	0	371
08:30 AM	0	211	0	0	0	0	7	0	1	156	6	0	7	0	6	0	394
08:45 AM	2	200	0	0	3	0	3	0	0	144	4	0	5	0	5	0	366
Total	5	778	0	0	5	0	17	0	2	639	15	0	17	0	23	0	1501
Grand Total	11	1300	2	0	12	2	27	0	4	1324	22	0	34	0	46	0	2784
Apprch %	0.8	99	0.2	0	29.3	4.9	65.9	0	0.3	98.1	1.6	0	42.5	0	57.5	0	
Total %	0.4	46.7	0.1	0	0.4	0.1	1	0	0.1	47.6	0.8	0	1.2	0	1.7	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. 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	0	185	0	0	185	0	0	4	0	4	1	169	2	0	172	4	0	5	0	9	370
08:15 AM	3	182	0	0	185	2	0	3	0	5	0	170	3	0	173	1	0	7	0	8	371
08:30 AM	0	211	0	0	211	0	0	7	0	7	1	156	6	0	163	7	0	6	0	13	394
08:45 AM	2	200	0	0	202	3	0	3	0	6	0	144	4	0	148	5	0	5	0	10	366
Total Volume	5	778	0	0	783	5	0	17	0	22	2	639	15	0	656	17	0	23	0	40	1501
% App. Total	0.6	99.4	0	0		22.7	0	77.3	0		0.3	97.4	2.3	0		42.5	0	57.5	0		
PHF	.417	.922	.000	.000	.928	.417	.000	.607	.000	.786	.500	.940	.625	.000	.948	.607	.000	.821	.000	.769	.952

N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 B
Site Code : 19531095
Start Date : 9/11/2014
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Groups Printed- Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	1	2	0	0	0	0	0	0	0	5	1	0	0	0	1	0	10
07:15 AM	1	3	0	0	0	0	0	0	0	12	0	0	0	0	2	0	18
07:30 AM	0	3	0	0	0	0	0	0	0	9	1	0	0	0	0	0	13
07:45 AM	0	10	0	0	0	0	0	0	0	11	0	0	1	0	0	0	22
Total	2	18	0	0	0	0	0	0	0	37	2	0	1	0	3	0	63
08:00 AM	1	6	0	0	0	0	0	0	0	6	1	0	0	0	2	0	16
08:15 AM	0	3	0	0	0	0	0	0	0	9	1	0	0	0	1	0	14
08:30 AM	1	6	0	0	0	0	0	0	0	9	0	0	0	0	0	0	16
08:45 AM	0	3	0	0	0	0	0	0	0	9	0	0	0	0	1	0	13
Total	2	18	0	0	0	0	0	0	0	33	2	0	0	0	4	0	59
Grand Total	4	36	0	0	0	0	0	0	0	70	4	0	1	0	7	0	122
Apprch %	10	90	0	0	0	0	0	0	0	94.6	5.4	0	12.5	0	87.5	0	
Total %	3.3	29.5	0	0	0	0	0	0	0	57.4	3.3	0	0.8	0	5.7	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. 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	1	3	0	0	4	0	0	0	0	0	0	12	0	0	12	0	0	2	0	2	18
07:30 AM	0	3	0	0	3	0	0	0	0	0	0	9	1	0	10	0	0	0	0	0	13
07:45 AM	0	10	0	0	10	0	0	0	0	0	0	11	0	0	11	1	0	0	0	1	22
08:00 AM	1	6	0	0	7	0	0	0	0	0	0	6	1	0	7	0	0	2	0	2	16
Total Volume	2	22	0	0	24	0	0	0	0	0	0	38	2	0	40	1	0	4	0	5	69
% App. Total	8.3	91.7	0	0		0	0	0	0		0	95	5	0		20	0	80	0		
PHF	.500	.550	.000	.000	.600	.000	.000	.000	.000	.000	.000	.792	.500	.000	.833	.250	.000	.500	.000	.625	.784

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Groups Printed- Peds and Bikes

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	3	3	0	0	0	2	3	0	0	0	1	0	0	0	0	0	3	16
07:15 AM	0	0	0	3	1	0	0	0	2	1	0	2	0	0	0	0	0	0	1	2	12
07:30 AM	0	1	0	1	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	2	10
07:45 AM	0	3	0	1	3	0	0	0	4	0	0	0	0	0	0	0	0	0	2	11	24
Total	0	5	0	8	7	0	0	0	13	4	0	2	0	1	0	0	0	0	4	18	62
08:00 AM	0	2	0	8	2	0	0	0	5	0	0	0	0	0	0	0	0	0	1	7	25
08:15 AM	0	1	0	5	0	0	0	0	2	0	0	1	0	0	0	0	0	0	4	4	17
08:30 AM	0	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9
08:45 AM	0	3	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	7
Total	0	7	0	14	6	0	0	0	8	0	0	1	0	0	0	0	0	0	5	17	58
Grand Total	0	12	0	22	13	0	0	0	21	4	0	3	0	1	0	0	0	0	9	35	120
Apprch %	0	25.5	0	46.8	27.7	0	0	0	84	16	0	75	0	25	0	0	0	0	20.5	79.5	
Total %	0	10	0	18.3	10.8	0	0	0	17.5	3.3	0	2.5	0	0.8	0	0	0	0	7.5	29.2	

	Needham Street From North						Columbia Avenue From East						Needham Street From South						Avalon Bay From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	0	1	0	1	0	2	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	1	2	3	10
07:45 AM	0	3	0	1	3	7	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	2	11	13	24
08:00 AM	0	2	0	8	2	12	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	1	7	8	25
08:15 AM	0	1	0	5	0	6	0	0	0	2	0	2	0	1	0	0	0	1	0	0	0	4	4	8	17
Total Volume	0	7	0	15	5	27	0	0	0	16	0	16	0	1	0	0	0	1	0	0	0	8	24	32	76
% App. Total	0	25.9	0	55.6	18.5		0	0	0	100	0		0	100	0	0	0		0	0	0	25	75		
PHF	.000	.583	.000	.469	.417	.563	.000	.000	.000	.800	.000	.800	.000	.250	.000	.000	.000	.250	.000	.000	.000	.500	.545	.615	.760

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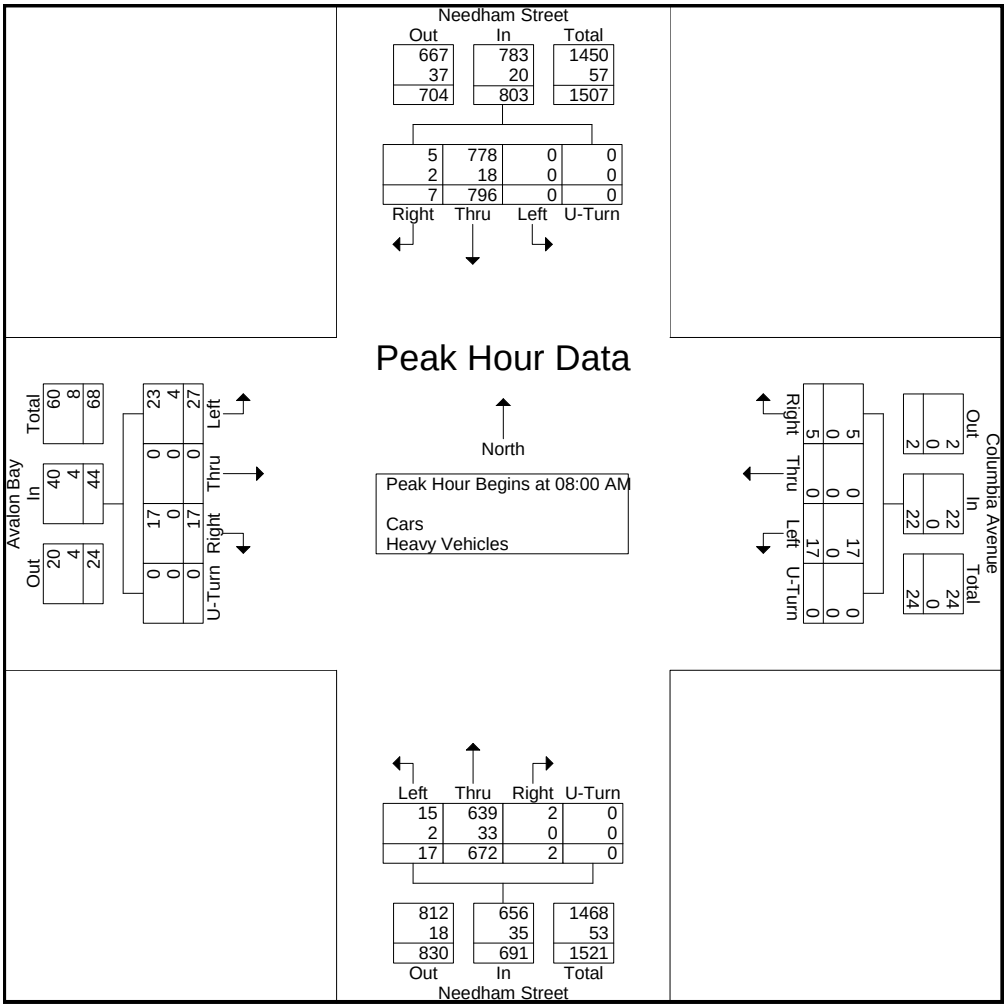
	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	191	0	0	192	0	0	4	0	4	1	175	3	0	179	4	0	7	0	11	386
08:15 AM	3	185	0	0	188	2	0	3	0	5	0	179	4	0	183	1	0	8	0	9	385
08:30 AM	1	217	0	0	218	0	0	7	0	7	1	165	6	0	172	7	0	6	0	13	410
08:45 AM	2	203	0	0	205	3	0	3	0	6	0	153	4	0	157	5	0	6	0	11	379
Total Volume	7	796	0	0	803	5	0	17	0	22	2	672	17	0	691	17	0	27	0	44	1560
% App. Total	0.9	99.1	0	0		22.7	0	77.3	0		0.3	97.3	2.5	0		38.6	0	61.4	0		
PHF	.583	.917	.000	.000	.921	.417	.000	.607	.000	.786	.500	.939	.708	.000	.944	.607	.000	.844	.000	.846	.951
Cars	5	778	0	0	783	5	0	17	0	22	2	639	15	0	656	17	0	23	0	40	1501
% Cars	71.4	97.7	0	0	97.5	100	0	100	0	100	100	95.1	88.2	0	94.9	100	0	85.2	0	90.9	96.2
Heavy Vehicles	2	18	0	0	20	0	0	0	0	0	0	33	2	0	35	0	0	4	0	4	59
% Heavy Vehicles	28.6	2.3	0	0	2.5	0	0	0	0	0	0	4.9	11.8	0	5.1	0	0	14.8	0	9.1	3.8



N/S: Needham Street
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Client: Stantec/ S. Wood

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File Name : 144047 BB
Site Code : 19531095
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Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	6	174	2	0	1	1	4	0	0	145	5	0	5	0	4	0	347
04:15 PM	2	148	1	0	0	0	2	0	4	200	6	0	3	0	5	0	371
04:30 PM	2	150	3	0	7	2	2	0	2	188	4	0	4	0	3	0	367
04:45 PM	2	163	0	0	2	1	6	0	0	201	4	0	3	0	4	0	386
Total	12	635	6	0	10	4	14	0	6	734	19	0	15	0	16	0	1471
05:00 PM	2	152	1	0	0	1	2	0	0	211	2	0	4	0	14	0	389
05:15 PM	4	132	1	0	2	0	2	0	3	218	7	0	2	0	5	0	376
05:30 PM	3	137	0	0	1	0	2	0	3	220	8	0	6	0	6	0	386
05:45 PM	3	150	2	0	2	0	2	0	2	201	7	0	3	0	13	0	385
Total	12	571	4	0	5	1	8	0	8	850	24	0	15	0	38	0	1536
Grand Total	24	1206	10	0	15	5	22	0	14	1584	43	0	30	0	54	0	3007
Apprch %	1.9	97.3	0.8	0	35.7	11.9	52.4	0	0.9	96.5	2.6	0	35.7	0	64.3	0	
Total %	0.8	40.1	0.3	0	0.5	0.2	0.7	0	0.5	52.7	1.4	0	1	0	1.8	0	
Cars	24	1177	10	0	14	5	22	0	14	1563	42	0	30	0	54	0	2955
% Cars	100	97.6	100	0	93.3	100	100	0	100	98.7	97.7	0	100	0	100	0	98.3
Heavy Vehicles	0	29	0	0	1	0	0	0	0	21	1	0	0	0	0	0	52
% Heavy Vehicles	0	2.4	0	0	6.7	0	0	0	0	1.3	2.3	0	0	0	0	0	1.7

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. 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	2	163	0	0	165	2	1	6	0	9	0	201	4	0	205	3	0	4	0	7	386
05:00 PM	2	152	1	0	155	0	1	2	0	3	0	211	2	0	213	4	0	14	0	18	389
05:15 PM	4	132	1	0	137	2	0	2	0	4	3	218	7	0	228	2	0	5	0	7	376
05:30 PM	3	137	0	0	140	1	0	2	0	3	3	220	8	0	231	6	0	6	0	12	386
Total Volume	11	584	2	0	597	5	2	12	0	19	6	850	21	0	877	15	0	29	0	44	1537
% App. Total	1.8	97.8	0.3	0		26.3	10.5	63.2	0		0.7	96.9	2.4	0		34.1	0	65.9	0		
PHF	.688	.896	.500	.000	.905	.625	.500	.500	.000	.528	.500	.966	.656	.000	.949	.625	.000	.518	.000	.611	.988
Cars	11	568	2	0	581	4	2	12	0	18	6	839	21	0	866	15	0	29	0	44	1509
% Cars	100	97.3	100	0	97.3	80.0	100	100	0	94.7	100	98.7	100	0	98.7	100	0	100	0	100	98.2
Heavy Vehicles	0	16	0	0	16	1	0	0	0	1	0	11	0	0	11	0	0	0	0	0	28
% Heavy Vehicles	0	2.7	0	0	2.7	20.0	0	0	0	5.3	0	1.3	0	0	1.3	0	0	0	0	0	1.8

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Client: Stantec/ S. Wood

File Name : 144047 BB
Site Code : 19531095
Start Date : 9/11/2014

Groups Printed- Cars

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	6	171	2	0	1	1	4	0	0	140	5	0	5	0	4	0	339
04:15 PM	2	144	1	0	0	0	2	0	4	197	6	0	3	0	5	0	364
04:30 PM	2	145	3	0	7	2	2	0	2	187	3	0	4	0	3	0	360
04:45 PM	2	159	0	0	2	1	6	0	0	199	4	0	3	0	4	0	380
Total	12	619	6	0	10	4	14	0	6	723	18	0	15	0	16	0	1443
05:00 PM	2	146	1	0	0	1	2	0	0	206	2	0	4	0	14	0	378
05:15 PM	4	128	1	0	2	0	2	0	3	218	7	0	2	0	5	0	372
05:30 PM	3	135	0	0	0	0	2	0	3	216	8	0	6	0	6	0	379
05:45 PM	3	149	2	0	2	0	2	0	2	200	7	0	3	0	13	0	383
Total	12	558	4	0	4	1	8	0	8	840	24	0	15	0	38	0	1512
Grand Total	24	1177	10	0	14	5	22	0	14	1563	42	0	30	0	54	0	2955
Apprch %	2	97.2	0.8	0	34.1	12.2	53.7	0	0.9	96.5	2.6	0	35.7	0	64.3	0	
Total %	0.8	39.8	0.3	0	0.5	0.2	0.7	0	0.5	52.9	1.4	0	1	0	1.8	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. 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	2	146	1	0	149	0	1	2	0	3	0	206	2	0	208	4	0	14	0	18	378
05:15 PM	4	128	1	0	133	2	0	2	0	4	3	218	7	0	228	2	0	5	0	7	372
05:30 PM	3	135	0	0	138	0	0	2	0	2	3	216	8	0	227	6	0	6	0	12	379
05:45 PM	3	149	2	0	154	2	0	2	0	4	2	200	7	0	209	3	0	13	0	16	383
Total Volume	12	558	4	0	574	4	1	8	0	13	8	840	24	0	872	15	0	38	0	53	1512
% App. Total	2.1	97.2	0.7	0		30.8	7.7	61.5	0		0.9	96.3	2.8	0		28.3	0	71.7	0		
PHF	.750	.936	.500	.000	.932	.500	.250	1.00	.000	.813	.667	.963	.750	.000	.956	.625	.000	.679	.000	.736	.987

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File Name : 144047 BB
Site Code : 19531095
Start Date : 9/11/2014

Groups Printed- Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	3	0	0	0	0	0	0	0	5	0	0	0	0	0	0	8
04:15 PM	0	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	7
04:30 PM	0	5	0	0	0	0	0	0	0	1	1	0	0	0	0	0	7
04:45 PM	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	6
Total	0	16	0	0	0	0	0	0	0	11	1	0	0	0	0	0	28
05:00 PM	0	6	0	0	0	0	0	0	0	5	0	0	0	0	0	0	11
05:15 PM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:30 PM	0	2	0	0	1	0	0	0	0	4	0	0	0	0	0	0	7
05:45 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Total	0	13	0	0	1	0	0	0	0	10	0	0	0	0	0	0	24
Grand Total	0	29	0	0	1	0	0	0	0	21	1	0	0	0	0	0	52
Apprch %	0	100	0	0	100	0	0	0	0	95.5	4.5	0	0	0	0	0	
Total %	0	55.8	0	0	1.9	0	0	0	0	40.4	1.9	0	0	0	0	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	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	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	7
04:30 PM	0	5	0	0	5	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	7
04:45 PM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
05:00 PM	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	11
Total Volume	0	19	0	0	19	0	0	0	0	0	0	11	1	0	12	0	0	0	0	0	31
% App. Total	0	100	0	0		0	0	0	0		0	91.7	8.3	0		0	0	0	0		
PHF	.000	.792	.000	.000	.792	.000	.000	.000	.000	.000	.000	.550	.250	.000	.600	.000	.000	.000	.000	.000	.705

PRECISION
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N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 BB
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0	0	0	0	4	5	14
04:15 PM	0	1	0	0	2	0	0	0	0	6	0	0	0	1	1	0	0	0	2	2	15
04:30 PM	0	0	0	1	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2	1	8
04:45 PM	0	1	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	3	1	9
Total	0	2	0	1	3	0	0	0	4	14	0	0	0	1	1	0	0	0	11	9	46
05:00 PM	0	0	0	2	2	0	0	0	3	3	0	0	0	0	1	0	0	0	4	0	15
05:15 PM	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	7
05:30 PM	0	0	0	0	3	0	0	0	1	4	0	1	0	0	0	0	0	0	4	1	14
05:45 PM	0	2	0	1	0	0	0	0	2	3	0	3	0	0	0	0	0	0	1	1	13
Total	0	4	0	3	5	0	0	0	6	11	0	4	0	0	1	0	0	0	13	2	49
Grand Total	0	6	0	4	8	0	0	0	10	25	0	4	0	1	2	0	0	0	24	11	95
Apprch %	0	33.3	0	22.2	44.4	0	0	0	28.6	71.4	0	57.1	0	14.3	28.6	0	0	0	68.6	31.4	
Total %	0	6.3	0	4.2	8.4	0	0	0	10.5	26.3	0	4.2	0	1.1	2.1	0	0	0	25.3	11.6	

	Needham Street From North						Columbia Avenue From East						Needham Street From South						Avalon Bay From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. 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	2	2	4	0	0	0	3	3	6	0	0	0	0	1	1	0	0	0	4	0	4	15
05:15 PM	0	2	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	4	0	4	7
05:30 PM	0	0	0	0	3	3	0	0	0	1	4	5	0	1	0	0	0	1	0	0	0	4	1	5	14
05:45 PM	0	2	0	1	0	3	0	0	0	2	3	5	0	3	0	0	0	3	0	0	0	1	1	2	13
Total Volume	0	4	0	3	5	12	0	0	0	6	11	17	0	4	0	0	1	5	0	0	0	13	2	15	49
% App. Total	0	33.3	0	25	41.7		0	0	0	35.3	64.7		0	80	0	0	20		0	0	0	86.7	13.3		
PHF	.000	.500	.000	.375	.417	.750	.000	.000	.000	.500	.688	.708	.000	.333	.000	.000	.250	.417	.000	.000	.000	.813	.500	.750	.817

N/S: Needham Street
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Client: Stantec/ S. Wood

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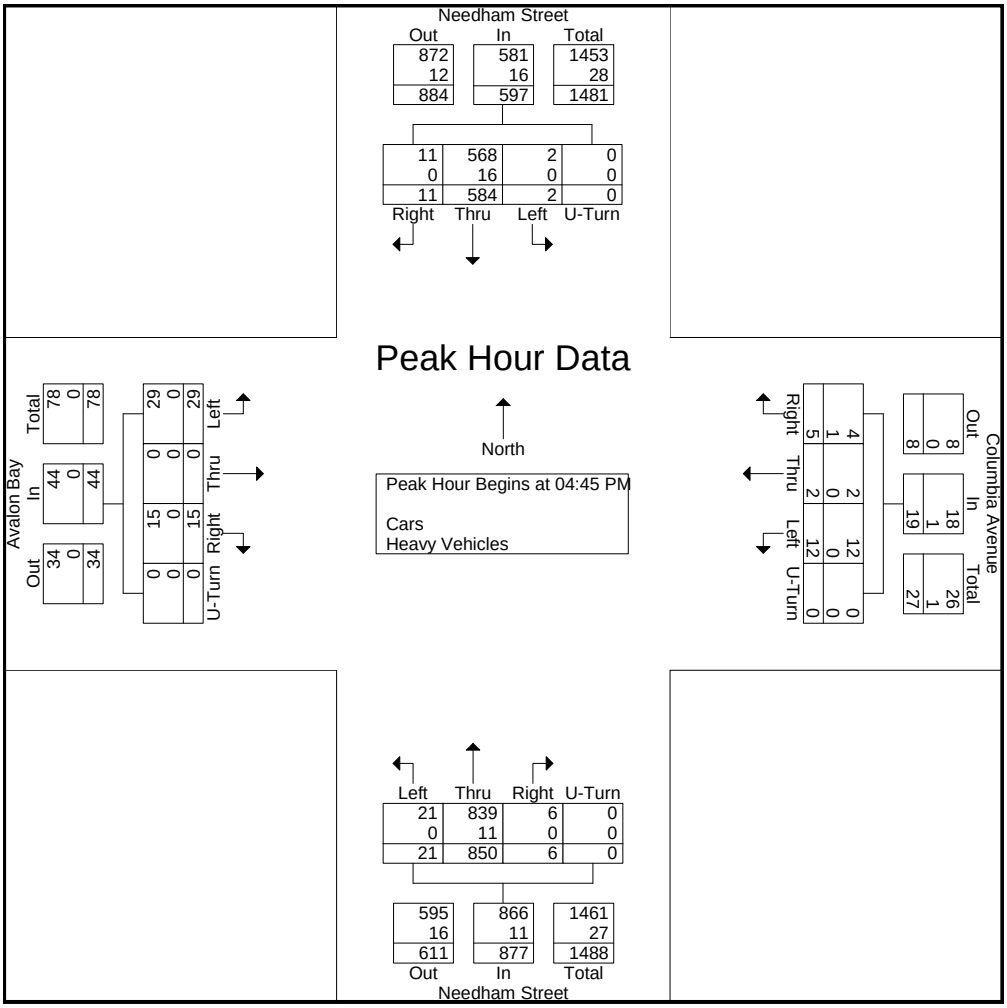
	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	2	163	0	0	165	2	1	6	0	9	0	201	4	0	205	3	0	4	0	7	386
05:00 PM	2	152	1	0	155	0	1	2	0	3	0	211	2	0	213	4	0	14	0	18	389
05:15 PM	4	132	1	0	137	2	0	2	0	4	3	218	7	0	228	2	0	5	0	7	376
05:30 PM	3	137	0	0	140	1	0	2	0	3	3	220	8	0	231	6	0	6	0	12	386
Total Volume	11	584	2	0	597	5	2	12	0	19	6	850	21	0	877	15	0	29	0	44	1537
% App. Total	1.8	97.8	0.3	0		26.3	10.5	63.2	0		0.7	96.9	2.4	0		34.1	0	65.9	0		
PHF	.688	.896	.500	.000	.905	.625	.500	.500	.000	.528	.500	.966	.656	.000	.949	.625	.000	.518	.000	.611	.988
Cars	11	568	2	0	581	4	2	12	0	18	6	839	21	0	866	15	0	29	0	44	1509
% Cars	100	97.3	100	0	97.3	80.0	100	100	0	94.7	100	98.7	100	0	98.7	100	0	100	0	100	98.2
Heavy Vehicles	0	16	0	0	16	1	0	0	0	1	0	11	0	0	11	0	0	0	0	0	28
% Heavy Vehicles	0	2.7	0	0	2.7	20.0	0	0	0	5.3	0	1.3	0	0	1.3	0	0	0	0	0	1.8



N/S: Winchester Street
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City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 C
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	94	33	11	0	14	23	0	0	0	41	3	0	8	15	158	0	400
07:15 AM	92	41	15	0	35	12	1	0	3	58	2	0	6	27	176	0	468
07:30 AM	116	39	13	0	43	27	3	0	1	66	7	0	9	19	138	0	481
07:45 AM	93	82	10	0	44	26	1	0	1	93	4	0	8	16	142	0	520
Total	395	195	49	0	136	88	5	0	5	258	16	0	31	77	614	0	1869
08:00 AM	147	76	11	0	38	39	4	0	3	80	9	0	4	24	157	0	592
08:15 AM	157	67	11	0	30	30	6	0	3	76	10	0	10	40	169	0	609
08:30 AM	172	59	13	0	24	52	5	0	0	64	9	0	13	13	138	0	562
08:45 AM	182	65	7	0	29	39	2	0	0	66	5	0	12	22	142	0	571
Total	658	267	42	0	121	160	17	0	6	286	33	0	39	99	606	0	2334
Grand Total	1053	462	91	0	257	248	22	0	11	544	49	0	70	176	1220	0	4203
Apprch %	65.6	28.8	5.7	0	48.8	47.1	4.2	0	1.8	90.1	8.1	0	4.8	12	83.2	0	
Total %	25.1	11	2.2	0	6.1	5.9	0.5	0	0.3	12.9	1.2	0	1.7	4.2	29	0	
Cars	1025	452	87	0	249	242	22	0	11	542	49	0	67	163	1151	0	4060
% Cars	97.3	97.8	95.6	0	96.9	97.6	100	0	100	99.6	100	0	95.7	92.6	94.3	0	96.6
Heavy Vehicles	28	10	4	0	8	6	0	0	0	2	0	0	3	13	69	0	143
% Heavy Vehicles	2.7	2.2	4.4	0	3.1	2.4	0	0	0	0.4	0	0	4.3	7.4	5.7	0	3.4

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	147	76	11	0	234	38	39	4	0	81	3	80	9	0	92	4	24	157	0	185	592
08:15 AM	157	67	11	0	235	30	30	6	0	66	3	76	10	0	89	10	40	169	0	219	609
08:30 AM	172	59	13	0	244	24	52	5	0	81	0	64	9	0	73	13	13	138	0	164	562
08:45 AM	182	65	7	0	254	29	39	2	0	70	0	66	5	0	71	12	22	142	0	176	571
Total Volume	658	267	42	0	967	121	160	17	0	298	6	286	33	0	325	39	99	606	0	744	2334
% App. Total	68	27.6	4.3	0		40.6	53.7	5.7	0		1.8	88	10.2	0		5.2	13.3	81.5	0		
PHF	.904	.878	.808	.000	.952	.796	.769	.708	.000	.920	.500	.894	.825	.000	.883	.750	.619	.896	.000	.849	.958
Cars	641	261	40	0	942	116	157	17	0	290	6	284	33	0	323	36	93	576	0	705	2260
% Cars	97.4	97.8	95.2	0	97.4	95.9	98.1	100	0	97.3	100	99.3	100	0	99.4	92.3	93.9	95.0	0	94.8	96.8
Heavy Vehicles	17	6	2	0	25	5	3	0	0	8	0	2	0	0	2	3	6	30	0	39	74
% Heavy Vehicles	2.6	2.2	4.8	0	2.6	4.1	1.9	0	0	2.7	0	0.7	0	0	0.6	7.7	6.1	5.0	0	5.2	3.2

N/S: Winchester Street
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Client: Stantec/ S. Wood

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File Name : 144047 C
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	91	32	10	0	14	23	0	0	0	41	3	0	8	14	154	0	390
07:15 AM	88	41	15	0	35	12	1	0	3	58	2	0	6	24	163	0	448
07:30 AM	114	37	12	0	43	26	3	0	1	66	7	0	9	16	130	0	464
07:45 AM	91	81	10	0	41	24	1	0	1	93	4	0	8	16	128	0	498
Total	384	191	47	0	133	85	5	0	5	258	16	0	31	70	575	0	1800
08:00 AM	144	74	11	0	36	38	4	0	3	79	9	0	3	22	153	0	576
08:15 AM	154	66	11	0	28	29	6	0	3	75	10	0	9	39	157	0	587
08:30 AM	166	57	12	0	24	51	5	0	0	64	9	0	13	11	131	0	543
08:45 AM	177	64	6	0	28	39	2	0	0	66	5	0	11	21	135	0	554
Total	641	261	40	0	116	157	17	0	6	284	33	0	36	93	576	0	2260
Grand Total	1025	452	87	0	249	242	22	0	11	542	49	0	67	163	1151	0	4060
Apprch %	65.5	28.9	5.6	0	48.5	47.2	4.3	0	1.8	90	8.1	0	4.9	11.8	83.3	0	
Total %	25.2	11.1	2.1	0	6.1	6	0.5	0	0.3	13.3	1.2	0	1.7	4	28.3	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	144	74	11	0	229	36	38	4	0	78	3	79	9	0	91	3	22	153	0	178	576
08:15 AM	154	66	11	0	231	28	29	6	0	63	3	75	10	0	88	9	39	157	0	205	587
08:30 AM	166	57	12	0	235	24	51	5	0	80	0	64	9	0	73	13	11	131	0	155	543
08:45 AM	177	64	6	0	247	28	39	2	0	69	0	66	5	0	71	11	21	135	0	167	554
Total Volume	641	261	40	0	942	116	157	17	0	290	6	284	33	0	323	36	93	576	0	705	2260
% App. Total	68	27.7	4.2	0		40	54.1	5.9	0		1.9	87.9	10.2	0		5.1	13.2	81.7	0		
PHF	.905	.882	.833	.000	.953	.806	.770	.708	.000	.906	.500	.899	.825	.000	.887	.692	.596	.917	.000	.860	.963

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Groups Printed- Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	3	1	1	0	0	0	0	0	0	0	0	0	0	1	4	0	10
07:15 AM	4	0	0	0	0	0	0	0	0	0	0	0	0	3	13	0	20
07:30 AM	2	2	1	0	0	1	0	0	0	0	0	0	0	3	8	0	17
07:45 AM	2	1	0	0	3	2	0	0	0	0	0	0	0	0	14	0	22
Total	11	4	2	0	3	3	0	0	0	0	0	0	0	7	39	0	69
08:00 AM	3	2	0	0	2	1	0	0	0	1	0	0	1	2	4	0	16
08:15 AM	3	1	0	0	2	1	0	0	0	1	0	0	1	1	12	0	22
08:30 AM	6	2	1	0	0	1	0	0	0	0	0	0	0	2	7	0	19
08:45 AM	5	1	1	0	1	0	0	0	0	0	0	0	1	1	7	0	17
Total	17	6	2	0	5	3	0	0	0	2	0	0	3	6	30	0	74
Grand Total	28	10	4	0	8	6	0	0	0	2	0	0	3	13	69	0	143
Apprch %	66.7	23.8	9.5	0	57.1	42.9	0	0	0	100	0	0	3.5	15.3	81.2	0	
Total %	19.6	7	2.8	0	5.6	4.2	0	0	0	1.4	0	0	2.1	9.1	48.3	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	2	1	0	0	3	3	2	0	0	5	0	0	0	0	0	0	0	14	0	14	22
08:00 AM	3	2	0	0	5	2	1	0	0	3	0	1	0	0	1	1	2	4	0	7	16
08:15 AM	3	1	0	0	4	2	1	0	0	3	0	1	0	0	1	1	1	12	0	14	22
08:30 AM	6	2	1	0	9	0	1	0	0	1	0	0	0	0	0	0	2	7	0	9	19
Total Volume	14	6	1	0	21	7	5	0	0	12	0	2	0	0	2	2	5	37	0	44	79
% App. Total	66.7	28.6	4.8	0		58.3	41.7	0	0		0	100	0	0		4.5	11.4	84.1	0		
PHF	.583	.750	.250	.000	.583	.583	.625	.000	.000	.600	.000	.500	.000	.000	.500	.500	.625	.661	.000	.786	.898

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Groups Printed- Peds and Bikes

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	3
07:15 AM	0	0	0	0	0	0	0	0	0	3	0	1	0	1	2	0	0	2	0	0	9
07:30 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	3
07:45 AM	0	0	0	0	0	0	0	0	4	1	0	0	0	1	1	0	0	0	0	0	7
Total	0	0	0	0	0	0	0	0	4	5	0	4	0	4	3	0	0	2	0	0	22
08:00 AM	2	0	0	1	0	0	0	0	0	1	0	2	0	1	2	0	0	0	0	0	9
08:15 AM	1	1	0	5	3	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	12
08:30 AM	2	1	0	1	1	0	0	0	0	2	0	1	0	2	0	0	0	1	0	0	11
08:45 AM	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4
Total	8	2	0	7	4	0	0	0	1	3	0	3	0	3	2	0	0	2	1	0	36
Grand Total	8	2	0	7	4	0	0	0	5	8	0	7	0	7	5	0	0	4	1	0	58
Apprch %	38.1	9.5	0	33.3	19	0	0	0	38.5	61.5	0	36.8	0	36.8	26.3	0	0	80	20	0	
Total %	13.8	3.4	0	12.1	6.9	0	0	0	8.6	13.8	0	12.1	0	12.1	8.6	0	0	6.9	1.7	0	

	Winchester Street From North						Dedham Street From East						Winchester Street From South						Needham Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. 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	0	0	0	0	0	0	0	0	0	4	1	5	0	0	0	1	1	2	0	0	0	0	0	0	7
08:00 AM	2	0	0	1	0	3	0	0	0	0	1	1	0	2	0	1	2	5	0	0	0	0	0	0	9
08:15 AM	1	1	0	5	3	10	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	12
08:30 AM	2	1	0	1	1	5	0	0	0	0	2	2	0	1	0	2	0	3	0	0	1	0	0	1	11
Total Volume	5	2	0	7	4	18	0	0	0	5	4	9	0	3	0	4	3	10	0	0	2	0	0	2	39
% App. Total	27.8	11.1	0	38.9	22.2		0	0	0	55.6	44.4		0	30	0	40	30		0	0	100	0	0		
PHF	.625	.500	.000	.350	.333	.450	.000	.000	.000	.313	.500	.450	.000	.375	.000	.500	.375	.500	.000	.000	.500	.000	.000	.500	.813

N/S: Winchester Street
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION D A T A INDUSTRIES, LLC
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File Name : 144047 C
Site Code : 19531095
Start Date : 9/11/2014
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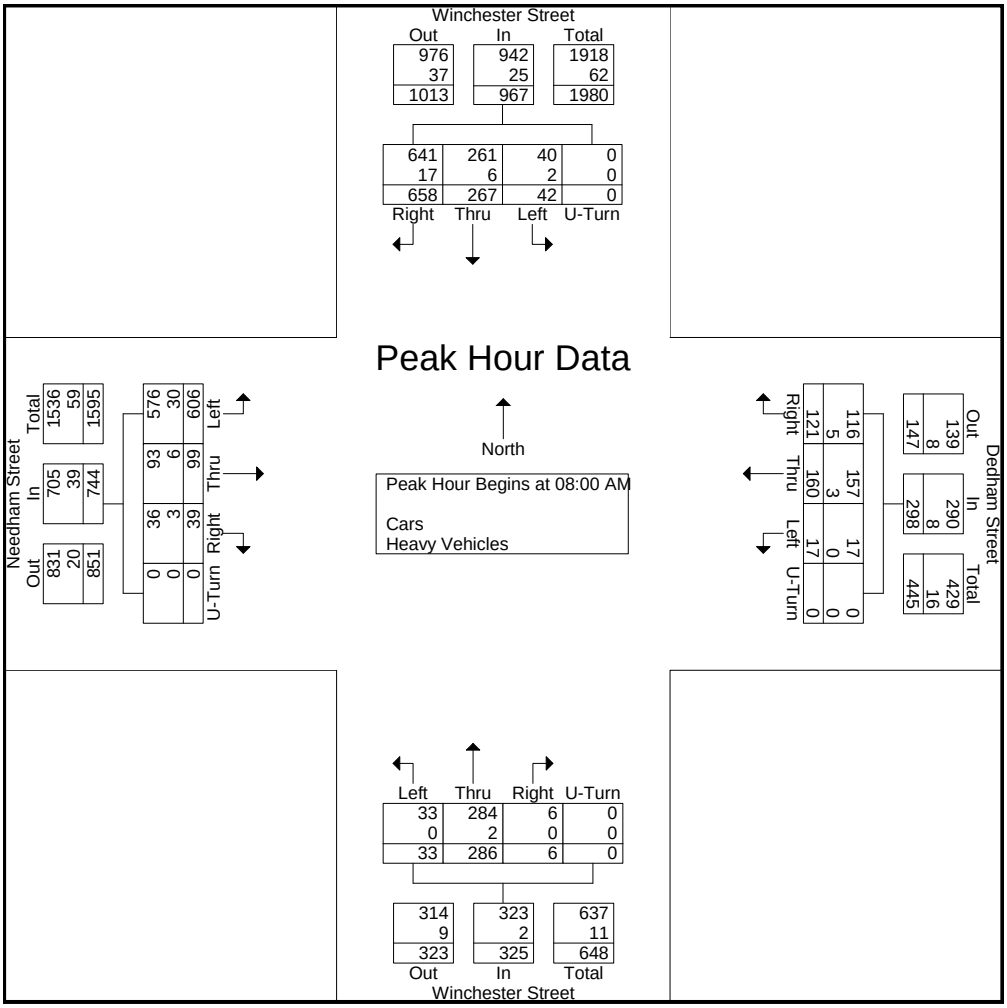
	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis 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	147	76	11	0	234	38	39	4	0	81	3	80	9	0	92	4	24	157	0	185	592
08:15 AM	157	67	11	0	235	30	30	6	0	66	3	76	10	0	89	10	40	169	0	219	609
08:30 AM	172	59	13	0	244	24	52	5	0	81	0	64	9	0	73	13	13	138	0	164	562
08:45 AM	182	65	7	0	254	29	39	2	0	70	0	66	5	0	71	12	22	142	0	176	571
Total Volume	658	267	42	0	967	121	160	17	0	298	6	286	33	0	325	39	99	606	0	744	2334
% App. Total	68	27.6	4.3	0		40.6	53.7	5.7	0		1.8	88	10.2	0		5.2	13.3	81.5	0		
PHF	.904	.878	.808	.000	.952	.796	.769	.708	.000	.920	.500	.894	.825	.000	.883	.750	.619	.896	.000	.849	.958
Cars	641	261	40	0	942	116	157	17	0	290	6	284	33	0	323	36	93	576	0	705	2260
% Cars	97.4	97.8	95.2	0	97.4	95.9	98.1	100	0	97.3	100	99.3	100	0	99.4	92.3	93.9	95.0	0	94.8	96.8
Heavy Vehicles	17	6	2	0	25	5	3	0	0	8	0	2	0	0	2	3	6	30	0	39	74
% Heavy Vehicles	2.6	2.2	4.8	0	2.6	4.1	1.9	0	0	2.7	0	0.7	0	0	0.6	7.7	6.1	5.0	0	5.2	3.2



N/S: Winchester Street
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File Name : 144047 CC
Site Code : 19531095
Start Date : 9/11/2014
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Groups Printed- Cars - Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	157	47	16	0	29	21	3	0	1	48	7	0	13	20	131	0	493
04:15 PM	124	46	23	0	34	24	1	0	2	60	8	0	16	22	167	0	527
04:30 PM	136	45	20	0	17	19	2	0	2	57	4	0	13	21	159	0	495
04:45 PM	134	54	20	0	27	26	11	0	1	53	1	0	16	18	182	0	543
Total	551	192	79	0	107	90	17	0	6	218	20	0	58	81	639	0	2058
05:00 PM	136	52	21	0	28	17	8	0	5	52	7	0	16	37	178	1	558
05:15 PM	138	57	18	0	23	20	9	0	4	72	3	0	11	38	195	0	588
05:30 PM	107	62	17	0	24	20	4	0	0	55	2	1	23	27	204	0	546
05:45 PM	134	56	22	0	25	25	4	0	2	74	5	0	13	26	180	0	566
Total	515	227	78	0	100	82	25	0	11	253	17	1	63	128	757	1	2258
Grand Total	1066	419	157	0	207	172	42	0	17	471	37	1	121	209	1396	1	4316
Apprch %	64.9	25.5	9.6	0	49.2	40.9	10	0	3.2	89.5	7	0.2	7	12.1	80.8	0.1	
Total %	24.7	9.7	3.6	0	4.8	4	1	0	0.4	10.9	0.9	0	2.8	4.8	32.3	0	
Cars	1041	407	156	0	205	171	40	0	16	467	37	1	120	207	1377	1	4246
% Cars	97.7	97.1	99.4	0	99	99.4	95.2	0	94.1	99.2	100	100	99.2	99	98.6	100	98.4
Heavy Vehicles	25	12	1	0	2	1	2	0	1	4	0	0	1	2	19	0	70
% Heavy Vehicles	2.3	2.9	0.6	0	1	0.6	4.8	0	5.9	0.8	0	0	0.8	1	1.4	0	1.6

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	136	52	21	0	209	28	17	8	0	53	5	52	7	0	64	16	37	178	1	232	558
05:15 PM	138	57	18	0	213	23	20	9	0	52	4	72	3	0	79	11	38	195	0	244	588
05:30 PM	107	62	17	0	186	24	20	4	0	48	0	55	2	1	58	23	27	204	0	254	546
05:45 PM	134	56	22	0	212	25	25	4	0	54	2	74	5	0	81	13	26	180	0	219	566
Total Volume	515	227	78	0	820	100	82	25	0	207	11	253	17	1	282	63	128	757	1	949	2258
% App. Total	62.8	27.7	9.5	0		48.3	39.6	12.1	0		3.9	89.7	6	0.4		6.6	13.5	79.8	0.1		
PHF	.933	.915	.886	.000	.962	.893	.820	.694	.000	.958	.550	.855	.607	.250	.870	.685	.842	.928	.250	.934	.960
Cars	503	225	77	0	805	100	82	24	0	206	11	251	17	1	280	63	127	749	1	940	2231
% Cars	97.7	99.1	98.7	0	98.2	100	100	96.0	0	99.5	100	99.2	100	100	99.3	100	99.2	98.9	100	99.1	98.8
Heavy Vehicles	12	2	1	0	15	0	0	1	0	1	0	2	0	0	2	0	1	8	0	9	27
% Heavy Vehicles	2.3	0.9	1.3	0	1.8	0	0	4.0	0	0.5	0	0.8	0	0	0.7	0	0.8	1.1	0	0.9	1.2

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E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 CC
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	153	45	16	0	29	21	3	0	1	48	7	0	13	19	127	0	482
04:15 PM	123	44	23	0	32	23	0	0	1	58	8	0	15	22	167	0	516
04:30 PM	131	42	20	0	17	19	2	0	2	57	4	0	13	21	155	0	483
04:45 PM	131	51	20	0	27	26	11	0	1	53	1	0	16	18	179	0	534
Total	538	182	79	0	105	89	16	0	5	216	20	0	57	80	628	0	2015
05:00 PM	130	52	20	0	28	17	8	0	5	52	7	0	16	37	175	1	548
05:15 PM	135	56	18	0	23	20	8	0	4	70	3	0	11	38	195	0	581
05:30 PM	105	62	17	0	24	20	4	0	0	55	2	1	23	26	201	0	540
05:45 PM	133	55	22	0	25	25	4	0	2	74	5	0	13	26	178	0	562
Total	503	225	77	0	100	82	24	0	11	251	17	1	63	127	749	1	2231
Grand Total	1041	407	156	0	205	171	40	0	16	467	37	1	120	207	1377	1	4246
Apprch %	64.9	25.4	9.7	0	49.3	41.1	9.6	0	3.1	89.6	7.1	0.2	7	12.1	80.8	0.1	
Total %	24.5	9.6	3.7	0	4.8	4	0.9	0	0.4	11	0.9	0	2.8	4.9	32.4	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	130	52	20	0	202	28	17	8	0	53	5	52	7	0	64	16	37	175	1	229	548
05:15 PM	135	56	18	0	209	23	20	8	0	51	4	70	3	0	77	11	38	195	0	244	581
05:30 PM	105	62	17	0	184	24	20	4	0	48	0	55	2	1	58	23	26	201	0	250	540
05:45 PM	133	55	22	0	210	25	25	4	0	54	2	74	5	0	81	13	26	178	0	217	562
Total Volume	503	225	77	0	805	100	82	24	0	206	11	251	17	1	280	63	127	749	1	940	2231
% App. Total	62.5	28	9.6	0		48.5	39.8	11.7	0		3.9	89.6	6.1	0.4		6.7	13.5	79.7	0.1		
PHF	.931	.907	.875	.000	.958	.893	.820	.750	.000	.954	.550	.848	.607	.250	.864	.685	.836	.932	.250	.940	.960

PRECISION
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City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 CC
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	4	2	0	0	0	0	0	0	0	0	0	0	0	1	4	0	11
04:15 PM	1	2	0	0	2	1	1	0	1	2	0	0	1	0	0	0	11
04:30 PM	5	3	0	0	0	0	0	0	0	0	0	0	0	0	4	0	12
04:45 PM	3	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9
Total	13	10	0	0	2	1	1	0	1	2	0	0	1	1	11	0	43
05:00 PM	6	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	10
05:15 PM	3	1	0	0	0	0	1	0	0	2	0	0	0	0	0	0	7
05:30 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	6
05:45 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
Total	12	2	1	0	0	0	1	0	0	2	0	0	0	1	8	0	27
Grand Total	25	12	1	0	2	1	2	0	1	4	0	0	1	2	19	0	70
Apprch %	65.8	31.6	2.6	0	40	20	40	0	20	80	0	0	4.5	9.1	86.4	0	
Total %	35.7	17.1	1.4	0	2.9	1.4	2.9	0	1.4	5.7	0	0	1.4	2.9	27.1	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. 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	4	2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	1	4	0	5	11
04:15 PM	1	2	0	0	3	2	1	1	0	4	1	2	0	0	3	1	0	0	0	1	11
04:30 PM	5	3	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	12
04:45 PM	3	3	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	9
Total Volume	13	10	0	0	23	2	1	1	0	4	1	2	0	0	3	1	1	11	0	13	43
% App. Total	56.5	43.5	0	0		50	25	25	0		33.3	66.7	0	0		7.7	7.7	84.6	0		
PHF	.650	.833	.000	.000	.719	.250	.250	.250	.000	.250	.250	.250	.000	.000	.250	.250	.250	.688	.000	.650	.896

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Groups Printed- Peds and Bikes

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
04:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	2	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	6
Total	1	2	0	0	0	0	0	0	1	2	0	0	0	0	2	0	0	1	0	0	9
05:00 PM	0	0	0	2	0	0	0	0	2	1	0	0	0	2	1	0	0	0	0	1	9
05:15 PM	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	4
05:30 PM	0	0	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	5
05:45 PM	2	1	0	1	0	0	0	0	1	1	0	0	0	0	2	0	1	1	0	1	11
Total	3	1	0	4	1	0	0	0	5	2	0	0	0	3	4	0	1	2	0	3	29
Grand Total	4	3	0	4	1	0	0	0	6	4	0	0	0	3	6	0	1	3	0	3	38
Apprch %	33.3	25	0	33.3	8.3	0	0	0	60	40	0	0	0	33.3	66.7	0	14.3	42.9	0	42.9	
Total %	10.5	7.9	0	10.5	2.6	0	0	0	15.8	10.5	0	0	0	7.9	15.8	0	2.6	7.9	0	7.9	

	Winchester Street From North						Dedham Street From East						Winchester Street From South						Needham Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. 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	2	0	2	0	0	0	2	1	3	0	0	0	2	1	3	0	0	0	0	1	1	9
05:15 PM	1	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	1	1	4
05:30 PM	0	0	0	1	1	2	0	0	0	1	0	1	0	0	0	0	1	1	0	0	1	0	0	1	5
05:45 PM	2	1	0	1	0	4	0	0	0	1	1	2	0	0	0	0	2	2	0	1	1	0	1	3	11
Total Volume	3	1	0	4	1	9	0	0	0	5	2	7	0	0	0	3	4	7	0	1	2	0	3	6	29
% App. Total	33.3	11.1	0	44.4	11.1		0	0	0	71.4	28.6		0	0	0	42.9	57.1		0	16.7	33.3	0	50		
PHF	.375	.250	.000	.500	.250	.563	.000	.000	.000	.625	.500	.583	.000	.000	.000	.375	.500	.583	.000	.250	.500	.000	.750	.500	.659

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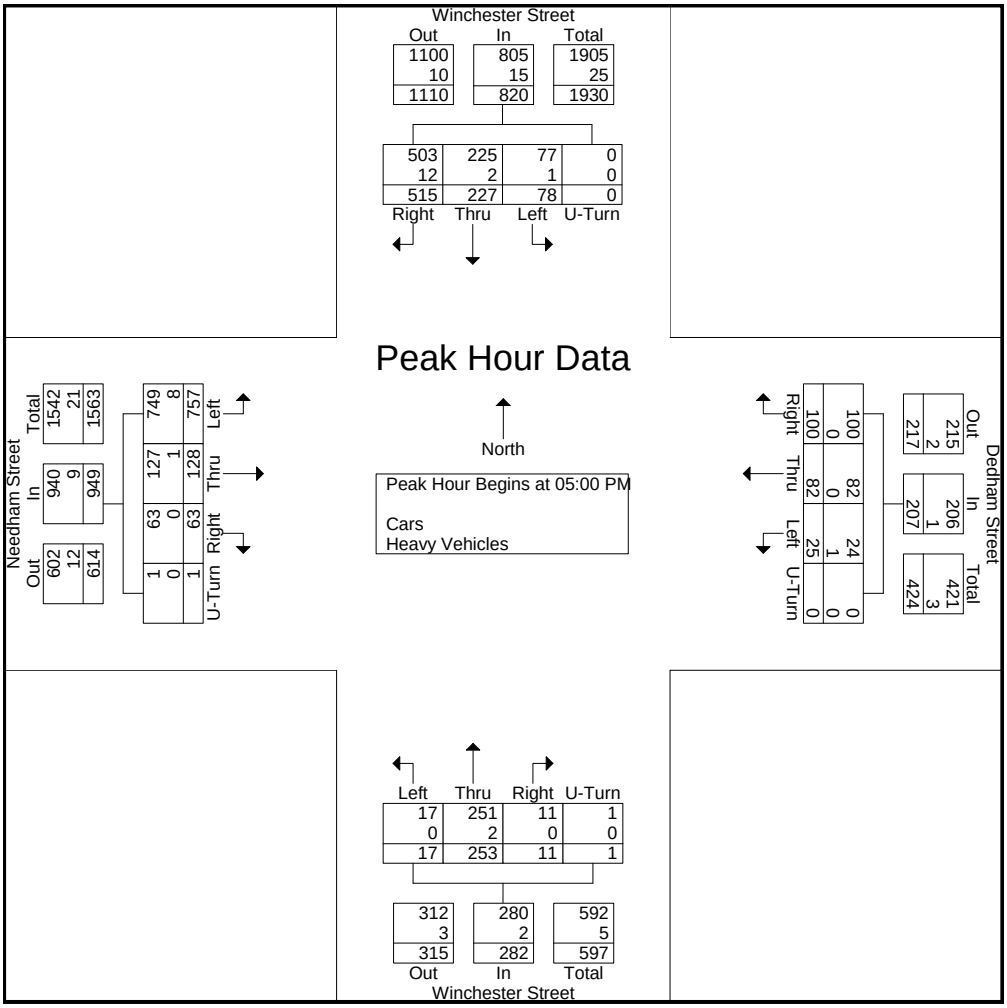
	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis 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	136	52	21	0	209	28	17	8	0	53	5	52	7	0	64	16	37	178	1	232	558
05:15 PM	138	57	18	0	213	23	20	9	0	52	4	72	3	0	79	11	38	195	0	244	588
05:30 PM	107	62	17	0	186	24	20	4	0	48	0	55	2	1	58	23	27	204	0	254	546
05:45 PM	134	56	22	0	212	25	25	4	0	54	2	74	5	0	81	13	26	180	0	219	566
Total Volume	515	227	78	0	820	100	82	25	0	207	11	253	17	1	282	63	128	757	1	949	2258
% App. Total	62.8	27.7	9.5	0		48.3	39.6	12.1	0		3.9	89.7	6	0.4		6.6	13.5	79.8	0.1		
PHF	.933	.915	.886	.000	.962	.893	.820	.694	.000	.958	.550	.855	.607	.250	.870	.685	.842	.928	.250	.934	.960
Cars	503	225	77	0	805	100	82	24	0	206	11	251	17	1	280	63	127	749	1	940	2231
% Cars	97.7	99.1	98.7	0	98.2	100	100	96.0	0	99.5	100	99.2	100	100	99.3	100	99.2	98.9	100	99.1	98.8
Heavy Vehicles	12	2	1	0	15	0	0	1	0	1	0	2	0	0	2	0	1	8	0	9	27
% Heavy Vehicles	2.3	0.9	1.3	0	1.8	0	0	4.0	0	0.5	0	0.8	0	0	0.7	0	0.8	1.1	0	0.9	1.2



N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
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File Name : 144047 D
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
07:00 AM	0	0	125	0	0	1	0	0	0	0	1	188	0	4	0	1	0	0	0	0	0	0	0	0	0	320
07:15 AM	0	0	114	0	0	0	0	0	0	0	0	209	0	1	0	2	0	0	0	0	0	0	0	0	0	326
07:30 AM	0	1	158	0	0	0	0	0	0	0	0	195	0	5	0	2	0	0	0	0	0	0	0	0	0	361
07:45 AM	0	1	168	1	0	0	0	0	0	0	1	188	0	5	0	0	0	1	0	0	0	0	0	0	0	365
Total	0	2	565	1	0	1	0	0	0	0	2	780	0	15	0	5	0	1	0	0	0	0	0	0	0	1372
08:00 AM	0	3	179	1	0	1	0	0	0	0	1	192	0	4	0	1	0	0	0	0	0	0	0	0	0	382
08:15 AM	0	5	170	1	0	0	0	0	2	0	1	186	0	10	0	0	0	0	0	0	0	0	0	0	0	375
08:30 AM	0	5	204	0	0	0	0	0	0	0	0	180	0	13	0	2	0	0	0	0	0	0	0	0	0	404
08:45 AM	0	7	178	1	0	0	0	0	0	0	1	186	0	15	0	1	0	0	0	0	0	0	0	0	0	389
Total	0	20	731	3	0	1	0	0	2	0	3	744	0	42	0	4	0	0	0	0	0	0	0	0	0	1550
Grand Total	0	22	1296	4	0	2	0	0	2	0	5	1524	0	57	0	9	0	1	0	0	0	0	0	0	0	2922
Apprch %	0	1.7	98	0.3	0	50	0	0	50	0	0.3	96.1	0	3.6	0	90	0	10	0	0	0	0	0	0	0	
Total %	0	0.8	44.4	0.1	0	0.1	0	0	0.1	0	0.2	52.2	0	2	0	0.3	0	0	0	0	0	0	0	0	0	
Cars	0	21	1260	4	0	2	0	0	2	0	5	1443	0	54	0	8	0	1	0	0	0	0	0	0	0	2800
% Cars	0	95.5	97.2	100	0	100	0	0	100	0	100	94.7	0	94.7	0	88.9	0	100	0	0	0	0	0	0	0	95.8
Heavy Vehicles	0	1	36	0	0	0	0	0	0	0	0	81	0	3	0	1	0	0	0	0	0	0	0	0	0	122
% Heavy Vehicles	0	4.5	2.8	0	0	0	0	0	0	0	0	5.3	0	5.3	0	11.1	0	0	0	0	0	0	0	0	0	4.2

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	0	3	179	1	0	183	1	0	0	0	0	1	1	192	0	4	0	197	1	0	0	0	0	1	0	0	0	0	0	0	382
08:15 AM	0	5	170	1	0	176	0	0	0	2	0	2	1	186	0	10	0	197	0	0	0	0	0	0	0	0	0	0	0	0	375
08:30 AM	0	5	204	0	0	209	0	0	0	0	0	0	0	180	0	13	0	193	2	0	0	0	0	2	0	0	0	0	0	0	404
08:45 AM	0	7	178	1	0	186	0	0	0	0	0	0	1	186	0	15	0	202	1	0	0	0	0	1	0	0	0	0	0	0	389
Total Volume	0	20	731	3	0	754	1	0	0	2	0	3	3	744	0	42	0	789	4	0	0	0	0	4	0	0	0	0	0	0	1550
% App. Total	0	2.7	96.9	0.4	0		33.3	0	0	66.7	0		0.4	94.3	0	5.3	0		100	0	0	0	0		0	0	0	0	0		
PHF	.000	.714	.896	.750	.000	.902	.250	.000	.000	.250	.000	.375	.750	.969	.000	.700	.000	.976	.500	.000	.000	.000	.000	.500	.000	.000	.000	.000	.000	.000	.959
Cars	0	20	715	3	0	738	1	0	0	2	0	3	3	708	0	40	0	751	3	0	0	0	0	3	0	0	0	0	0	0	1495
% Cars	0	100	97.8	100	0	97.9	100	0	0	100	0	100	100	95.2	0	95.2	0	95.2	75.0	0	0	0	0	75.0	0	0	0	0	0	0	96.5
Heavy Vehicles	0	0	16	0	0	16	0	0	0	0	0	0	0	36	0	2	0	38	1	0	0	0	0	1	0	0	0	0	0	0	55
% Heavy Vehicles	0	0	2.2	0	0	2.1	0	0	0	0	0	0	0	4.8	0	4.8	0	4.8	25.0	0	0	0	0	25.0	0	0	0	0	0	0	3.5

N/S/NW: Needham Street/ Loop Driveway
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File Name : 144047 D
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
07:00 AM	0	0	119	0	0	1	0	0	0	0	1	180	0	4	0	1	0	0	0	0	0	0	0	0	0	306
07:15 AM	0	0	111	0	0	0	0	0	0	0	0	196	0	0	0	2	0	0	0	0	0	0	0	0	0	309
07:30 AM	0	0	155	0	0	0	0	0	0	0	0	178	0	5	0	2	0	0	0	0	0	0	0	0	0	340
07:45 AM	0	1	160	1	0	0	0	0	0	0	1	181	0	5	0	0	0	1	0	0	0	0	0	0	0	350
Total	0	1	545	1	0	1	0	0	0	0	2	735	0	14	0	5	0	1	0	0	0	0	0	0	0	1305
08:00 AM	0	3	174	1	0	1	0	0	0	0	1	185	0	4	0	1	0	0	0	0	0	0	0	0	0	370
08:15 AM	0	5	167	1	0	0	0	0	2	0	1	174	0	9	0	0	0	0	0	0	0	0	0	0	0	359
08:30 AM	0	5	196	0	0	0	0	0	0	0	0	174	0	13	0	2	0	0	0	0	0	0	0	0	0	390
08:45 AM	0	7	178	1	0	0	0	0	0	0	1	175	0	14	0	0	0	0	0	0	0	0	0	0	0	376
Total	0	20	715	3	0	1	0	0	2	0	3	708	0	40	0	3	0	0	0	0	0	0	0	0	0	1495
Grand Total	0	21	1260	4	0	2	0	0	2	0	5	1443	0	54	0	8	0	1	0	0	0	0	0	0	0	2800
Apprch %	0	1.6	98.1	0.3	0	50	0	0	50	0	0.3	96.1	0	3.6	0	88.9	0	11.1	0	0	0	0	0	0	0	
Total %	0	0.8	45	0.1	0	0.1	0	0	0.1	0	0.2	51.5	0	1.9	0	0.3	0	0	0	0	0	0	0	0	0	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	0	3	174	1	0	178	1	0	0	0	0	1	1	185	0	4	0	190	1	0	0	0	0	1	0	0	0	0	0	0	370
08:15 AM	0	5	167	1	0	173	0	0	0	2	0	2	1	174	0	9	0	184	0	0	0	0	0	0	0	0	0	0	0	0	359
08:30 AM	0	5	196	0	0	201	0	0	0	0	0	0	0	174	0	13	0	187	2	0	0	0	0	2	0	0	0	0	0	0	390
08:45 AM	0	7	178	1	0	186	0	0	0	0	0	0	1	175	0	14	0	190	0	0	0	0	0	0	0	0	0	0	0	0	376
Total Volume	0	20	715	3	0	738	1	0	0	2	0	3	3	708	0	40	0	751	3	0	0	0	0	3	0	0	0	0	0	0	1495
% App. Total	0	2.7	96.9	0.4	0		33.3	0	0	66.7	0		0.4	94.3	0	5.3	0		100	0	0	0	0		0	0	0	0	0		
PHF	.000	.714	.912	.750	.000	.918	.250	.000	.000	.250	.000	.375	.750	.957	.000	.714	.000	.988	.375	.000	.000	.000	.000	.375	.000	.000	.000	.000	.000	.000	.958

N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 D
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
07:00 AM	0	0	6	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	14
07:15 AM	0	0	3	0	0	0	0	0	0	0	0	13	0	1	0	0	0	0	0	0	0	0	0	0	0	17
07:30 AM	0	1	3	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	21
07:45 AM	0	0	8	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Total	0	1	20	0	0	0	0	0	0	0	0	45	0	1	0	0	0	0	0	0	0	0	0	0	0	67
08:00 AM	0	0	5	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	12
08:15 AM	0	0	3	0	0	0	0	0	0	0	0	12	0	1	0	0	0	0	0	0	0	0	0	0	0	16
08:30 AM	0	0	8	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	14
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	11	0	1	0	1	0	0	0	0	0	0	0	0	0	13
Total	0	0	16	0	0	0	0	0	0	0	0	36	0	2	0	1	0	0	0	0	0	0	0	0	0	55
Grand Total	0	1	36	0	0	0	0	0	0	0	0	81	0	3	0	1	0	0	0	0	0	0	0	0	0	122
Apprch %	0	2.7	97.3	0	0	0	0	0	0	0	0	96.4	0	3.6	0	100	0	0	0	0	0	0	0	0	0	
Total %	0	0.8	29.5	0	0	0	0	0	0	0	0	66.4	0	2.5	0	0.8	0	0	0	0	0	0	0	0	0	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	6	0	0	6	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	14
07:15 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	13	0	1	0	14	0	0	0	0	0	0	0	0	0	0	0	0	17
07:30 AM	0	1	3	0	0	4	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	21
07:45 AM	0	0	8	0	0	8	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	15
Total Volume	0	1	20	0	0	21	0	0	0	0	0	0	0	45	0	1	0	46	0	0	0	0	0	0	0	0	0	0	0	0	67
% App. Total	0	4.8	95.2	0	0		0	0	0	0	0		0	97.8	0	2.2	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.250	.625	.000	.000	.656	.000	.000	.000	.000	.000	.000	.000	.662	.000	.250	.000	.676	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.798

N/S/NW: Needham Street/ Loop Driveway
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File Name : 144047 D
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	Right	Bear Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Bear Left	Left	Peds WB	Peds EB	Right	Thru	Left	Hard Left	Peds NB	Peds SB	Hard Right	Bear Right	Bear Left	Hard Left	Peds NEB	Peds SWB	Int. Total
07:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
07:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	8
07:30 AM	0	0	1	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	9
07:45 AM	0	0	3	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	15
Total	0	0	5	0	0	0	0	0	0	0	11	2	0	3	0	0	0	0	0	0	0	0	2	14	0	0	0	0	0	0	37
08:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:45 AM	0	0	1	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7
Total	0	0	3	0	0	0	0	0	0	0	4	2	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	13
Grand Total	0	0	8	0	0	0	0	0	0	0	15	4	0	6	0	0	0	0	0	0	0	0	3	14	0	0	0	0	0	0	50
Apprch %	0	0	100	0	0	0	0	0	0	0	78.9	21.1	0	100	0	0	0	0	0	0	0	0	17.6	82.4	0	0	0	0	0	0	
Total %	0	0	16	0	0	0	0	0	0	0	30	8	0	12	0	0	0	0	0	0	0	0	6	28	0	0	0	0	0	0	

	Needham Street From North							Driveway From East							Needham Street From South							Site Driveway South From West							Loop Driveway From Northwest							
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Bear Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Bear Left	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Hard Left	Peds NB	Peds SB	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds NEB	Peds SWB	App. Total	Int. 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	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	5
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	0	0	0	2	0	0	0	0	1	2	3	0	0	0	0	0	0	8
07:30 AM	0	0	1	0	0	0	1	0	0	0	0	5	2	7	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	9
07:45 AM	0	0	3	0	0	0	3	0	0	0	0	3	0	3	0	1	0	0	0	0	1	0	0	0	0	0	8	8	0	0	0	0	0	0	15
Total Volume	0	0	5	0	0	0	5	0	0	0	0	11	2	13	0	3	0	0	0	0	3	0	0	0	0	2	14	16	0	0	0	0	0	0	0	37
% App. Total			100	0	0	0		0	0	0	0	84.6	15.4		0	100	0	0	0	0		0	0	0	0	12.5	87.5		0	0	0	0	0	0		
PHF	.000	.000	.417	.000	.000	.000	.417	.000	.000	.000	.000	.550	.250	.464	.000	.375	.000	.000	.000	.000	.375	.000	.000	.000	.000	.500	.438	.500	.000	.000	.000	.000	.000	.000	.000	.617

N/S/NW: Needham Street/ Loop Driveway
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Start Date : 9/11/2014
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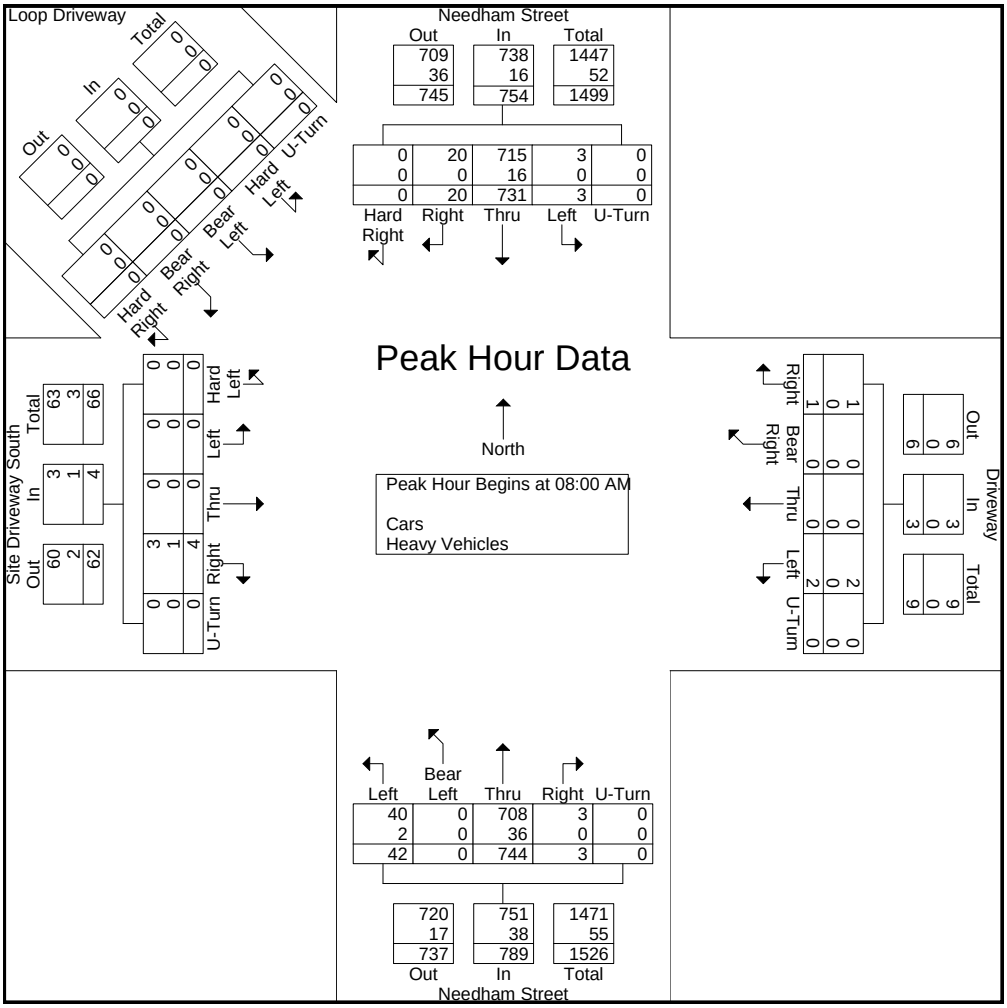
	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	0	3	179	1	0	183	1	0	0	0	0	1	1	192	0	4	0	197	1	0	0	0	0	1	0	0	0	0	0	0	382
08:15 AM	0	5	170	1	0	176	0	0	0	2	0	2	1	186	0	10	0	197	0	0	0	0	0	0	0	0	0	0	0	0	375
08:30 AM	0	5	204	0	0	209	0	0	0	0	0	0	0	180	0	13	0	193	2	0	0	0	0	2	0	0	0	0	0	0	404
08:45 AM	0	7	178	1	0	186	0	0	0	0	0	0	1	186	0	15	0	202	1	0	0	0	0	1	0	0	0	0	0	0	389
Total Volume	0	20	731	3	0	754	1	0	0	2	0	3	3	744	0	42	0	789	4	0	0	0	0	4	0	0	0	0	0	0	1550
% App. Total	0	2.7	96.9	0.4	0		33.3	0	0	66.7	0		0.4	94.3	0	5.3	0		100	0	0	0	0		0	0	0	0	0		
PHF	.000	.714	.896	.750	.000	.902	.250	.000	.000	.250	.000	.375	.750	.969	.000	.700	.000	.976	.500	.000	.000	.000	.000	.500	.000	.000	.000	.000	.000	.000	.959
Cars	0	20	715	3	0	738	1	0	0	2	0	3	3	708	0	40	0	751	3	0	0	0	0	3	0	0	0	0	0	0	1495
% Cars	0	100	97.8	100	0	97.9	100	0	0	100	0	100	100	95.2	0	95.2	0	95.2	75.0	0	0	0	0	75.0	0	0	0	0	0	0	96.5
Heavy Vehicles	0	0	16	0	0	16	0	0	0	0	0	0	0	36	0	2	0	38	1	0	0	0	0	1	0	0	0	0	0	0	55
% Heavy Vehicles	0	0	2.2	0	0	2.1	0	0	0	0	0	0	0	4.8	0	4.8	0	4.8	25.0	0	0	0	0	25.0	0	0	0	0	0	0	3.5



N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION DATA INDUSTRIES, LLC
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Office: 508.481.3999 Fax: 508.545.1234
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File Name : 144047 DD
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
04:00 PM	0	0	180	1	0	1	0	0	0	0	1	165	0	1	0	8	0	2	0	0	0	1	0	0	0	360
04:15 PM	0	0	164	1	0	4	0	0	0	0	2	217	0	2	0	4	0	1	0	0	0	0	0	0	0	395
04:30 PM	0	1	167	0	1	2	0	0	0	0	1	190	0	3	0	8	0	0	0	0	0	0	0	0	0	373
04:45 PM	0	0	182	1	0	3	0	0	0	0	0	199	0	2	1	11	0	3	0	0	0	0	0	0	0	402
Total	0	1	693	3	1	10	0	0	0	0	4	771	0	8	1	31	0	6	0	0	0	1	0	0	0	1530
05:00 PM	0	1	145	1	0	2	0	0	0	0	1	197	0	0	0	15	0	7	0	0	0	0	0	0	0	369
05:15 PM	0	0	130	0	0	0	0	0	0	0	0	224	0	0	0	23	0	1	2	0	0	0	0	0	0	380
05:30 PM	0	0	170	0	0	2	0	0	0	0	1	205	0	1	0	16	0	7	0	0	0	0	0	0	0	402
05:45 PM	0	1	174	1	0	1	0	0	1	0	0	206	0	1	0	7	0	4	0	0	0	1	0	0	0	397
Total	0	2	619	2	0	5	0	0	1	0	2	832	0	2	0	61	0	19	2	0	0	1	0	0	0	1548
Grand Total	0	3	1312	5	1	15	0	0	1	0	6	1603	0	10	1	92	0	25	2	0	0	2	0	0	0	3078
Apprch %	0	0.2	99.3	0.4	0.1	93.8	0	0	6.2	0	0.4	99	0	0.6	0.1	77.3	0	21	1.7	0	0	100	0	0	0	
Total %	0	0.1	42.6	0.2	0	0.5	0	0	0	0	0.2	52.1	0	0.3	0	3	0	0.8	0.1	0	0	0.1	0	0	0	
Cars	0	3	1277	5	1	15	0	0	1	0	6	1580	0	6	1	91	0	24	2	0	0	2	0	0	0	3014
% Cars	0	100	97.3	100	100	100	0	0	100	0	100	98.6	0	60	100	98.9	0	96	100	0	0	100	0	0	0	97.9
Heavy Vehicles	0	0	35	0	0	0	0	0	0	0	0	23	0	4	0	1	0	1	0	0	0	0	0	0	0	64
% Heavy Vehicles	0	0	2.7	0	0	0	0	0	0	0	0	1.4	0	40	0	1.1	0	4	0	0	0	0	0	0	0	2.1

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	0	0	182	1	0	183	3	0	0	0	0	3	0	199	0	2	1	202	11	0	3	0	0	14	0	0	0	0	0	0	402
05:00 PM	0	1	145	1	0	147	2	0	0	0	0	2	1	197	0	0	0	198	15	0	7	0	0	22	0	0	0	0	0	0	369
05:15 PM	0	0	130	0	0	130	0	0	0	0	0	0	0	224	0	0	0	224	23	0	1	2	0	26	0	0	0	0	0	0	380
05:30 PM	0	0	170	0	0	170	2	0	0	0	0	2	1	205	0	1	0	207	16	0	7	0	0	23	0	0	0	0	0	0	402
Total Volume	0	1	627	2	0	630	7	0	0	0	0	7	2	825	0	3	1	831	65	0	18	2	0	85	0	0	0	0	0	0	1553
% App. Total	0	0.2	99.5	0.3	0		100	0	0	0	0		0.2	99.3	0	0.4	0.1		76.5	0	21.2	2.4	0		0	0	0	0	0		
PHF	.000	.250	.861	.500	.000	.861	.583	.000	.000	.000	.000	.583	.500	.921	.000	.375	.250	.927	.707	.000	.643	.250	.000	.817	.000	.000	.000	.000	.000	.000	.966
Cars	0	1	611	2	0	614	7	0	0	0	0	7	2	815	0	1	1	819	65	0	17	2	0	84	0	0	0	0	0	0	1524
% Cars	0	100	97.4	100	0	97.5	100	0	0	0	0	100	100	98.8	0	33.3	100	98.6	100	0	94.4	100	0	98.8	0	0	0	0	0	0	98.1
Heavy Vehicles	0	0	16	0	0	16	0	0	0	0	0	0	0	10	0	2	0	12	0	0	1	0	0	1	0	0	0	0	0	0	29
% Heavy Vehicles	0	0	2.6	0	0	2.5	0	0	0	0	0	0	0	1.2	0	66.7	0	1.4	0	0	5.6	0	0	1.2	0	0	0	0	0	0	1.9

N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION DATA INDUSTRIES, LLC
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File Name : 144047 DD
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
04:00 PM	0	0	171	1	0	1	0	0	0	0	1	160	0	1	0	8	0	2	0	0	0	1	0	0	0	346
04:15 PM	0	0	161	1	0	4	0	0	0	0	2	213	0	1	0	4	0	1	0	0	0	0	0	0	0	387
04:30 PM	0	1	161	0	1	2	0	0	0	0	1	187	0	3	0	7	0	0	0	0	0	0	0	0	0	363
04:45 PM	0	0	177	1	0	3	0	0	0	0	0	196	0	1	1	11	0	2	0	0	0	0	0	0	0	392
Total	0	1	670	3	1	10	0	0	0	0	4	756	0	6	1	30	0	5	0	0	0	1	0	0	0	1488
05:00 PM	0	1	142	1	0	2	0	0	0	0	1	193	0	0	0	15	0	7	0	0	0	0	0	0	0	362
05:15 PM	0	0	126	0	0	0	0	0	0	0	0	223	0	0	0	23	0	1	2	0	0	0	0	0	0	375
05:30 PM	0	0	166	0	0	2	0	0	0	0	1	203	0	0	0	16	0	7	0	0	0	0	0	0	0	395
05:45 PM	0	1	173	1	0	1	0	0	1	0	0	205	0	0	0	7	0	4	0	0	0	1	0	0	0	394
Total	0	2	607	2	0	5	0	0	1	0	2	824	0	0	0	61	0	19	2	0	0	1	0	0	0	1526
Grand Total	0	3	1277	5	1	15	0	0	1	0	6	1580	0	6	1	91	0	24	2	0	0	2	0	0	0	3014
Apprch %	0	0.2	99.3	0.4	0.1	93.8	0	0	6.2	0	0.4	99.2	0	0.4	0.1	77.8	0	20.5	1.7	0	0	100	0	0	0	
Total %	0	0.1	42.4	0.2	0	0.5	0	0	0	0	0.2	52.4	0	0.2	0	3	0	0.8	0.1	0	0	0.1	0	0	0	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	1	142	1	0	144	2	0	0	0	0	2	1	193	0	0	0	194	15	0	7	0	0	22	0	0	0	0	0	0	362
05:15 PM	0	0	126	0	0	126	0	0	0	0	0	0	0	223	0	0	0	223	23	0	1	2	0	26	0	0	0	0	0	0	375
05:30 PM	0	0	166	0	0	166	2	0	0	0	0	2	1	203	0	0	0	204	16	0	7	0	0	23	0	0	0	0	0	0	395
05:45 PM	0	1	173	1	0	175	1	0	0	1	0	2	0	205	0	0	0	205	7	0	4	0	0	11	0	1	0	0	0	1	394
Total Volume	0	2	607	2	0	611	5	0	0	1	0	6	2	824	0	0	0	826	61	0	19	2	0	82	0	1	0	0	0	1	1526
% App. Total	0	0.3	99.3	0.3	0		83.3	0	0	16.7	0		0.2	99.8	0	0	0		74.4	0	23.2	2.4	0		0	100	0	0	0		
PHF	.000	.500	.877	.500	.000	.873	.625	.000	.000	.250	.000	.750	.500	.924	.000	.000	.000	.926	.663	.000	.679	.250	.000	.788	.000	.250	.000	.000	.000	.250	.966

N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 DD
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway South From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
04:00 PM	0	0	9	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	14
04:15 PM	0	0	3	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	8
04:30 PM	0	0	6	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	10
04:45 PM	0	0	5	0	0	0	0	0	0	0	0	3	0	1	0	0	0	1	0	0	0	0	0	0	0	10
Total	0	0	23	0	0	0	0	0	0	0	0	15	0	2	0	1	0	1	0	0	0	0	0	0	0	42
05:00 PM	0	0	3	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7
05:15 PM	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
05:30 PM	0	0	4	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	7
05:45 PM	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	12	0	0	0	0	0	0	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	22
Grand Total	0	0	35	0	0	0	0	0	0	0	0	23	0	4	0	1	0	1	0	0	0	0	0	0	0	64
Apprch %	0	0	100	0	0	0	0	0	0	0	0	85.2	0	14.8	0	50	0	50	0	0	0	0	0	0	0	
Total %	0	0	54.7	0	0	0	0	0	0	0	0	35.9	0	6.2	0	1.6	0	1.6	0	0	0	0	0	0	0	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. 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	0	9	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	14
04:15 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	4	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	8
04:30 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	3	0	0	0	3	1	0	0	0	0	1	0	0	0	0	0	0	10
04:45 PM	0	0	5	0	0	5	0	0	0	0	0	0	0	3	0	1	0	4	0	0	1	0	0	1	0	0	0	0	0	0	10
Total Volume	0	0	23	0	0	23	0	0	0	0	0	0	0	15	0	2	0	17	1	0	1	0	0	2	0	0	0	0	0	0	42
% App. Total	0	0	100	0	0		0	0	0	0	0		0	88.2	0	11.8	0		50	0	50	0	0		0	0	0	0	0		
PHF	.000	.000	.639	.000	.000	.639	.000	.000	.000	.000	.000	.000	.000	.750	.000	.500	.000	.850	.250	.000	.250	.000	.000	.500	.000	.000	.000	.000	.000	.000	.750

N/S/NW: Needham Street/ Loop Driveway
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Groups Printed- Peds and Bikes

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	Right	Bear Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Bear Left	Left	Peds WB	Peds EB	Right	Thru	Left	Hard Left	Peds NB	Peds SB	Hard Right	Bear Right	Bear Left	Hard Left	Peds NEB	Peds SWB	Int. Total
04:00 PM	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	11
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	6
04:30 PM	0	0	0	0	0	1	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	11
04:45 PM	0	0	0	0	1	0	0	0	0	0	3	1	0	0	0	0	0	1	0	0	0	0	2	4	0	0	0	0	0	1	13
Total	0	0	1	0	1	1	0	0	0	0	5	13	0	0	0	0	0	1	0	0	0	0	4	13	0	0	0	0	1	1	41
05:00 PM	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	12
05:15 PM	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	8
05:30 PM	0	0	1	0	0	0	0	0	0	0	3	7	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	15
05:45 PM	0	0	1	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	8
Total	0	0	3	0	0	0	0	0	0	0	9	14	0	2	0	0	1	1	0	0	0	0	5	8	0	0	0	0	0	0	43
Grand Total	0	0	4	0	1	1	0	0	0	0	14	27	0	2	0	0	1	2	0	0	0	0	9	21	0	0	0	0	1	1	84
Apprch %	0	0	66.7	0	16.7	16.7	0	0	0	0	34.1	65.9	0	40	0	0	20	40	0	0	0	0	30	70	0	0	0	0	50	50	
Total %	0	0	4.8	0	1.2	1.2	0	0	0	0	16.7	32.1	0	2.4	0	0	1.2	2.4	0	0	0	0	10.7	25	0	0	0	0	1.2	1.2	

	Needham Street From North							Driveway From East							Needham Street From South							Site Driveway South From West							Loop Driveway From Northwest							
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Bear Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Bear Left	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Hard Left	Peds NB	Peds SB	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds NEB	Peds SWB	App. Total	Int. 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	0	0	0	0	1	0	1	0	0	0	0	3	1	4	0	0	0	0	0	1	1	0	0	0	0	2	4	6	0	0	0	0	0	1	1	13
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	4	3	7	0	0	0	0	0	0	0	0	0	0	0	1	4	5	0	0	0	0	0	0	0	12
05:15 PM	0	0	1	0	0	0	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	0	0	0	8
05:30 PM	0	0	1	0	0	0	1	0	0	0	0	3	7	10	0	1	0	0	1	1	3	0	0	0	0	0	1	1	0	0	0	0	0	0	0	15
Total Volume	0	0	2	0	1	0	3	0	0	0	0	10	14	24	0	1	0	0	1	2	4	0	0	0	0	6	10	16	0	0	0	0	0	1	1	48
% App. Total			66.7	0	33.3							41.7	58.3		0	25	0	0	25	50						37.5	62.5		0	0	0	0	0	100		
PHF	.000	.000	.500	.000	.250	.000	.750	.000	.000	.000	.000	.625	.500	.600	.000	.250	.000	.000	.250	.500	.333	.000	.000	.000	.000	.500	.625	.667	.000	.000	.000	.000	.000	.250	.250	.800

N/S/NW: Needham Street/ Loop Driveway
E/W: Driveway/ Site Driveway South
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 DD
Site Code : 19531095
Start Date : 9/11/2014
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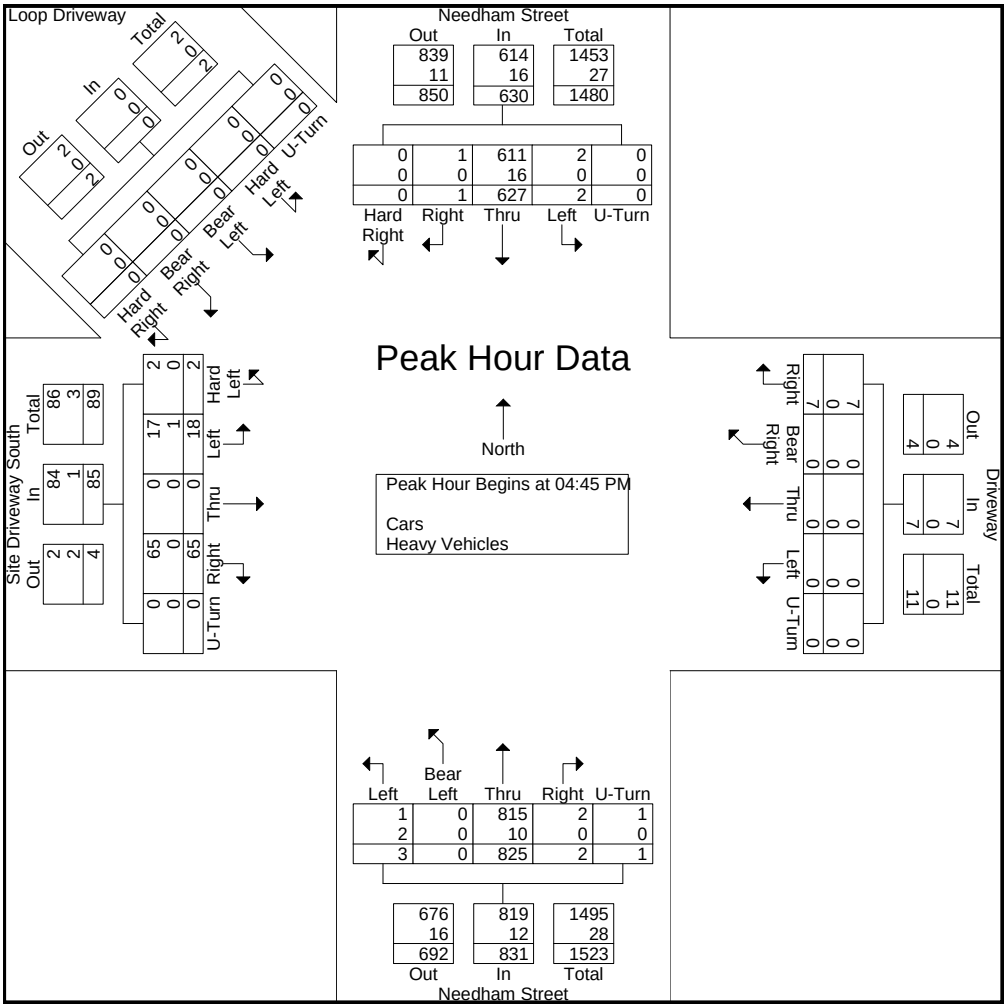
Start Time	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway South From West						Loop Driveway From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard 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	0	0	182	1	0	183	3	0	0	0	0	3	0	199	0	2	1	202	11	0	3	0	0	14	0	0	0	0	0	0	402
05:00 PM	0	1	145	1	0	147	2	0	0	0	0	2	1	197	0	0	0	198	15	0	7	0	0	22	0	0	0	0	0	0	369
05:15 PM	0	0	130	0	0	130	0	0	0	0	0	0	0	224	0	0	0	224	23	0	1	2	0	26	0	0	0	0	0	0	380
05:30 PM	0	0	170	0	0	170	2	0	0	0	0	2	1	205	0	1	0	207	16	0	7	0	0	23	0	0	0	0	0	0	402
Total Volume	0	1	627	2	0	630	7	0	0	0	0	7	2	825	0	3	1	831	65	0	18	2	0	85	0	0	0	0	0	0	1553
% App. Total	0	0.2	99.5	0.3	0		100	0	0	0	0		0.2	99.3	0	0.4	0.1		76.5	0	21.2	2.4	0		0	0	0	0	0		
PHF	.000	.250	.861	.500	.000	.861	.583	.000	.000	.000	.000	.583	.500	.921	.000	.375	.250	.927	.707	.000	.643	.250	.000	.817	.000	.000	.000	.000	.000	.000	.966
Cars	0	1	611	2	0	614	7	0	0	0	0	7	2	815	0	1	1	819	65	0	17	2	0	84	0	0	0	0	0	0	1524
% Cars	0	100	97.4	100	0	97.5	100	0	0	0	0	100	100	98.8	0	33.3	100	98.6	100	0	94.4	100	0	98.8	0	0	0	0	0	0	98.1
Heavy Vehicles	0	0	16	0	0	16	0	0	0	0	0	0	0	10	0	2	0	12	0	0	1	0	0	1	0	0	0	0	0	0	29
% Heavy Vehicles	0	0	2.6	0	0	2.5	0	0	0	0	0	0	0	1.2	0	66.7	0	1.4	0	0	5.6	0	0	1.2	0	0	0	0	0	0	1.9



N/S: Needham Street
E/W: Driveway/ Site Driveway Center
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 E
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	122	0	0	0	0	1	0	0	186	1	0	2	0	0	0	312
07:15 AM	0	113	0	0	1	0	1	0	1	201	2	0	1	0	1	0	321
07:30 AM	0	155	0	0	0	0	1	0	0	188	2	0	2	0	0	0	348
07:45 AM	4	169	0	0	2	0	0	0	0	177	6	0	3	0	0	0	361
Total	4	559	0	0	3	0	3	0	1	752	11	0	8	0	1	0	1342
08:00 AM	12	185	0	0	2	0	0	0	0	182	11	0	1	0	0	0	393
08:15 AM	9	167	0	0	2	0	1	0	1	177	8	0	4	0	1	0	370
08:30 AM	11	206	0	0	0	0	3	0	0	166	13	0	3	0	1	0	403
08:45 AM	17	189	1	0	2	0	1	0	3	171	13	0	1	0	3	0	401
Total	49	747	1	0	6	0	5	0	4	696	45	0	9	0	5	0	1567
Grand Total	53	1306	1	0	9	0	8	0	5	1448	56	0	17	0	6	0	2909
Apprch %	3.9	96	0.1	0	52.9	0	47.1	0	0.3	96	3.7	0	73.9	0	26.1	0	
Total %	1.8	44.9	0	0	0.3	0	0.3	0	0.2	49.8	1.9	0	0.6	0	0.2	0	
Cars	48	1271	1	0	7	0	7	0	5	1371	56	0	13	0	6	0	2785
% Cars	90.6	97.3	100	0	77.8	0	87.5	0	100	94.7	100	0	76.5	0	100	0	95.7
Heavy Vehicles	5	35	0	0	2	0	1	0	0	77	0	0	4	0	0	0	124
% Heavy Vehicles	9.4	2.7	0	0	22.2	0	12.5	0	0	5.3	0	0	23.5	0	0	0	4.3

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	12	185	0	0	197	2	0	0	0	2	0	182	11	0	193	1	0	0	0	1	393
08:15 AM	9	167	0	0	176	2	0	1	0	3	1	177	8	0	186	4	0	1	0	5	370
08:30 AM	11	206	0	0	217	0	0	3	0	3	0	166	13	0	179	3	0	1	0	4	403
08:45 AM	17	189	1	0	207	2	0	1	0	3	3	171	13	0	187	1	0	3	0	4	401
Total Volume	49	747	1	0	797	6	0	5	0	11	4	696	45	0	745	9	0	5	0	14	1567
% App. Total	6.1	93.7	0.1	0		54.5	0	45.5	0		0.5	93.4	6	0		64.3	0	35.7	0		
PHF	.721	.907	.250	.000	.918	.750	.000	.417	.000	.917	.333	.956	.865	.000	.965	.563	.000	.417	.000	.700	.972
Cars	44	732	1	0	777	6	0	4	0	10	4	665	45	0	714	7	0	5	0	12	1513
% Cars	89.8	98.0	100	0	97.5	100	0	80.0	0	90.9	100	95.5	100	0	95.8	77.8	0	100	0	85.7	96.6
Heavy Vehicles	5	15	0	0	20	0	0	1	0	1	0	31	0	0	31	2	0	0	0	2	54
% Heavy Vehicles	10.2	2.0	0	0	2.5	0	0	20.0	0	9.1	0	4.5	0	0	4.2	22.2	0	0	0	14.3	3.4

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N/S: Needham Street
E/W: Driveway/ Site Driveway Center
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 E
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	117	0	0	0	0	1	0	0	179	1	0	1	0	0	0	299
07:15 AM	0	110	0	0	1	0	1	0	1	187	2	0	0	0	1	0	303
07:30 AM	0	152	0	0	0	0	1	0	0	172	2	0	2	0	0	0	329
07:45 AM	4	160	0	0	0	0	0	0	0	168	6	0	3	0	0	0	341
Total	4	539	0	0	1	0	3	0	1	706	11	0	6	0	1	0	1272
08:00 AM	10	181	0	0	2	0	0	0	0	175	11	0	0	0	0	0	379
08:15 AM	9	165	0	0	2	0	1	0	1	168	8	0	4	0	1	0	359
08:30 AM	9	199	0	0	0	0	2	0	0	160	13	0	2	0	1	0	386
08:45 AM	16	187	1	0	2	0	1	0	3	162	13	0	1	0	3	0	389
Total	44	732	1	0	6	0	4	0	4	665	45	0	7	0	5	0	1513
Grand Total	48	1271	1	0	7	0	7	0	5	1371	56	0	13	0	6	0	2785
Apprch %	3.6	96.3	0.1	0	50	0	50	0	0.3	95.7	3.9	0	68.4	0	31.6	0	
Total %	1.7	45.6	0	0	0.3	0	0.3	0	0.2	49.2	2	0	0.5	0	0.2	0	

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	10	181	0	0	191	2	0	0	0	2	0	175	11	0	186	0	0	0	0	0	379
08:15 AM	9	165	0	0	174	2	0	1	0	3	1	168	8	0	177	4	0	1	0	5	359
08:30 AM	9	199	0	0	208	0	0	2	0	2	0	160	13	0	173	2	0	1	0	3	386
08:45 AM	16	187	1	0	204	2	0	1	0	3	3	162	13	0	178	1	0	3	0	4	389
Total Volume	44	732	1	0	777	6	0	4	0	10	4	665	45	0	714	7	0	5	0	12	1513
% App. Total	5.7	94.2	0.1	0		60	0	40	0		0.6	93.1	6.3	0		58.3	0	41.7	0		
PHF	.688	.920	.250	.000	.934	.750	.000	.500	.000	.833	.333	.950	.865	.000	.960	.438	.000	.417	.000	.600	.972

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N/S: Needham Street
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City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 E
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	5	0	0	0	0	0	0	0	7	0	0	1	0	0	0	13
07:15 AM	0	3	0	0	0	0	0	0	0	14	0	0	1	0	0	0	18
07:30 AM	0	3	0	0	0	0	0	0	0	16	0	0	0	0	0	0	19
07:45 AM	0	9	0	0	2	0	0	0	0	9	0	0	0	0	0	0	20
Total	0	20	0	0	2	0	0	0	0	46	0	0	2	0	0	0	70
08:00 AM	2	4	0	0	0	0	0	0	0	7	0	0	1	0	0	0	14
08:15 AM	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	11
08:30 AM	2	7	0	0	0	0	1	0	0	6	0	0	1	0	0	0	17
08:45 AM	1	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	12
Total	5	15	0	0	0	0	1	0	0	31	0	0	2	0	0	0	54
Grand Total	5	35	0	0	2	0	1	0	0	77	0	0	4	0	0	0	124
Apprch %	12.5	87.5	0	0	66.7	0	33.3	0	0	100	0	0	100	0	0	0	
Total %	4	28.2	0	0	1.6	0	0.8	0	0	62.1	0	0	3.2	0	0	0	

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	0	3	0	0	3	0	0	0	0	0	0	14	0	0	14	1	0	0	0	1	18
07:30 AM	0	3	0	0	3	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	19
07:45 AM	0	9	0	0	9	2	0	0	0	2	0	9	0	0	9	0	0	0	0	0	20
08:00 AM	2	4	0	0	6	0	0	0	0	0	0	7	0	0	7	1	0	0	0	1	14
Total Volume	2	19	0	0	21	2	0	0	0	2	0	46	0	0	46	2	0	0	0	2	71
% App. Total	9.5	90.5	0	0		100	0	0	0		0	100	0	0		100	0	0	0		
PHF	.250	.528	.000	.000	.583	.250	.000	.000	.000	.250	.000	.719	.000	.000	.719	.500	.000	.000	.000	.500	.888

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Client: Stantec/ S. Wood

File Name : 144047 E
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	3	7
07:15 AM	0	0	0	0	0	0	0	0	3	1	0	2	0	0	0	0	0	0	1	3	10
07:30 AM	0	1	0	1	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	1	9
07:45 AM	0	3	0	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	1	7	15
Total	0	5	0	1	0	0	0	0	12	1	0	3	1	0	0	0	0	0	4	14	41
08:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	8
08:15 AM	0	1	0	0	0	0	0	0	4	3	0	2	0	0	1	0	0	0	0	2	13
08:30 AM	0	1	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	0	1	2	9
08:45 AM	0	2	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	3	9
Total	0	5	0	0	0	0	0	0	9	6	0	3	0	0	1	0	0	0	2	13	39
Grand Total	0	10	0	1	0	0	0	0	21	7	0	6	1	0	1	0	0	0	6	27	80
Apprch %	0	90.9	0	9.1	0	0	0	0	75	25	0	75	12.5	0	12.5	0	0	0	18.2	81.8	
Total %	0	12.5	0	1.2	0	0	0	0	26.2	8.8	0	7.5	1.2	0	1.2	0	0	0	7.5	33.8	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway Center From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	0	1	0	1	0	2	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	1	1	2	9
07:45 AM	0	3	0	0	0	3	0	0	0	2	0	2	0	1	1	0	0	2	0	0	0	1	7	8	15
08:00 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	7	8
08:15 AM	0	1	0	0	0	1	0	0	0	4	3	7	0	2	0	0	1	3	0	0	0	0	2	2	13
Total Volume	0	6	0	1	0	7	0	0	0	11	3	14	0	3	1	0	1	5	0	0	0	3	16	19	45
% App. Total	0	85.7	0	14.3	0		0	0	0	78.6	21.4		0	60	20	0	20		0	0	0	15.8	84.2		
PHF	.000	.500	.000	.250	.000	.583	.000	.000	.000	.550	.250	.500	.000	.375	.250	.000	.250	.417	.000	.000	.000	.750	.571	.594	.750

N/S: Needham Street
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Client: Stantec/ S. Wood

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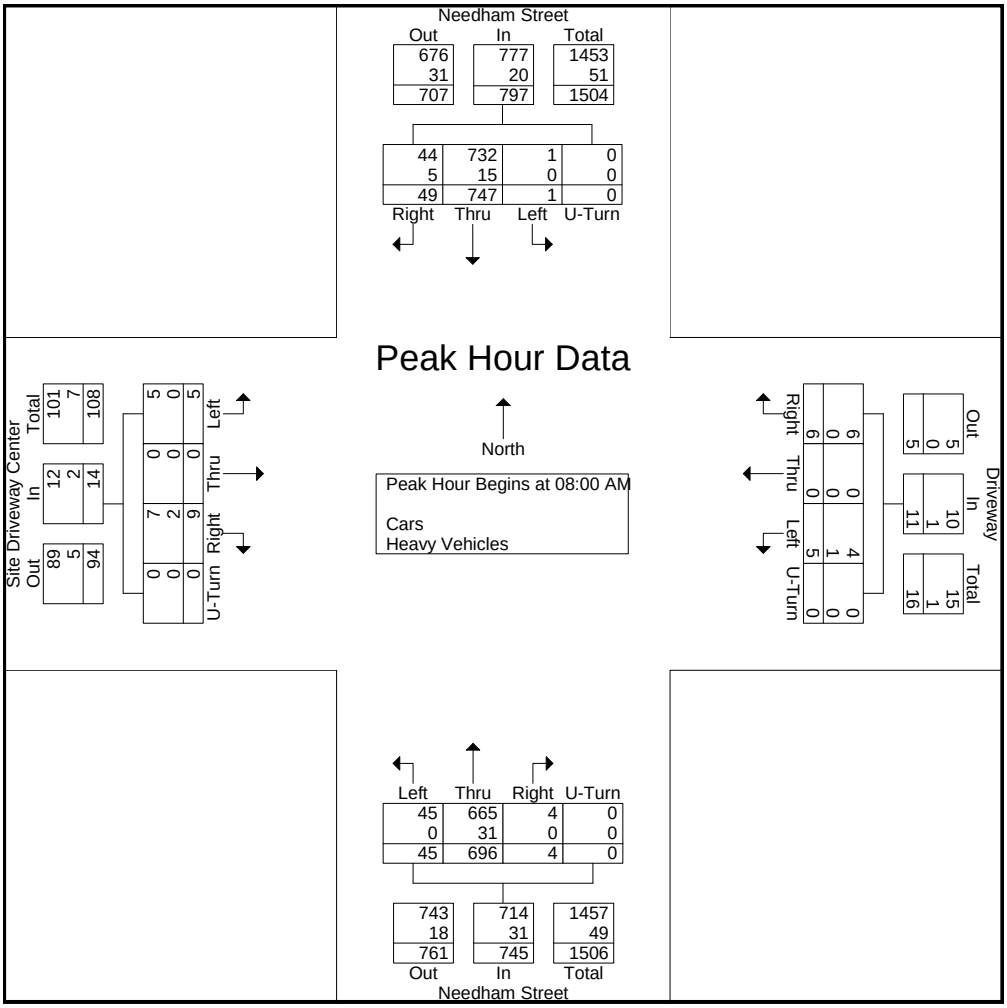
	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	12	185	0	0	197	2	0	0	0	2	0	182	11	0	193	1	0	0	0	1	393
08:15 AM	9	167	0	0	176	2	0	1	0	3	1	177	8	0	186	4	0	1	0	5	370
08:30 AM	11	206	0	0	217	0	0	3	0	3	0	166	13	0	179	3	0	1	0	4	403
08:45 AM	17	189	1	0	207	2	0	1	0	3	3	171	13	0	187	1	0	3	0	4	401
Total Volume	49	747	1	0	797	6	0	5	0	11	4	696	45	0	745	9	0	5	0	14	1567
% App. Total	6.1	93.7	0.1	0		54.5	0	45.5	0		0.5	93.4	6	0		64.3	0	35.7	0		
PHF	.721	.907	.250	.000	.918	.750	.000	.417	.000	.917	.333	.956	.865	.000	.965	.563	.000	.417	.000	.700	.972
Cars	44	732	1	0	777	6	0	4	0	10	4	665	45	0	714	7	0	5	0	12	1513
% Cars	89.8	98.0	100	0	97.5	100	0	80.0	0	90.9	100	95.5	100	0	95.8	77.8	0	100	0	85.7	96.6
Heavy Vehicles	5	15	0	0	20	0	0	1	0	1	0	31	0	0	31	2	0	0	0	2	54
% Heavy Vehicles	10.2	2.0	0	0	2.5	0	0	20.0	0	9.1	0	4.5	0	0	4.2	22.2	0	0	0	14.3	3.4



N/S: Needham Street
E/W: Driveway/ Site Driveway Center
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
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File Name : 144047 EE
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	2	165	0	0	1	0	5	0	1	165	2	0	4	0	1	0	346
04:15 PM	0	160	0	0	8	0	5	0	3	201	4	0	4	0	0	0	385
04:30 PM	4	152	0	0	1	0	4	0	2	194	3	0	5	0	1	0	366
04:45 PM	3	166	0	0	3	0	4	0	0	192	3	0	1	0	5	0	377
Total	9	643	0	0	13	0	18	0	6	752	12	0	14	0	7	0	1474
05:00 PM	0	138	0	0	0	0	3	0	1	195	3	0	12	0	9	0	361
05:15 PM	2	119	1	0	0	0	3	0	0	227	1	0	3	0	9	0	365
05:30 PM	1	151	1	0	2	0	3	0	2	216	2	0	4	0	7	0	389
05:45 PM	2	157	1	0	1	0	2	0	1	208	1	0	9	0	2	0	384
Total	5	565	3	0	3	0	11	0	4	846	7	0	28	0	27	0	1499
Grand Total	14	1208	3	0	16	0	29	0	10	1598	19	0	42	0	34	0	2973
Apprch %	1.1	98.6	0.2	0	35.6	0	64.4	0	0.6	98.2	1.2	0	55.3	0	44.7	0	
Total %	0.5	40.6	0.1	0	0.5	0	1	0	0.3	53.8	0.6	0	1.4	0	1.1	0	
Cars	14	1170	3	0	16	0	29	0	10	1579	16	0	37	0	29	0	2903
% Cars	100	96.9	100	0	100	0	100	0	100	98.8	84.2	0	88.1	0	85.3	0	97.6
Heavy Vehicles	0	38	0	0	0	0	0	0	0	19	3	0	5	0	5	0	70
% Heavy Vehicles	0	3.1	0	0	0	0	0	0	0	1.2	15.8	0	11.9	0	14.7	0	2.4

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	138	0	0	138	0	0	3	0	3	1	195	3	0	199	12	0	9	0	21	361
05:15 PM	2	119	1	0	122	0	0	3	0	3	0	227	1	0	228	3	0	9	0	12	365
05:30 PM	1	151	1	0	153	2	0	3	0	5	2	216	2	0	220	4	0	7	0	11	389
05:45 PM	2	157	1	0	160	1	0	2	0	3	1	208	1	0	210	9	0	2	0	11	384
Total Volume	5	565	3	0	573	3	0	11	0	14	4	846	7	0	857	28	0	27	0	55	1499
% App. Total	0.9	98.6	0.5	0		21.4	0	78.6	0		0.5	98.7	0.8	0		50.9	0	49.1	0		
PHF	.625	.900	.750	.000	.895	.375	.000	.917	.000	.700	.500	.932	.583	.000	.940	.583	.000	.750	.000	.655	.963
Cars	5	553	3	0	561	3	0	11	0	14	4	839	6	0	849	26	0	24	0	50	1474
% Cars	100	97.9	100	0	97.9	100	0	100	0	100	100	99.2	85.7	0	99.1	92.9	0	88.9	0	90.9	98.3
Heavy Vehicles	0	12	0	0	12	0	0	0	0	0	0	7	1	0	8	2	0	3	0	5	25
% Heavy Vehicles	0	2.1	0	0	2.1	0	0	0	0	0	0	0.8	14.3	0	0.9	7.1	0	11.1	0	9.1	1.7

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N/S: Needham Street
E/W: Driveway/ Site Driveway Center
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 EE
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	2	155	0	0	1	0	5	0	1	160	2	0	2	0	1	0	329
04:15 PM	0	156	0	0	8	0	5	0	3	198	3	0	4	0	0	0	377
04:30 PM	4	145	0	0	1	0	4	0	2	192	3	0	4	0	0	0	355
04:45 PM	3	161	0	0	3	0	4	0	0	190	2	0	1	0	4	0	368
Total	9	617	0	0	13	0	18	0	6	740	10	0	11	0	5	0	1429
05:00 PM	0	132	0	0	0	0	3	0	1	191	3	0	11	0	8	0	349
05:15 PM	2	116	1	0	0	0	3	0	0	227	0	0	3	0	9	0	361
05:30 PM	1	149	1	0	2	0	3	0	2	214	2	0	3	0	5	0	382
05:45 PM	2	156	1	0	1	0	2	0	1	207	1	0	9	0	2	0	382
Total	5	553	3	0	3	0	11	0	4	839	6	0	26	0	24	0	1474
Grand Total	14	1170	3	0	16	0	29	0	10	1579	16	0	37	0	29	0	2903
Apprch %	1.2	98.6	0.3	0	35.6	0	64.4	0	0.6	98.4	1	0	56.1	0	43.9	0	
Total %	0.5	40.3	0.1	0	0.6	0	1	0	0.3	54.4	0.6	0	1.3	0	1	0	

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	132	0	0	132	0	0	3	0	3	1	191	3	0	195	11	0	8	0	19	349
05:15 PM	2	116	1	0	119	0	0	3	0	3	0	227	0	0	227	3	0	9	0	12	361
05:30 PM	1	149	1	0	151	2	0	3	0	5	2	214	2	0	218	3	0	5	0	8	382
05:45 PM	2	156	1	0	159	1	0	2	0	3	1	207	1	0	209	9	0	2	0	11	382
Total Volume	5	553	3	0	561	3	0	11	0	14	4	839	6	0	849	26	0	24	0	50	1474
% App. Total	0.9	98.6	0.5	0		21.4	0	78.6	0		0.5	98.8	0.7	0		52	0	48	0		
PHF	.625	.886	.750	.000	.882	.375	.000	.917	.000	.700	.500	.924	.500	.000	.935	.591	.000	.667	.000	.658	.965

N/S: Needham Street
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Client: Stantec/ S. Wood

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File Name : 144047 EE
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North				Driveway From East				Needham Street From South				Site Driveway Center From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	0	10	0	0	0	0	0	0	0	5	0	0	2	0	0	0	17
04:15 PM	0	4	0	0	0	0	0	0	0	3	1	0	0	0	0	0	8
04:30 PM	0	7	0	0	0	0	0	0	0	2	0	0	1	0	1	0	11
04:45 PM	0	5	0	0	0	0	0	0	0	2	1	0	0	0	1	0	9
Total	0	26	0	0	0	0	0	0	0	12	2	0	3	0	2	0	45
05:00 PM	0	6	0	0	0	0	0	0	0	4	0	0	1	0	1	0	12
05:15 PM	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4
05:30 PM	0	2	0	0	0	0	0	0	0	2	0	0	1	0	2	0	7
05:45 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Total	0	12	0	0	0	0	0	0	0	7	1	0	2	0	3	0	25
Grand Total	0	38	0	0	0	0	0	0	0	19	3	0	5	0	5	0	70
Apprch %	0	100	0	0	0	0	0	0	0	86.4	13.6	0	50	0	50	0	
Total %	0	54.3	0	0	0	0	0	0	0	27.1	4.3	0	7.1	0	7.1	0	

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	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	Int. 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	10	0	0	10	0	0	0	0	0	0	5	0	0	5	2	0	0	0	2	17
04:15 PM	0	4	0	0	4	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	8
04:30 PM	0	7	0	0	7	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	11
04:45 PM	0	5	0	0	5	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	9
Total Volume	0	26	0	0	26	0	0	0	0	0	0	12	2	0	14	3	0	2	0	5	45
% App. Total	0	100	0	0		0	0	0	0		0	85.7	14.3	0		60	0	40	0		
PHF	.000	.650	.000	.000	.650	.000	.000	.000	.000	.000	.000	.600	.500	.000	.700	.375	.000	.500	.000	.625	.662

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N/S: Needham Street
E/W: Driveway/ Site Driveway Center
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144047 EE
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Peds and Bikes

	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	1	3	8
04:15 PM	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	2	8
04:30 PM	0	0	0	0	0	0	0	0	4	5	0	0	0	2	0	0	0	0	0	1	12
04:45 PM	0	0	0	1	0	0	0	0	2	3	0	0	0	1	0	0	0	0	2	5	14
Total	0	1	0	1	0	0	0	0	6	14	0	0	0	3	0	1	0	0	5	11	42
05:00 PM	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	5
05:15 PM	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	1	8
05:30 PM	0	0	0	0	0	0	0	1	3	6	0	1	0	0	0	0	0	0	1	2	14
05:45 PM	0	2	0	0	1	0	0	0	4	2	0	2	0	0	0	0	0	0	1	2	14
Total	0	3	0	0	1	0	0	1	8	14	0	3	0	0	0	0	0	0	6	5	41
Grand Total	0	4	0	1	1	0	0	1	14	28	0	3	0	3	0	1	0	0	11	16	83
Apprch %	0	66.7	0	16.7	16.7	0	0	2.3	32.6	65.1	0	50	0	50	0	3.6	0	0	39.3	57.1	
Total %	0	4.8	0	1.2	1.2	0	0	1.2	16.9	33.7	0	3.6	0	3.6	0	1.2	0	0	13.3	19.3	

	Needham Street From North						Driveway From East						Needham Street From South						Site Driveway Center From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. 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	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	1	0	0	1	3	5	8
04:15 PM	0	1	0	0	0	1	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	2	2	4	8
04:30 PM	0	0	0	0	0	0	0	0	0	4	5	9	0	0	0	2	0	2	0	0	0	0	1	1	12
04:45 PM	0	0	0	1	0	1	0	0	0	2	3	5	0	0	0	1	0	1	0	0	0	2	5	7	14
Total Volume	0	1	0	1	0	2	0	0	0	6	14	20	0	0	0	3	0	3	1	0	0	5	11	17	42
% App. Total	0	50	0	50	0		0	0	0	30	70		0	0	0	100	0		5.9	0	0	29.4	64.7		
PHF	.000	.250	.000	.250	.000	.500	.000	.000	.000	.375	.700	.556	.000	.000	.000	.375	.000	.375	.250	.000	.000	.625	.550	.607	.750

N/S: Needham Street
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City, State: Newton, MA
Client: Stantec/ S. Wood

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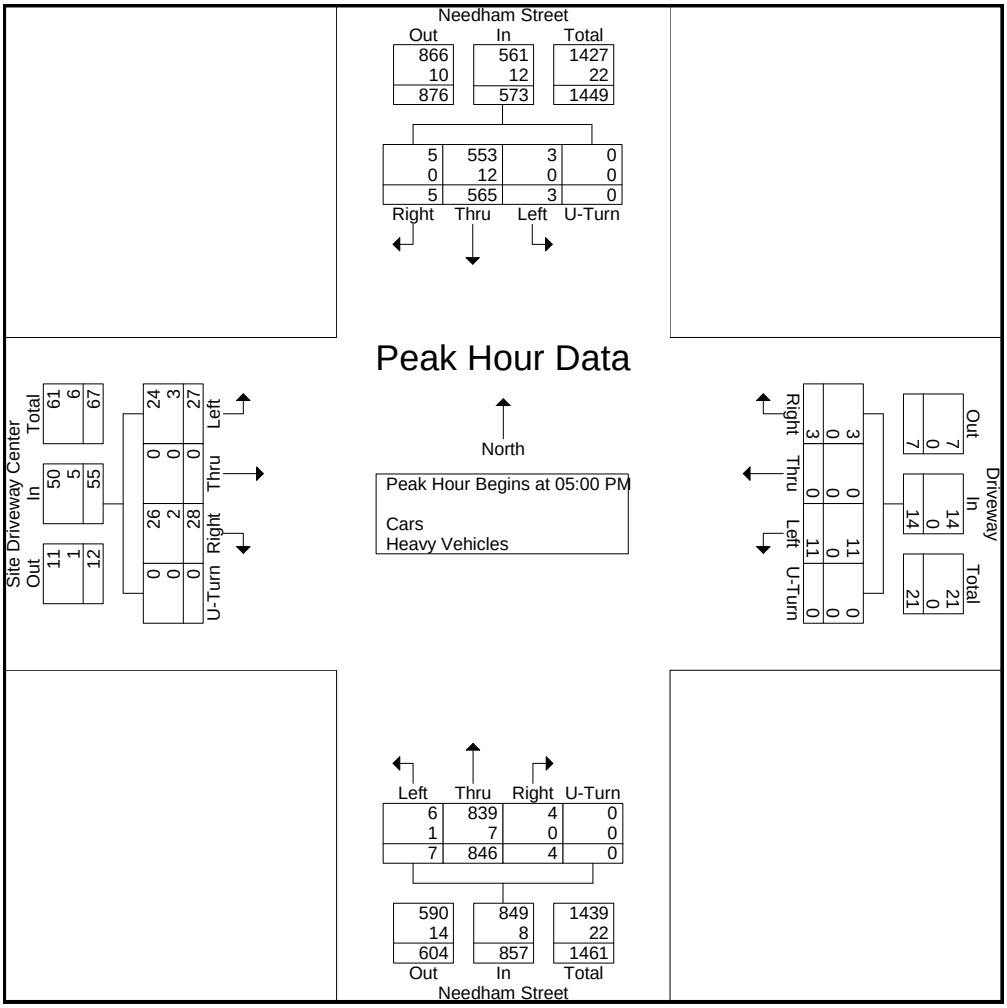
	Needham Street From North					Driveway From East					Needham Street From South					Site Driveway Center From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 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	138	0	0	138	0	0	3	0	3	1	195	3	0	199	12	0	9	0	21	361
05:15 PM	2	119	1	0	122	0	0	3	0	3	0	227	1	0	228	3	0	9	0	12	365
05:30 PM	1	151	1	0	153	2	0	3	0	5	2	216	2	0	220	4	0	7	0	11	389
05:45 PM	2	157	1	0	160	1	0	2	0	3	1	208	1	0	210	9	0	2	0	11	384
Total Volume	5	565	3	0	573	3	0	11	0	14	4	846	7	0	857	28	0	27	0	55	1499
% App. Total	0.9	98.6	0.5	0		21.4	0	78.6	0		0.5	98.7	0.8	0		50.9	0	49.1	0		
PHF	.625	.900	.750	.000	.895	.375	.000	.917	.000	.700	.500	.932	.583	.000	.940	.583	.000	.750	.000	.655	.963
Cars	5	553	3	0	561	3	0	11	0	14	4	839	6	0	849	26	0	24	0	50	1474
% Cars	100	97.9	100	0	97.9	100	0	100	0	100	100	99.2	85.7	0	99.1	92.9	0	88.9	0	90.9	98.3
Heavy Vehicles	0	12	0	0	12	0	0	0	0	0	0	7	1	0	8	2	0	3	0	5	25
% Heavy Vehicles	0	2.1	0	0	2.1	0	0	0	0	0	0	0.8	14.3	0	0.9	7.1	0	11.1	0	9.1	1.7



N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144047 F
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	129	0	175	0	0	0	0	0	304
07:15 AM	0	111	0	206	0	0	0	0	0	317
07:30 AM	1	161	0	190	0	0	0	0	0	352
07:45 AM	1	170	0	174	2	0	0	0	0	347
Total	2	571	0	745	2	0	0	0	0	1320
08:00 AM	1	203	0	179	1	0	0	1	0	385
08:15 AM	2	179	0	182	1	0	0	0	0	364
08:30 AM	4	223	0	165	4	0	1	1	0	398
08:45 AM	8	202	0	171	3	0	0	0	0	384
Total	15	807	0	697	9	0	1	2	0	1531
Grand Total	17	1378	0	1442	11	0	1	2	0	2851
Apprch %	1.2	98.8	0	99.2	0.8	0	33.3	66.7	0	
Total %	0.6	48.3	0	50.6	0.4	0	0	0.1	0	
Cars	17	1342	0	1362	11	0	1	1	0	2734
% Cars	100	97.4	0	94.5	100	0	100	50	0	95.9
Heavy Vehicles	0	36	0	80	0	0	0	1	0	117
% Heavy Vehicles	0	2.6	0	5.5	0	0	0	50	0	4.1

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	203	0	204	179	1	0	180	0	1	0	1	385
08:15 AM	2	179	0	181	182	1	0	183	0	0	0	0	364
08:30 AM	4	223	0	227	165	4	0	169	1	1	0	2	398
08:45 AM	8	202	0	210	171	3	0	174	0	0	0	0	384
Total Volume	15	807	0	822	697	9	0	706	1	2	0	3	1531
% App. Total	1.8	98.2	0		98.7	1.3	0		33.3	66.7	0		
PHF	.469	.905	.000	.905	.957	.563	.000	.964	.250	.500	.000	.375	.962
Cars	15	788	0	803	660	9	0	669	1	1	0	2	1474
% Cars	100	97.6	0	97.7	94.7	100	0	94.8	100	50.0	0	66.7	96.3
Heavy Vehicles	0	19	0	19	37	0	0	37	0	1	0	1	57
% Heavy Vehicles	0	2.4	0	2.3	5.3	0	0	5.2	0	50.0	0	33.3	3.7

N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION
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File Name : 144047 F
Site Code : 19531095
Start Date : 9/11/2014
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Groups Printed- Cars

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	125	0	169	0	0	0	0	0	294
07:15 AM	0	109	0	193	0	0	0	0	0	302
07:30 AM	1	159	0	175	0	0	0	0	0	335
07:45 AM	1	161	0	165	2	0	0	0	0	329
Total	2	554	0	702	2	0	0	0	0	1260
08:00 AM	1	196	0	169	1	0	0	0	0	367
08:15 AM	2	176	0	172	1	0	0	0	0	351
08:30 AM	4	216	0	157	4	0	1	1	0	383
08:45 AM	8	200	0	162	3	0	0	0	0	373
Total	15	788	0	660	9	0	1	1	0	1474
Grand Total	17	1342	0	1362	11	0	1	1	0	2734
Apprch %	1.3	98.7	0	99.2	0.8	0	50	50	0	
Total %	0.6	49.1	0	49.8	0.4	0	0	0	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	196	0	197	169	1	0	170	0	0	0	0	367
08:15 AM	2	176	0	178	172	1	0	173	0	0	0	0	351
08:30 AM	4	216	0	220	157	4	0	161	1	1	0	2	383
08:45 AM	8	200	0	208	162	3	0	165	0	0	0	0	373
Total Volume	15	788	0	803	660	9	0	669	1	1	0	2	1474
% App. Total	1.9	98.1	0		98.7	1.3	0		50	50	0		
PHF	.469	.912	.000	.913	.959	.563	.000	.967	.250	.250	.000	.250	.962

N/S: Needham Street
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City, State: Newton, MA
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File Name : 144047 F
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Groups Printed- Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	4	0	6	0	0	0	0	0	10
07:15 AM	0	2	0	13	0	0	0	0	0	15
07:30 AM	0	2	0	15	0	0	0	0	0	17
07:45 AM	0	9	0	9	0	0	0	0	0	18
Total	0	17	0	43	0	0	0	0	0	60
08:00 AM	0	7	0	10	0	0	0	1	0	18
08:15 AM	0	3	0	10	0	0	0	0	0	13
08:30 AM	0	7	0	8	0	0	0	0	0	15
08:45 AM	0	2	0	9	0	0	0	0	0	11
Total	0	19	0	37	0	0	0	1	0	57
Grand Total	0	36	0	80	0	0	0	1	0	117
Apprch %	0	100	0	100	0	0	0	100	0	
Total %	0	30.8	0	68.4	0	0	0	0.9	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	0	2	0	2	13	0	0	13	0	0	0	0	15
07:30 AM	0	2	0	2	15	0	0	15	0	0	0	0	17
07:45 AM	0	9	0	9	9	0	0	9	0	0	0	0	18
08:00 AM	0	7	0	7	10	0	0	10	0	1	0	1	18
Total Volume	0	20	0	20	47	0	0	47	0	1	0	1	68
% App. Total	0	100	0		100	0	0		0	100	0		
PHF	.000	.556	.000	.556	.783	.000	.000	.783	.000	.250	.000	.250	.944

N/S: Needham Street
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Site Code : 19531095
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Groups Printed- Peds and Bikes

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	0	0	0	2	3
07:15 AM	0	0	0	0	1	0	0	0	0	0	1	3	5
07:30 AM	0	1	0	0	0	0	0	0	0	0	1	0	2
07:45 AM	0	3	0	0	1	0	0	0	0	0	0	6	10
Total	0	5	0	0	2	0	0	0	0	0	2	11	20
08:00 AM	1	1	0	0	0	0	0	0	0	0	1	5	8
08:15 AM	0	1	0	0	1	0	0	0	0	0	2	3	7
08:30 AM	0	1	0	0	0	0	0	0	0	0	3	5	9
08:45 AM	0	2	0	0	0	0	0	0	0	0	2	7	11
Total	1	5	0	0	1	0	0	0	0	0	8	20	35
Grand Total	1	10	0	0	3	0	0	0	0	0	10	31	55
Apprch %	9.1	90.9	0	0	100	0	0	0	0	0	24.4	75.6	
Total %	1.8	18.2	0	0	5.5	0	0	0	0	0	18.2	56.4	

	Needham Street From North					Needham Street From South					Site Driveway North From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. 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	1	0	0	2	0	0	0	0	0	0	0	1	5	6	8
08:15 AM	0	1	0	0	1	1	0	0	0	1	0	0	2	3	5	7
08:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	3	5	8	9
08:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	2	7	9	11
Total Volume	1	5	0	0	6	1	0	0	0	1	0	0	8	20	28	35
% App. Total	16.7	83.3	0	0		100	0	0	0		0	0	28.6	71.4		
PHF	.250	.625	.000	.000	.750	.250	.000	.000	.000	.250	.000	.000	.667	.714	.778	.795

N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

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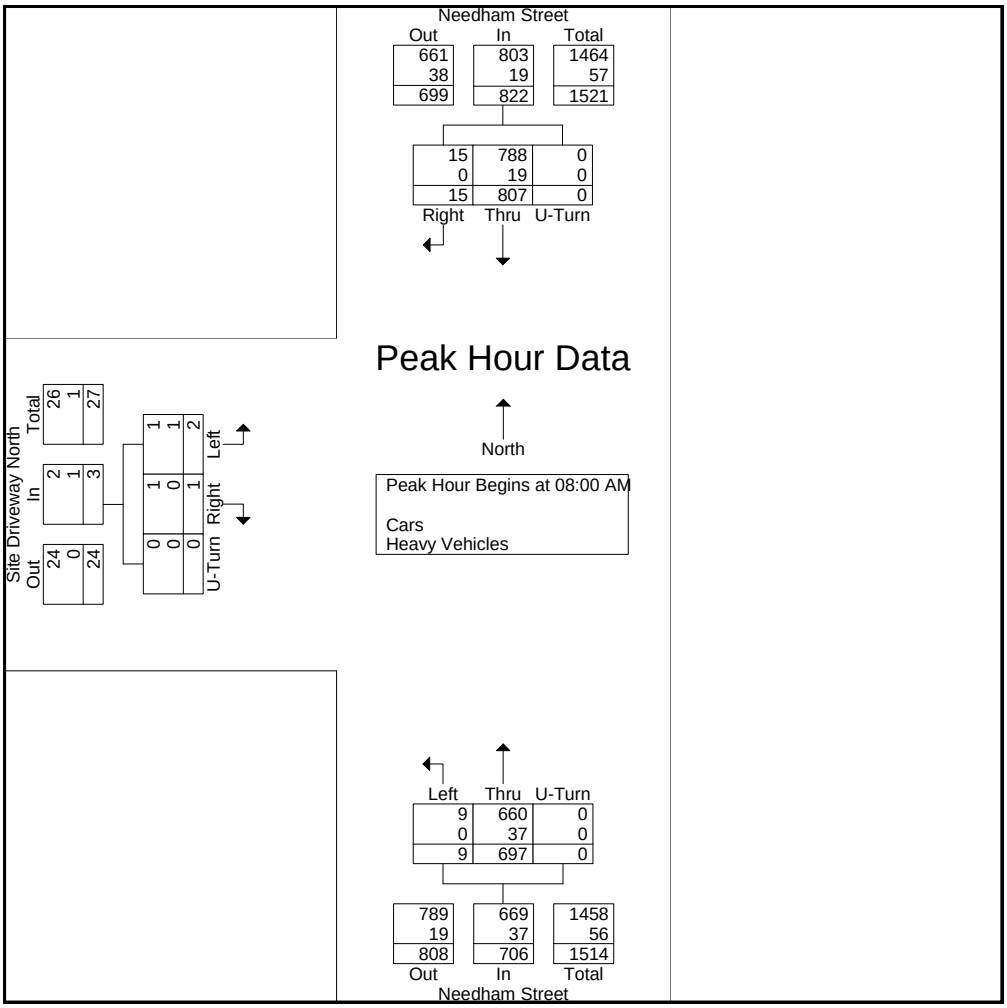
	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	1	203	0	204	179	1	0	180	0	1	0	1	385
08:15 AM	2	179	0	181	182	1	0	183	0	0	0	0	364
08:30 AM	4	223	0	227	165	4	0	169	1	1	0	2	398
08:45 AM	8	202	0	210	171	3	0	174	0	0	0	0	384
Total Volume	15	807	0	822	697	9	0	706	1	2	0	3	1531
% App. Total	1.8	98.2	0		98.7	1.3	0		33.3	66.7	0		
PHF	.469	.905	.000	.905	.957	.563	.000	.964	.250	.500	.000	.375	.962
Cars	15	788	0	803	660	9	0	669	1	1	0	2	1474
% Cars	100	97.6	0	97.7	94.7	100	0	94.8	100	50.0	0	66.7	96.3
Heavy Vehicles	0	19	0	19	37	0	0	37	0	1	0	1	57
% Heavy Vehicles	0	2.4	0	2.3	5.3	0	0	5.2	0	50.0	0	33.3	3.7



N/S: Needham Street
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File Name : 144047 FF
Site Code : 19531095
Start Date : 9/11/2014
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Groups Printed- Cars - Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	170	0	155	0	0	0	0	0	325
04:15 PM	1	156	0	205	0	0	0	0	0	362
04:30 PM	2	160	0	194	1	0	0	3	0	360
04:45 PM	0	171	0	196	1	0	3	2	0	373
Total	3	657	0	750	2	0	3	5	0	1420
05:00 PM	1	149	0	206	1	0	2	6	0	365
05:15 PM	1	121	0	226	0	1	2	3	0	354
05:30 PM	0	146	0	230	0	0	0	5	0	381
05:45 PM	0	158	0	212	0	0	3	4	0	377
Total	2	574	0	874	1	1	7	18	0	1477
Grand Total	5	1231	0	1624	3	1	10	23	0	2897
Apprch %	0.4	99.6	0	99.8	0.2	0.1	30.3	69.7	0	
Total %	0.2	42.5	0	56.1	0.1	0	0.3	0.8	0	
Cars	4	1195	0	1600	3	1	10	23	0	2836
% Cars	80	97.1	0	98.5	100	100	100	100	0	97.9
Heavy Vehicles	1	36	0	24	0	0	0	0	0	61
% Heavy Vehicles	20	2.9	0	1.5	0	0	0	0	0	2.1

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	149	0	150	206	1	0	207	2	6	0	8	365
05:15 PM	1	121	0	122	226	0	1	227	2	3	0	5	354
05:30 PM	0	146	0	146	230	0	0	230	0	5	0	5	381
05:45 PM	0	158	0	158	212	0	0	212	3	4	0	7	377
Total Volume	2	574	0	576	874	1	1	876	7	18	0	25	1477
% App. Total	0.3	99.7	0		99.8	0.1	0.1		28	72	0		
PHF	.500	.908	.000	.911	.950	.250	.250	.952	.583	.750	.000	.781	.969
Cars	2	561	0	563	864	1	1	866	7	18	0	25	1454
% Cars	100	97.7	0	97.7	98.9	100	100	98.9	100	100	0	100	98.4
Heavy Vehicles	0	13	0	13	10	0	0	10	0	0	0	0	23
% Heavy Vehicles	0	2.3	0	2.3	1.1	0	0	1.1	0	0	0	0	1.6

N/S: Needham Street
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File Name : 144047 FF
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	161	0	149	0	0	0	0	0	310
04:15 PM	1	152	0	202	0	0	0	0	0	355
04:30 PM	1	155	0	192	1	0	0	3	0	352
04:45 PM	0	166	0	193	1	0	3	2	0	365
Total	2	634	0	736	2	0	3	5	0	1382
05:00 PM	1	144	0	201	1	0	2	6	0	355
05:15 PM	1	116	0	226	0	1	2	3	0	349
05:30 PM	0	144	0	226	0	0	0	5	0	375
05:45 PM	0	157	0	211	0	0	3	4	0	375
Total	2	561	0	864	1	1	7	18	0	1454
Grand Total	4	1195	0	1600	3	1	10	23	0	2836
Apprch %	0.3	99.7	0	99.8	0.2	0.1	30.3	69.7	0	
Total %	0.1	42.1	0	56.4	0.1	0	0.4	0.8	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	144	0	145	201	1	0	202	2	6	0	8	355
05:15 PM	1	116	0	117	226	0	1	227	2	3	0	5	349
05:30 PM	0	144	0	144	226	0	0	226	0	5	0	5	375
05:45 PM	0	157	0	157	211	0	0	211	3	4	0	7	375
Total Volume	2	561	0	563	864	1	1	866	7	18	0	25	1454
% App. Total	0.4	99.6	0		99.8	0.1	0.1		28	72	0		
PHF	.500	.893	.000	.896	.956	.250	.250	.954	.583	.750	.000	.781	.969

N/S: Needham Street
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Groups Printed- Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	9	0	6	0	0	0	0	0	15
04:15 PM	0	4	0	3	0	0	0	0	0	7
04:30 PM	1	5	0	2	0	0	0	0	0	8
04:45 PM	0	5	0	3	0	0	0	0	0	8
Total	1	23	0	14	0	0	0	0	0	38
05:00 PM	0	5	0	5	0	0	0	0	0	10
05:15 PM	0	5	0	0	0	0	0	0	0	5
05:30 PM	0	2	0	4	0	0	0	0	0	6
05:45 PM	0	1	0	1	0	0	0	0	0	2
Total	0	13	0	10	0	0	0	0	0	23
Grand Total	1	36	0	24	0	0	0	0	0	61
Apprch %	2.7	97.3	0	100	0	0	0	0	0	
Total %	1.6	59	0	39.3	0	0	0	0	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	9	0	9	6	0	0	6	0	0	0	0	15
04:15 PM	0	4	0	4	3	0	0	3	0	0	0	0	7
04:30 PM	1	5	0	6	2	0	0	2	0	0	0	0	8
04:45 PM	0	5	0	5	3	0	0	3	0	0	0	0	8
Total Volume	1	23	0	24	14	0	0	14	0	0	0	0	38
% App. Total	4.2	95.8	0		100	0	0		0	0	0		
PHF	.250	.639	.000	.667	.583	.000	.000	.583	.000	.000	.000	.000	.633

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Groups Printed- Peds and Bikes

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	2	3
04:15 PM	0	1	0	0	0	0	0	0	0	0	0	2	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	2	3	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	1	4	5
Total	0	1	0	0	0	0	0	0	0	0	4	11	16
05:00 PM	0	0	0	0	0	0	0	0	0	0	4	0	4
05:15 PM	0	1	0	0	0	0	0	0	0	0	1	1	3
05:30 PM	0	1	0	0	1	0	0	0	0	0	3	0	5
05:45 PM	0	2	0	0	3	0	0	0	0	0	1	1	7
Total	0	4	0	0	4	0	0	0	0	0	9	2	19
Grand Total	0	5	0	0	4	0	0	0	0	0	13	13	35
Apprch %	0	100	0	0	100	0	0	0	0	0	50	50	
Total %	0	14.3	0	0	11.4	0	0	0	0	0	37.1	37.1	

	Needham Street From North					Needham Street From South					Site Driveway North From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. 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	0	0	0	0	0	0	4	0	4	4
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	1	2	3
05:30 PM	0	1	0	0	1	1	0	0	0	1	0	0	3	0	3	5
05:45 PM	0	2	0	0	2	3	0	0	0	3	0	0	1	1	2	7
Total Volume	0	4	0	0	4	4	0	0	0	4	0	0	9	2	11	19
% App. Total	0	100	0	0		100	0	0	0		0	0	81.8	18.2		
PHF	.000	.500	.000	.000	.500	.333	.000	.000	.000	.333	.000	.000	.563	.500	.688	.679

N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION D A T A INDUSTRIES, LLC
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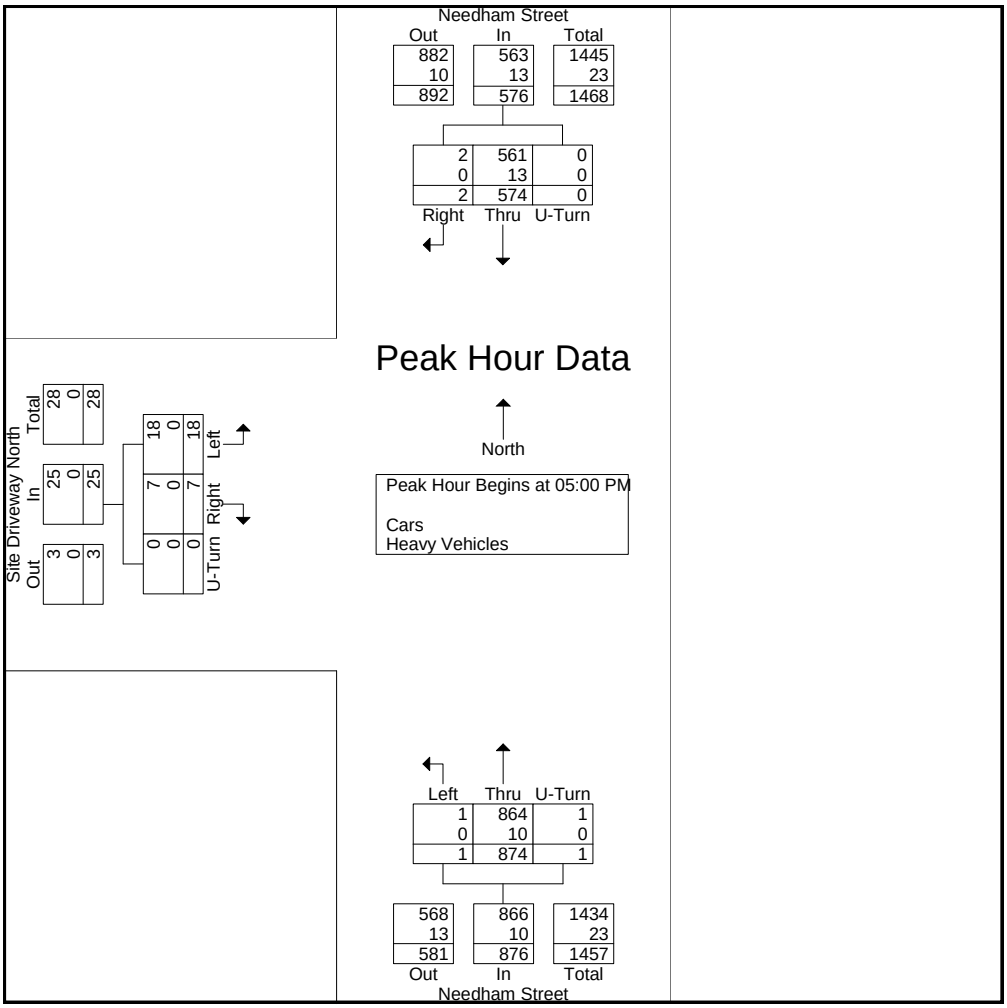
File Name : 144047 FF
Site Code : 19531095
Start Date : 9/11/2014
Page No : 1

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. 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	149	0	150	206	1	0	207	2	6	0	8	365
05:15 PM	1	121	0	122	226	0	1	227	2	3	0	5	354
05:30 PM	0	146	0	146	230	0	0	230	0	5	0	5	381
05:45 PM	0	158	0	158	212	0	0	212	3	4	0	7	377
Total Volume	2	574	0	576	874	1	1	876	7	18	0	25	1477
% App. Total	0.3	99.7	0		99.8	0.1	0.1		28	72	0		
PHF	.500	.908	.000	.911	.950	.250	.250	.952	.583	.750	.000	.781	.969
Cars	2	561	0	563	864	1	1	866	7	18	0	25	1454
% Cars	100	97.7	0	97.7	98.9	100	100	98.9	100	100	0	100	98.4
Heavy Vehicles	0	13	0	13	10	0	0	10	0	0	0	0	23
% Heavy Vehicles	0	2.3	0	2.3	1.1	0	0	1.1	0	0	0	0	1.6



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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 A
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	38	172	7	0	7	14	13	0	15	210	25	0	31	19	40	0	591
12:45 PM	42	164	7	0	17	26	28	0	8	196	34	1	26	17	47	0	613
Total	80	336	14	0	24	40	41	0	23	406	59	1	57	36	87	0	1204
01:00 PM	38	147	9	0	11	22	23	0	13	193	27	0	40	22	49	0	594
01:15 PM	38	159	14	0	16	29	27	0	15	192	29	0	30	10	39	0	598
01:30 PM	32	178	10	0	11	15	25	0	12	195	33	0	34	18	51	0	614
01:45 PM	38	163	3	0	12	16	22	0	12	182	29	0	35	32	47	0	591
Total	146	647	36	0	50	82	97	0	52	762	118	0	139	82	186	0	2397
02:00 PM	35	169	12	0	11	8	19	0	14	191	32	0	28	19	52	0	590
02:15 PM	43	161	7	0	17	19	21	0	14	178	25	0	37	22	47	0	591
02:30 PM	29	163	9	0	13	11	21	0	10	184	35	0	38	30	40	0	583
02:45 PM	28	182	7	0	14	21	16	0	10	191	17	0	32	29	50	0	597
Total	135	675	35	0	55	59	77	0	48	744	109	0	135	100	189	0	2361
03:00 PM	31	179	10	0	13	14	21	0	11	195	21	0	37	27	47	0	606
03:15 PM	33	154	10	0	13	19	17	0	12	175	15	0	24	15	37	0	524
Grand Total	425	1991	105	0	155	214	253	0	146	2282	322	1	392	260	546	0	7092
Apprch %	16.9	79	4.2	0	24.9	34.4	40.7	0	5.3	83	11.7	0	32.7	21.7	45.6	0	
Total %	6	28.1	1.5	0	2.2	3	3.6	0	2.1	32.2	4.5	0	5.5	3.7	7.7	0	
Cars	423	1974	105	0	155	213	251	0	146	2262	322	1	387	259	543	0	7041
% Cars	99.5	99.1	100	0	100	99.5	99.2	0	100	99.1	100	100	98.7	99.6	99.5	0	99.3
Heavy Vehicles	2	17	0	0	0	1	2	0	0	20	0	0	5	1	3	0	51
% Heavy Vehicles	0.5	0.9	0	0	0	0.5	0.8	0	0	0.9	0	0	1.3	0.4	0.5	0	0.7

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:45 PM																					
12:45 PM	**42**	164	7	0	213	**17**	26	**28**	0	71	8	**196**	**34**	**1**	239	26	17	47	0	90	613
01:00 PM	38	147	9	0	194	11	22	23	0	56	13	193	27	0	233	**40**	**22**	49	0	**111**	594
01:15 PM	38	159	**14**	0	211	16	**29**	27	0	**72**	**15**	192	29	0	236	30	10	39	0	79	598
01:30 PM	32	**178**	10	0	**220**	11	15	25	0	51	12	195	33	0	**240**	34	18	**51**	0	103	**614**
Total Volume	150	648	40	0	838	55	92	103	0	250	48	776	123	1	948	130	67	186	0	383	2419
% App. Total	17.9	77.3	4.8	0		22	36.8	41.2	0		5.1	81.9	13	0.1		33.9	17.5	48.6	0		
PHF	.893	.910	.714	.000	.952	.809	.793	.920	.000	.868	.800	.990	.904	.250	.988	.813	.761	.912	.000	.863	.985
Cars	149	644	40	0	833	55	91	103	0	249	48	769	123	1	941	128	67	185	0	380	2403
% Cars	99.3	99.4	100	0	99.4	100	98.9	100	0	99.6	100	99.1	100	100	99.3	98.5	100	99.5	0	99.2	99.3
Heavy Vehicles	1	4	0	0	5	0	1	0	0	1	0	7	0	0	7	2	0	1	0	3	16
% Heavy Vehicles	0.7	0.6	0	0	0.6	0	1.1	0	0	0.4	0	0.9	0	0	0.7	1.5	0	0.5	0	0.8	0.7

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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 A
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	38	171	7	0	7	14	13	0	15	201	25	0	31	18	40	0	580
12:45 PM	42	163	7	0	17	26	28	0	8	194	34	1	26	17	47	0	610
Total	80	334	14	0	24	40	41	0	23	395	59	1	57	35	87	0	1190
01:00 PM	37	144	9	0	11	21	23	0	13	189	27	0	40	22	49	0	585
01:15 PM	38	159	14	0	16	29	27	0	15	191	29	0	30	10	38	0	596
01:30 PM	32	178	10	0	11	15	25	0	12	195	33	0	32	18	51	0	612
01:45 PM	37	163	3	0	12	16	22	0	12	182	29	0	35	32	47	0	590
Total	144	644	36	0	50	81	97	0	52	757	118	0	137	82	185	0	2383
02:00 PM	35	168	12	0	11	8	18	0	14	191	32	0	28	19	52	0	588
02:15 PM	43	160	7	0	17	19	21	0	14	178	25	0	37	22	47	0	590
02:30 PM	29	160	9	0	13	11	21	0	10	184	35	0	38	30	40	0	580
02:45 PM	28	178	7	0	14	21	16	0	10	190	17	0	31	29	48	0	589
Total	135	666	35	0	55	59	76	0	48	743	109	0	134	100	187	0	2347
03:00 PM	31	179	10	0	13	14	21	0	11	193	21	0	36	27	47	0	603
03:15 PM	33	151	10	0	13	19	16	0	12	174	15	0	23	15	37	0	518
Grand Total	423	1974	105	0	155	213	251	0	146	2262	322	1	387	259	543	0	7041
Apprch %	16.9	78.9	4.2	0	25	34.4	40.5	0	5.3	82.8	11.8	0	32.5	21.8	45.7	0	
Total %	6	28	1.5	0	2.2	3	3.6	0	2.1	32.1	4.6	0	5.5	3.7	7.7	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:45 PM																					
12:45 PM	**42**	163	7	0	212	**17**	26	**28**	0	71	8	194	**34**	**1**	237	26	17	47	0	90	610
01:00 PM	37	144	9	0	190	11	21	23	0	55	13	189	27	0	229	**40**	**22**	49	0	**111**	585
01:15 PM	38	159	**14**	0	211	16	**29**	27	0	**72**	**15**	191	29	0	235	30	10	38	0	78	596
01:30 PM	32	**178**	10	0	**220**	11	15	25	0	51	12	**195**	33	0	**240**	32	18	**51**	0	101	**612**
Total Volume	149	644	40	0	833	55	91	103	0	249	48	769	123	1	941	128	67	185	0	380	2403
% App. Total	17.9	77.3	4.8	0		22.1	36.5	41.4	0		5.1	81.7	13.1	0.1		33.7	17.6	48.7	0		
PHF	.887	.904	.714	.000	.947	.809	.784	.920	.000	.865	.800	.986	.904	.250	.980	.800	.761	.907	.000	.856	.982

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N/S: Needham Street
E/W: Christina Street/ Oak Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 A
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North				Christina Street From East				Needham Street From South				Oak Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	0	1	0	0	0	0	0	0	0	9	0	0	0	1	0	0	11
12:45 PM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
Total	0	2	0	0	0	0	0	0	0	11	0	0	0	1	0	0	14
01:00 PM	1	3	0	0	0	1	0	0	0	4	0	0	0	0	0	0	9
01:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
01:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	2	3	0	0	0	1	0	0	0	5	0	0	2	0	1	0	14
02:00 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
02:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
02:45 PM	0	4	0	0	0	0	0	0	0	1	0	0	1	0	2	0	8
Total	0	9	0	0	0	0	1	0	0	1	0	0	1	0	2	0	14
03:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	3
03:15 PM	0	3	0	0	0	0	1	0	0	1	0	0	1	0	0	0	6
Grand Total	2	17	0	0	0	1	2	0	0	20	0	0	5	1	3	0	51
Apprch %	10.5	89.5	0	0	0	33.3	66.7	0	0	100	0	0	55.6	11.1	33.3	0	
Total %	3.9	33.3	0	0	0	2	3.9	0	0	39.2	0	0	9.8	2	5.9	0	

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	0	1	0	0	1	0	0	0	0	0	0	**9**	0	0	**9**	0	**1**	0	0	**1**	**11**
12:45 PM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
01:00 PM	**1**	**3**	0	0	**4**	0	**1**	0	0	**1**	0	4	0	0	4	0	0	0	0	0	9
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	**1**	0	1	2
Total Volume	1	5	0	0	6	0	1	0	0	1	0	16	0	0	16	0	1	1	0	2	25
% App. Total	16.7	83.3	0	0		0	100	0	0		0	100	0	0		0	50	50	0		
PHF	.250	.417	.000	.000	.375	.000	.250	.000	.000	.250	.000	.444	.000	.000	.444	.000	.250	.250	.000	.500	.568

N/S: Needham Street
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File Name : 144128 A
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Peds and Bicycles

	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
12:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	4
12:45 PM	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5
Total	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	9
01:00 PM	0	0	0	2	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	6
01:15 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	5
01:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
01:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
Total	0	1	0	3	2	0	0	0	1	2	0	1	0	3	1	0	2	1	0	2	19
02:00 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2	0	1	0	7
02:15 PM	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
02:30 PM	0	0	0	0	0	0	2	0	0	4	0	2	0	0	0	0	0	0	0	0	8
02:45 PM	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	1	1	0	4	0	2	6	0	3	0	0	0	0	2	0	1	0	20
03:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 PM	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	3	0	0	6
Grand Total	0	1	0	8	4	0	4	0	5	9	0	4	0	3	1	0	4	6	3	3	55
Apprch %	0	7.7	0	61.5	30.8	0	22.2	0	27.8	50	0	50	0	37.5	12.5	0	25	37.5	18.8	18.8	
Total %	0	1.8	0	14.5	7.3	0	7.3	0	9.1	16.4	0	7.3	0	5.5	1.8	0	7.3	10.9	5.5	5.5	

	Needham Street From North						Christina Street From East						Needham Street From South						Oak Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:45 PM																									
01:45 PM	0	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	**2**	**4**	5
02:00 PM	0	0	0	0	0	0	0	0	0	**2**	2	4	0	0	0	0	0	0	0	2	0	**1**	0	3	7
02:15 PM	0	0	0	0	**1**	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
02:30 PM	0	0	0	0	0	0	0	**2**	0	0	**4**	**6**	0	**2**	0	0	0	**2**	0	0	0	0	0	0	**8**
Total Volume	0	0	0	1	1	2	0	2	0	2	6	10	0	3	0	0	0	3	0	4	0	1	2	7	22
% App. Total	0	0	0	50	50		0	20	0	20	60		0	100	0	0	0		0	57.1	0	14.3	28.6		
PHF	.000	.000	.000	.250	.250	.500	.000	.250	.000	.250	.375	.417	.000	.375	.000	.000	.000	.375	.000	.500	.000	.250	.250	.438	.688

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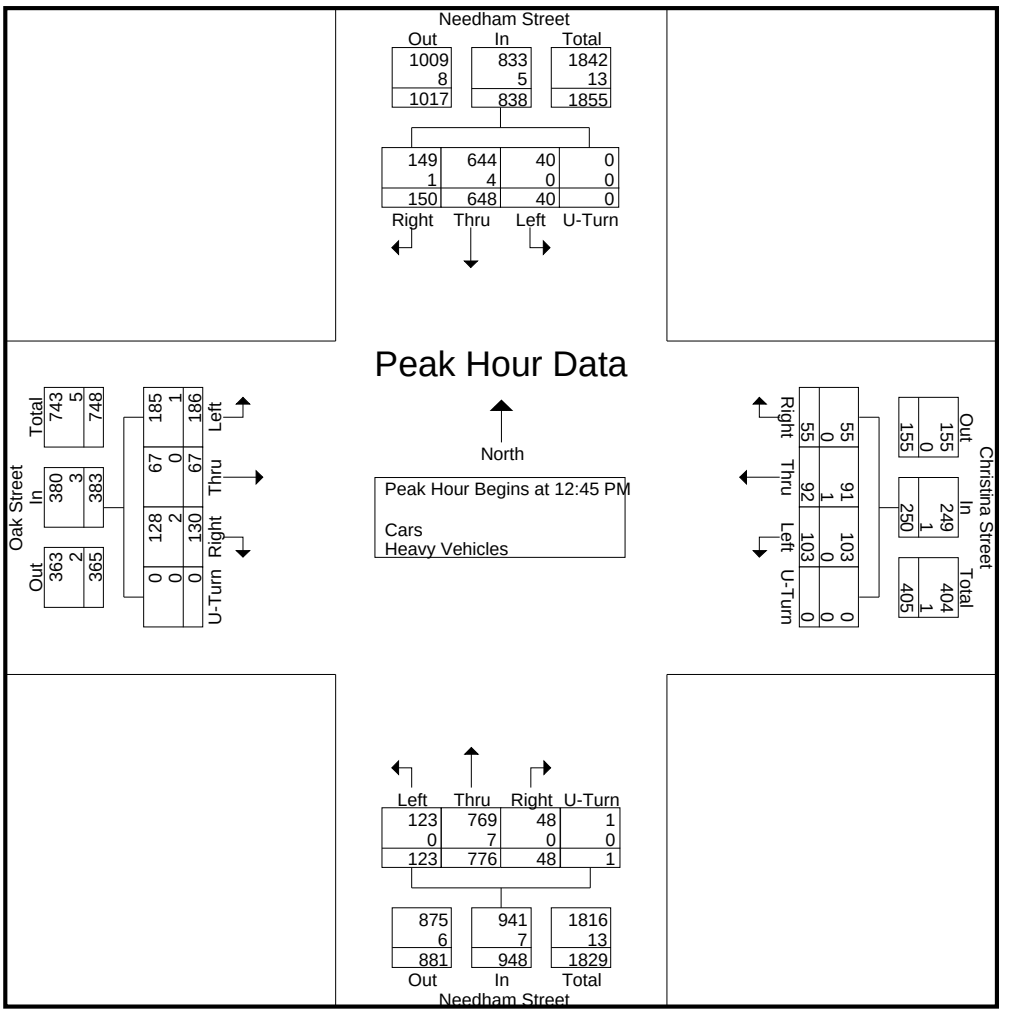
	Needham Street From North					Christina Street From East					Needham Street From South					Oak Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:45 PM																					
12:45 PM	**42**	164	7	0	213	**17**	26	**28**	0	71	8	**196**	**34**	**1**	239	26	17	47	0	90	613
01:00 PM	38	147	9	0	194	11	22	23	0	56	13	193	27	0	233	**40**	**22**	49	0	**111**	594
01:15 PM	38	159	**14**	0	211	16	**29**	27	0	**72**	**15**	192	29	0	236	30	10	39	0	79	598
01:30 PM	32	**178**	10	0	**220**	11	15	25	0	51	12	195	33	0	**240**	34	18	**51**	0	103	**614**
Total Volume	150	648	40	0	838	55	92	103	0	250	48	776	123	1	948	130	67	186	0	383	2419
% App. Total	17.9	77.3	4.8	0		22	36.8	41.2	0		5.1	81.9	13	0.1		33.9	17.5	48.6	0		
PHF	.893	.910	.714	.000	.952	.809	.793	.920	.000	.868	.800	.990	.904	.250	.988	.813	.761	.912	.000	.863	.985
Cars	149	644	40	0	833	55	91	103	0	249	48	769	123	1	941	128	67	185	0	380	2403
% Cars	99.3	99.4	100	0	99.4	100	98.9	100	0	99.6	100	99.1	100	100	99.3	98.5	100	99.5	0	99.2	99.3
Heavy Vehicles	1	4	0	0	5	0	1	0	0	1	0	7	0	0	7	2	0	1	0	3	16
% Heavy Vehicles	0.7	0.6	0	0	0.6	0	1.1	0	0	0.4	0	0.9	0	0	0.7	1.5	0	0.5	0	0.8	0.7



PRECISION
D A T A
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N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay Drive
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 B
Site Code : 19530953
Start Date : 10/18/2014

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	2	186	2	0	4	0	1	0	2	205	3	0	2	0	2	0	409
12:45 PM	1	185	2	0	3	0	6	0	1	215	2	0	3	0	2	0	420
Total	3	371	4	0	7	0	7	0	3	420	5	0	5	0	4	0	829
01:00 PM	3	180	1	0	3	0	1	0	3	211	6	0	4	0	3	0	415
01:15 PM	5	188	0	0	3	0	2	0	2	214	3	0	1	0	3	0	421
01:30 PM	1	203	2	0	2	0	7	0	2	184	4	0	2	0	4	1	412
01:45 PM	3	203	4	0	5	0	4	0	3	230	5	0	2	0	3	0	462
Total	12	774	7	0	13	0	14	0	10	839	18	0	9	0	13	1	1710
02:00 PM	2	194	0	0	2	0	5	0	0	217	5	0	4	0	5	0	434
02:15 PM	2	196	0	0	4	0	2	0	3	199	6	0	6	0	4	0	422
02:30 PM	1	157	1	0	1	0	4	0	3	212	2	0	2	0	3	0	386
02:45 PM	1	198	0	0	2	0	3	0	0	230	2	0	6	0	4	0	446
Total	6	745	1	0	9	0	14	0	6	858	15	0	18	0	16	0	1688
03:00 PM	3	158	0	0	1	0	5	0	3	193	1	0	1	0	2	0	367
03:15 PM	2	170	0	0	2	0	1	0	1	175	3	0	2	0	4	0	360
Grand Total	26	2218	12	0	32	0	41	0	23	2485	42	0	35	0	39	1	4954
Apprch %	1.2	98.3	0.5	0	43.8	0	56.2	0	0.9	97.5	1.6	0	46.7	0	52	1.3	
Total %	0.5	44.8	0.2	0	0.6	0	0.8	0	0.5	50.2	0.8	0	0.7	0	0.8	0	
Cars	26	2206	11	0	31	0	40	0	23	2462	42	0	35	0	39	1	4916
% Cars	100	99.5	91.7	0	96.9	0	97.6	0	100	99.1	100	0	100	0	100	100	99.2
Heavy Vehicles	0	12	1	0	1	0	1	0	0	23	0	0	0	0	0	0	38
% Heavy Vehicles	0	0.5	8.3	0	3.1	0	2.4	0	0	0.9	0	0	0	0	0	0	0.8

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:30 PM																					
01:30 PM	1	**203**	2	0	206	2	0	**7**	0	**9**	2	184	4	0	190	2	0	4	**1**	7	412
01:45 PM	**3**	203	**4**	0	**210**	**5**	0	4	0	9	**3**	**230**	5	0	**238**	2	0	3	0	5	**462**
02:00 PM	2	194	0	0	196	2	0	5	0	7	0	217	5	0	222	4	0	**5**	0	9	434
02:15 PM	2	196	0	0	198	4	0	2	0	6	3	199	**6**	0	208	**6**	0	4	0	**10**	422
Total Volume	8	796	6	0	810	13	0	18	0	31	8	830	20	0	858	14	0	16	1	31	1730
% App. Total	1	98.3	0.7	0		41.9	0	58.1	0		0.9	96.7	2.3	0		45.2	0	51.6	3.2		
PHF	.667	.980	.375	.000	.964	.650	.000	.643	.000	.861	.667	.902	.833	.000	.901	.583	.000	.800	.250	.775	.936
Cars	8	791	6	0	805	12	0	17	0	29	8	827	20	0	855	14	0	16	1	31	1720
% Cars	100	99.4	100	0	99.4	92.3	0	94.4	0	93.5	100	99.6	100	0	99.7	100	0	100	100	100	99.4
Heavy Vehicles	0	5	0	0	5	1	0	1	0	2	0	3	0	0	3	0	0	0	0	0	10
% Heavy Vehicles	0	0.6	0	0	0.6	7.7	0	5.6	0	6.5	0	0.4	0	0	0.3	0	0	0	0	0	0.6

PRECISION
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N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay Drive
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 B
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	2	185	1	0	4	0	1	0	2	196	3	0	2	0	2	0	398
12:45 PM	1	181	2	0	3	0	6	0	1	214	2	0	3	0	2	0	415
Total	3	366	3	0	7	0	7	0	3	410	5	0	5	0	4	0	813
01:00 PM	3	180	1	0	3	0	1	0	3	207	6	0	4	0	3	0	411
01:15 PM	5	188	0	0	3	0	2	0	2	212	3	0	1	0	3	0	419
01:30 PM	1	202	2	0	1	0	7	0	2	183	4	0	2	0	4	1	409
01:45 PM	3	202	4	0	5	0	4	0	3	229	5	0	2	0	3	0	460
Total	12	772	7	0	12	0	14	0	10	831	18	0	9	0	13	1	1699
02:00 PM	2	193	0	0	2	0	5	0	0	217	5	0	4	0	5	0	433
02:15 PM	2	194	0	0	4	0	1	0	3	198	6	0	6	0	4	0	418
02:30 PM	1	156	1	0	1	0	4	0	3	212	2	0	2	0	3	0	385
02:45 PM	1	197	0	0	2	0	3	0	0	228	2	0	6	0	4	0	443
Total	6	740	1	0	9	0	13	0	6	855	15	0	18	0	16	0	1679
03:00 PM	3	158	0	0	1	0	5	0	3	192	1	0	1	0	2	0	366
03:15 PM	2	170	0	0	2	0	1	0	1	174	3	0	2	0	4	0	359
Grand Total	26	2206	11	0	31	0	40	0	23	2462	42	0	35	0	39	1	4916
Apprch %	1.2	98.4	0.5	0	43.7	0	56.3	0	0.9	97.4	1.7	0	46.7	0	52	1.3	
Total %	0.5	44.9	0.2	0	0.6	0	0.8	0	0.5	50.1	0.9	0	0.7	0	0.8	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:15 PM																					
01:15 PM	**5**	188	0	0	193	3	0	2	0	5	2	212	3	0	217	1	0	3	0	4	419
01:30 PM	1	**202**	2	0	205	1	0	**7**	0	8	2	183	4	0	189	2	0	4	**1**	7	409
01:45 PM	3	202	**4**	0	**209**	**5**	0	4	0	**9**	**3**	**229**	**5**	0	**237**	2	0	3	0	5	**460**
02:00 PM	2	193	0	0	195	2	0	5	0	7	0	217	5	0	222	**4**	0	**5**	0	**9**	433
Total Volume	11	785	6	0	802	11	0	18	0	29	7	841	17	0	865	9	0	15	1	25	1721
% App. Total	1.4	97.9	0.7	0		37.9	0	62.1	0		0.8	97.2	2	0		36	0	60	4		
PHF	.550	.972	.375	.000	.959	.550	.000	.643	.000	.806	.583	.918	.850	.000	.912	.563	.000	.750	.250	.694	.935

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N/S: Needham Street
E/W: Columbia Avenue/ Avalon Bay Drive
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 B
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North				Columbia Avenue From East				Needham Street From South				Avalon Bay Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	0	1	1	0	0	0	0	0	0	9	0	0	0	0	0	0	11
12:45 PM	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5
Total	0	5	1	0	0	0	0	0	0	10	0	0	0	0	0	0	16
01:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
01:30 PM	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3
01:45 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Total	0	2	0	0	1	0	0	0	0	8	0	0	0	0	0	0	11
02:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:15 PM	0	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4
02:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:45 PM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
Total	0	5	0	0	0	0	1	0	0	3	0	0	0	0	0	0	9
03:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
03:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Grand Total	0	12	1	0	1	0	1	0	0	23	0	0	0	0	0	0	38
Apprch %	0	92.3	7.7	0	50	0	50	0	0	100	0	0	0	0	0	0	
Total %	0	31.6	2.6	0	2.6	0	2.6	0	0	60.5	0	0	0	0	0	0	

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	0	1	**1**	0	2	0	0	0	0	0	0	**9**	0	0	**9**	0	0	0	0	0	**11**
12:45 PM	0	**4**	0	0	**4**	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
Total Volume	0	5	1	0	6	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	22
% App. Total	0	83.3	16.7	0		0	0	0	0		0	100	0	0		0	0	0	0		
PHF	.000	.313	.250	.000	.375	.000	.000	.000	.000	.000	.000	.444	.000	.000	.444	.000	.000	.000	.000	.000	.500

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City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 B
Site Code : 19530953
Start Date : 10/18/2014

Groups Printed- Peds and Bicycles

	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay Driveway From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
12:30 PM	0	1	0	1	2	0	0	3	1	2	0	0	0	0	0	0	0	0	2	4	16
12:45 PM	0	0	0	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	8
Total	0	1	0	3	4	0	0	3	1	3	0	0	0	0	0	0	0	0	5	4	24
01:00 PM	0	1	0	0	0	0	0	0	1	2	0	1	0	1	0	0	0	0	1	3	10
01:15 PM	0	0	0	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	4	2	11
01:30 PM	0	1	0	0	0	0	0	0	0	4	0	2	0	0	0	0	0	0	2	3	12
01:45 PM	0	0	0	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	2	9
Total	0	2	0	3	1	0	0	0	1	11	0	5	0	1	1	0	0	0	7	10	42
02:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
02:15 PM	0	0	0	1	2	1	0	0	4	2	0	1	0	0	0	0	0	0	1	0	12
02:30 PM	0	2	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	6
02:45 PM	0	2	0	0	1	0	0	0	2	5	0	0	0	1	0	0	0	0	1	6	18
Total	0	5	0	1	4	1	0	0	6	8	0	2	0	1	0	0	0	0	2	8	38
03:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	5	3	10
03:15 PM	0	0	0	0	2	0	0	0	0	3	0	0	0	0	0	0	0	0	1	1	7
Grand Total	0	8	0	7	12	1	0	3	8	26	0	7	0	2	1	0	0	0	20	26	121
Apprch %	0	29.6	0	25.9	44.4	2.6	0	7.9	21.1	68.4	0	70	0	20	10	0	0	0	43.5	56.5	
Total %	0	6.6	0	5.8	9.9	0.8	0	2.5	6.6	21.5	0	5.8	0	1.7	0.8	0	0	0	16.5	21.5	

	Needham Street From North						Columbia Avenue From East						Needham Street From South						Avalon Bay Driveway From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:15 PM																									
02:15 PM	0	0	0	**1**	**2**	**3**	**1**	0	0	**4**	2	**7**	0	**1**	0	0	0	**1**	0	0	0	1	0	1	12
02:30 PM	0	**2**	0	0	1	3	0	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	1	1	6
02:45 PM	0	2	0	0	1	3	0	0	0	2	**5**	7	0	0	0	**1**	0	1	0	0	0	1	**6**	7	**18**
03:00 PM	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	**5**	3	**8**	10
Total Volume	0	4	0	1	5	10	1	0	0	6	9	16	0	2	0	1	0	3	0	0	0	7	10	17	46
% App. Total	0	40	0	10	50		6.2	0	0	37.5	56.2		0	66.7	0	33.3	0		0	0	0	41.2	58.8		
PHF	.000	.500	.000	.250	.625	.833	.250	.000	.000	.375	.450	.571	.000	.500	.000	.250	.000	.750	.000	.000	.000	.350	.417	.531	.639

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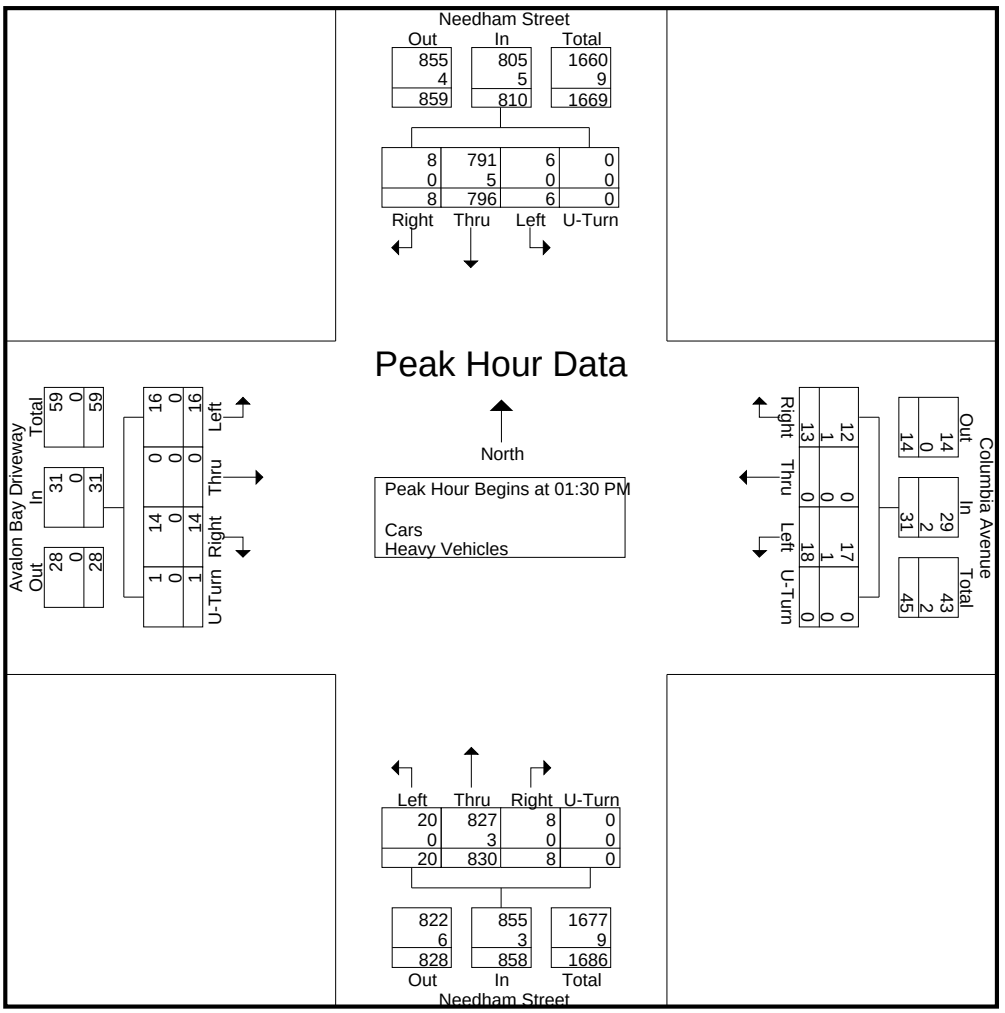
	Needham Street From North					Columbia Avenue From East					Needham Street From South					Avalon Bay Driveway From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:30 PM																					
01:30 PM	1	**203**	2	0	206	2	0	**7**	0	**9**	2	184	4	0	190	2	0	4	**1**	7	412
01:45 PM	**3**	203	**4**	0	**210**	**5**	0	4	0	9	**3**	**230**	5	0	**238**	2	0	3	0	5	**462**
02:00 PM	2	194	0	0	196	2	0	5	0	7	0	217	5	0	222	4	0	**5**	0	9	434
02:15 PM	2	196	0	0	198	4	0	2	0	6	3	199	**6**	0	208	**6**	0	4	0	**10**	422
Total Volume	8	796	6	0	810	13	0	18	0	31	8	830	20	0	858	14	0	16	1	31	1730
% App. Total	1	98.3	0.7	0		41.9	0	58.1	0		0.9	96.7	2.3	0		45.2	0	51.6	3.2		
PHF	.667	.980	.375	.000	.964	.650	.000	.643	.000	.861	.667	.902	.833	.000	.901	.583	.000	.800	.250	.775	.936
Cars	8	791	6	0	805	12	0	17	0	29	8	827	20	0	855	14	0	16	1	31	1720
% Cars	100	99.4	100	0	99.4	92.3	0	94.4	0	93.5	100	99.6	100	0	99.7	100	0	100	100	100	99.4
Heavy Vehicles	0	5	0	0	5	1	0	1	0	2	0	3	0	0	3	0	0	0	0	0	10
% Heavy Vehicles	0	0.6	0	0	0.6	7.7	0	5.6	0	6.5	0	0.4	0	0	0.3	0	0	0	0	0	0.6



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: Winchester Street
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 C
Site Code : 19530953
Start Date : 10/18/2014

Groups Printed- Cars - Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	160	34	17	0	26	31	1	0	1	29	9	0	11	35	184	0	538
12:45 PM	158	44	18	0	20	30	6	0	1	34	8	0	13	35	185	0	552
Total	318	78	35	0	46	61	7	0	2	63	17	0	24	70	369	0	1090
01:00 PM	153	43	19	0	33	25	1	0	0	46	9	0	23	25	174	0	551
01:15 PM	166	44	39	0	38	28	3	0	1	41	6	0	11	26	179	0	582
01:30 PM	160	30	21	0	21	43	3	0	5	39	11	0	13	24	145	0	515
01:45 PM	167	37	22	0	30	30	4	0	2	43	6	0	27	25	188	1	582
Total	646	154	101	0	122	126	11	0	8	169	32	0	74	100	686	1	2230
02:00 PM	172	35	14	0	19	27	1	0	1	20	6	0	16	33	182	0	526
02:15 PM	154	31	25	0	27	27	1	0	1	51	8	0	11	31	185	0	552
02:30 PM	147	28	16	0	22	21	3	0	0	21	4	0	18	31	173	0	484
02:45 PM	164	28	26	0	18	28	1	0	0	38	5	0	16	30	178	0	532
Total	637	122	81	0	86	103	6	0	2	130	23	0	61	125	718	0	2094
03:00 PM	145	44	13	0	30	24	5	0	0	33	5	0	13	31	146	0	489
03:15 PM	145	44	13	0	14	26	2	0	0	28	4	0	16	24	150	0	466
Grand Total	1891	442	243	0	298	340	31	0	12	423	81	0	188	350	2069	1	6369
Apprch %	73.4	17.2	9.4	0	44.5	50.8	4.6	0	2.3	82	15.7	0	7.2	13.4	79.3	0	
Total %	29.7	6.9	3.8	0	4.7	5.3	0.5	0	0.2	6.6	1.3	0	3	5.5	32.5	0	
Cars	1876	440	243	0	296	339	31	0	12	422	81	0	188	347	2048	1	6324
% Cars	99.2	99.5	100	0	99.3	99.7	100	0	100	99.8	100	0	100	99.1	99	100	99.3
Heavy Vehicles	15	2	0	0	2	1	0	0	0	1	0	0	0	3	21	0	45
% Heavy Vehicles	0.8	0.5	0	0	0.7	0.3	0	0	0	0.2	0	0	0	0.9	1	0	0.7

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:00 PM																					
01:00 PM	153	43	19	0	215	33	25	1	0	59	0	**46**	9	0	**55**	23	25	174	0	222	551
01:15 PM	166	**44**	**39**	0	**249**	**38**	28	3	0	**69**	1	41	6	0	48	11	**26**	179	0	216	**582**
01:30 PM	160	30	21	0	211	21	**43**	3	0	67	**5**	39	**11**	0	55	13	24	145	0	182	515
01:45 PM	**167**	37	22	0	226	30	30	**4**	0	64	2	43	6	0	51	**27**	25	**188**	**1**	**241**	582
Total Volume	646	154	101	0	901	122	126	11	0	259	8	169	32	0	209	74	100	686	1	861	2230
% App. Total	71.7	17.1	11.2	0		47.1	48.6	4.2	0		3.8	80.9	15.3	0		8.6	11.6	79.7	0.1		
PHF	.967	.875	.647	.000	.905	.803	.733	.688	.000	.938	.400	.918	.727	.000	.950	.685	.962	.912	.250	.893	.958
Cars	644	154	101	0	899	122	126	11	0	259	8	168	32	0	208	74	98	681	1	854	2220
% Cars	99.7	100	100	0	99.8	100	100	100	0	100	100	99.4	100	0	99.5	100	98.0	99.3	100	99.2	99.6
Heavy Vehicles	2	0	0	0	2	0	0	0	0	0	0	1	0	0	1	0	2	5	0	7	10
% Heavy Vehicles	0.3	0	0	0	0.2	0	0	0	0	0	0	0.6	0	0	0.5	0	2.0	0.7	0	0.8	0.4

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: Winchester Street
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 C
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	156	34	17	0	26	30	1	0	1	29	9	0	11	34	175	0	523
12:45 PM	155	44	18	0	19	30	6	0	1	34	8	0	13	35	183	0	546
Total	311	78	35	0	45	60	7	0	2	63	17	0	24	69	358	0	1069
01:00 PM	153	43	19	0	33	25	1	0	0	46	9	0	23	24	171	0	547
01:15 PM	165	44	39	0	38	28	3	0	1	40	6	0	11	26	179	0	580
01:30 PM	159	30	21	0	21	43	3	0	5	39	11	0	13	23	144	0	512
01:45 PM	167	37	22	0	30	30	4	0	2	43	6	0	27	25	187	1	581
Total	644	154	101	0	122	126	11	0	8	168	32	0	74	98	681	1	2220
02:00 PM	170	34	14	0	19	27	1	0	1	20	6	0	16	33	182	0	523
02:15 PM	153	31	25	0	27	27	1	0	1	51	8	0	11	31	184	0	550
02:30 PM	146	28	16	0	22	21	3	0	0	21	4	0	18	31	173	0	483
02:45 PM	163	28	26	0	18	28	1	0	0	38	5	0	16	30	176	0	529
Total	632	121	81	0	86	103	6	0	2	130	23	0	61	125	715	0	2085
03:00 PM	144	43	13	0	30	24	5	0	0	33	5	0	13	31	145	0	486
03:15 PM	145	44	13	0	13	26	2	0	0	28	4	0	16	24	149	0	464
Grand Total	1876	440	243	0	296	339	31	0	12	422	81	0	188	347	2048	1	6324
Apprch %	73.3	17.2	9.5	0	44.4	50.9	4.7	0	2.3	81.9	15.7	0	7.3	13.4	79.3	0	
Total %	29.7	7	3.8	0	4.7	5.4	0.5	0	0.2	6.7	1.3	0	3	5.5	32.4	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:00 PM																					
01:00 PM	153	43	19	0	215	33	25	1	0	59	0	**46**	9	0	**55**	23	24	171	0	218	547
01:15 PM	165	**44**	**39**	0	**248**	**38**	28	3	0	**69**	1	40	6	0	47	11	**26**	179	0	216	580
01:30 PM	159	30	21	0	210	21	**43**	3	0	67	**5**	39	**11**	0	55	13	23	144	0	180	512
01:45 PM	**167**	37	22	0	226	30	30	**4**	0	64	2	43	6	0	51	**27**	25	**187**	**1**	**240**	**581**
Total Volume	644	154	101	0	899	122	126	11	0	259	8	168	32	0	208	74	98	681	1	854	2220
% App. Total	71.6	17.1	11.2	0		47.1	48.6	4.2	0		3.8	80.8	15.4	0		8.7	11.5	79.7	0.1		
PHF	.964	.875	.647	.000	.906	.803	.733	.688	.000	.938	.400	.913	.727	.000	.945	.685	.942	.910	.250	.890	.955

PRECISION
D A T A
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N/S: Winchester Street
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 C
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Winchester Street From North				Dedham Street From East				Winchester Street From South				Needham Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	4	0	0	0	0	1	0	0	0	0	0	0	0	1	9	0	15
12:45 PM	3	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	6
Total	7	0	0	0	1	1	0	0	0	0	0	0	0	1	11	0	21
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	4
01:15 PM	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
01:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	2	0	0	0	0	0	0	0	0	1	0	0	0	2	5	0	10
02:00 PM	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
02:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
02:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
Total	5	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9
03:00 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
03:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2
Grand Total	15	2	0	0	2	1	0	0	0	1	0	0	0	3	21	0	45
Apprch %	88.2	11.8	0	0	66.7	33.3	0	0	0	100	0	0	0	12.5	87.5	0	
Total %	33.3	4.4	0	0	4.4	2.2	0	0	0	2.2	0	0	0	6.7	46.7	0	

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	**4**	0	0	0	**4**	0	**1**	0	0	**1**	0	0	0	0	0	0	**1**	**9**	0	**10**	**15**
12:45 PM	3	0	0	0	3	**1**	0	0	0	1	0	0	0	0	0	0	0	2	0	2	6
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	4	4
01:15 PM	1	0	0	0	1	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	2
Total Volume	8	0	0	0	8	1	1	0	0	2	0	1	0	0	1	0	2	14	0	16	27
% App. Total	100	0	0	0		50	50	0	0		0	100	0	0		0	12.5	87.5	0		
PHF	.500	.000	.000	.000	.500	.250	.250	.000	.000	.500	.000	.250	.000	.000	.250	.000	.500	.389	.000	.400	.450

PRECISION
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N/S: Winchester Street
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 C
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Peds and Bicycles

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
12:30 PM	1	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
12:45 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	3
Total	1	7	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	11
01:00 PM	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
01:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
01:30 PM	0	2	0	2	0	0	0	0	0	2	0	2	0	0	3	0	0	1	0	0	12
01:45 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	2	1	0	0	2	0	0	7
Total	0	4	0	2	0	0	0	0	2	2	0	3	0	3	4	0	0	3	0	0	23
02:00 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5
02:15 PM	0	1	0	0	0	0	0	0	2	1	0	0	0	0	1	1	1	0	0	0	7
02:30 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	3	0	0	0	0	0	0	6
02:45 PM	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	7
Total	2	1	0	0	1	0	0	0	3	8	0	0	0	3	4	1	1	1	0	0	25
03:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	0	5
03:15 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Grand Total	3	12	0	2	2	0	0	0	7	12	0	3	0	6	13	1	1	4	0	0	66
Apprch %	15.8	63.2	0	10.5	10.5	0	0	0	36.8	63.2	0	13.6	0	27.3	59.1	16.7	16.7	66.7	0	0	
Total %	4.5	18.2	0	3	3	0	0	0	10.6	18.2	0	4.5	0	9.1	19.7	1.5	1.5	6.1	0	0	

	Winchester Street From North						Dedham Street From East						Winchester Street From South						Needham Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:30 PM																									
01:30 PM	0	**2**	0	**2**	0	**4**	0	0	0	0	2	2	0	**2**	0	0	**3**	**5**	0	0	1	0	0	1	**12**
01:45 PM	0	0	0	0	0	0	0	0	0	**2**	0	2	0	0	0	**2**	1	3	0	0	**2**	0	0	**2**	7
02:00 PM	0	0	0	0	0	0	0	0	0	0	**5**	**5**	0	0	0	0	0	0	0	0	0	0	0	0	5
02:15 PM	0	1	0	0	0	1	0	0	0	2	1	3	0	0	0	0	1	1	**1**	**1**	0	0	0	2	7
Total Volume	0	3	0	2	0	5	0	0	0	4	8	12	0	2	0	2	5	9	1	1	3	0	0	5	31
% App. Total	0	60	0	40	0		0	0	0	33.3	66.7		0	22.2	0	22.2	55.6		20	20	60	0	0		
PHF	.000	.375	.000	.250	.000	.313	.000	.000	.000	.500	.400	.600	.000	.250	.000	.250	.417	.450	.250	.250	.375	.000	.000	.625	.646

PRECISION
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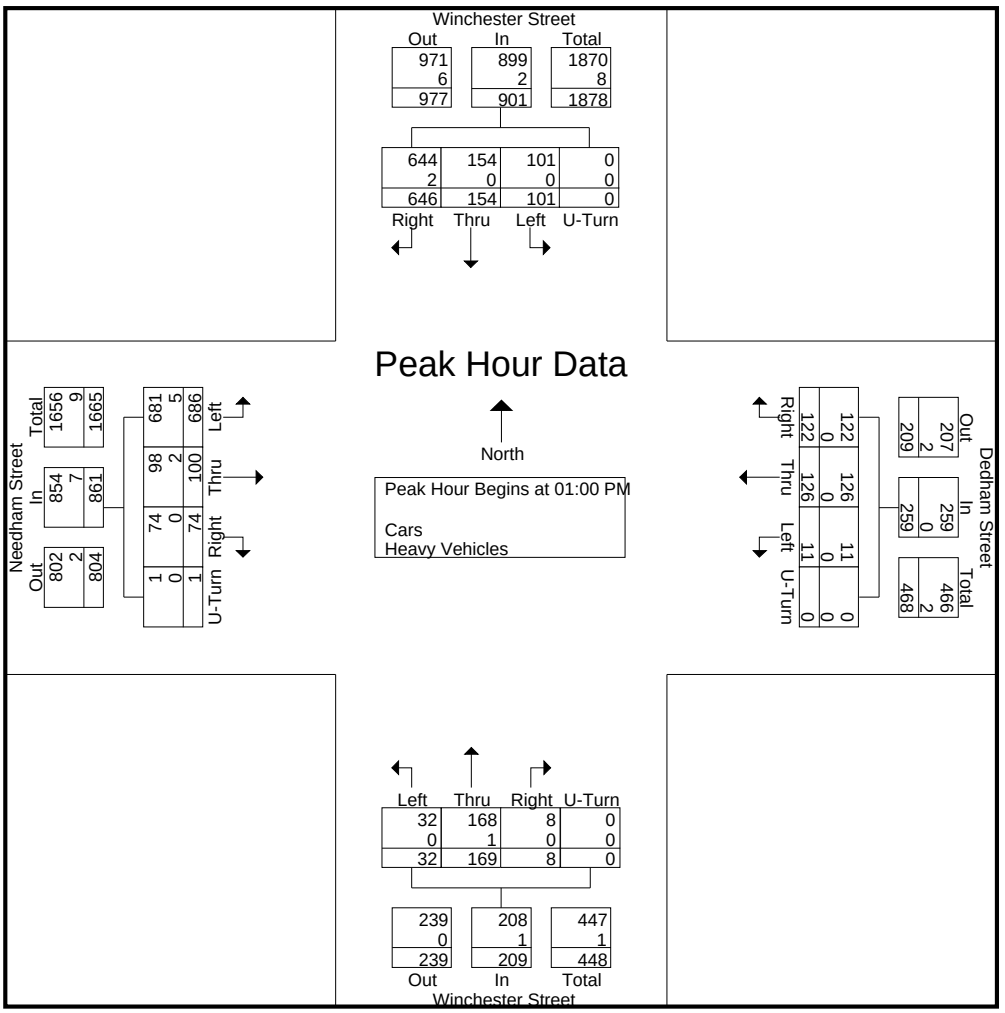
E/W: Dedham Street/ Needham Street
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 C
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

	Winchester Street From North					Dedham Street From East					Winchester Street From South					Needham Street From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:00 PM																					
01:00 PM	153	43	19	0	215	33	25	1	0	59	0	**46**	9	0	**55**	23	25	174	0	222	551
01:15 PM	166	**44**	**39**	0	**249**	**38**	28	3	0	**69**	1	41	6	0	48	11	**26**	179	0	216	**582**
01:30 PM	160	30	21	0	211	21	**43**	3	0	67	**5**	39	**11**	0	55	13	24	145	0	182	515
01:45 PM	**167**	37	22	0	226	30	30	**4**	0	64	2	43	6	0	51	**27**	25	**188**	**1**	**241**	582
Total Volume	646	154	101	0	901	122	126	11	0	259	8	169	32	0	209	74	100	686	1	861	2230
% App. Total	71.7	17.1	11.2	0		47.1	48.6	4.2	0		3.8	80.9	15.3	0		8.6	11.6	79.7	0.1		
PHF	.967	.875	.647	.000	.905	.803	.733	.688	.000	.938	.400	.918	.727	.000	.950	.685	.962	.912	.250	.893	.958
Cars	644	154	101	0	899	122	126	11	0	259	8	168	32	0	208	74	98	681	1	854	2220
% Cars	99.7	100	100	0	99.8	100	100	100	0	100	100	99.4	100	0	99.5	100	98.0	99.3	100	99.2	99.6
Heavy Vehicles	2	0	0	0	2	0	0	0	0	0	0	1	0	0	1	0	2	5	0	7	10
% Heavy Vehicles	0.3	0	0	0	0.2	0	0	0	0	0	0	0.6	0	0	0.5	0	2.0	0.7	0	0.8	0.4



PRECISION
D A T A
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N/S: Needham Street
E/W: Parking Lot/South Site Dr/Loop Dr
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 D
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North					Parking Lot From East					Needham Street From South					South Site Drive From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
12:30 PM	0	0	205	2	1	0	0	0	1	0	1	209	0	0	0	2	0	1	0	0	0	0	0	0	0	422
12:45 PM	0	0	201	0	0	0	0	0	0	0	1	220	0	0	0	1	0	0	0	0	0	0	0	0	0	423
Total	0	0	406	2	1	0	0	0	1	0	2	429	0	0	0	3	0	1	0	0	0	0	0	0	0	845
01:00 PM	0	0	185	0	0	0	0	0	0	0	0	223	0	1	0	0	0	0	0	0	0	1	0	0	0	410
01:15 PM	0	0	191	0	0	0	0	0	0	0	1	214	0	0	0	3	0	0	0	0	0	2	0	0	0	411
01:30 PM	0	0	231	0	0	1	0	0	0	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0	0	446
01:45 PM	0	0	216	0	0	0	0	0	0	0	1	236	0	0	0	0	0	0	0	0	0	0	0	0	0	453
Total	0	0	823	0	0	1	0	0	0	0	2	887	0	1	0	3	0	0	0	0	0	3	0	0	0	1720
02:00 PM	0	0	202	2	0	1	0	0	1	0	3	221	0	0	0	0	0	0	0	0	0	2	0	0	0	432
02:15 PM	0	0	209	0	0	1	0	0	0	0	0	205	0	0	0	0	0	0	0	0	0	2	0	0	0	417
02:30 PM	0	0	172	0	0	2	0	0	0	0	2	215	0	0	0	2	0	0	0	0	0	0	0	0	0	393
02:45 PM	0	0	192	0	0	0	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	1	0	0	0	421
Total	0	0	775	2	0	4	0	0	1	0	5	869	0	0	0	2	0	0	0	0	0	5	0	0	0	1663
03:00 PM	0	0	183	1	1	2	0	0	1	0	3	218	0	0	0	0	0	0	0	0	0	0	0	0	0	409
03:15 PM	0	0	191	2	0	2	0	0	0	0	2	191	0	0	0	3	0	0	0	0	0	0	0	0	0	391
Grand Total	0	0	2378	7	2	9	0	0	3	0	14	2594	0	1	0	11	0	1	0	0	0	8	0	0	0	5028
Apprch %	0	0	99.6	0.3	0.1	75	0	0	25	0	0.5	99.4	0	0	0	91.7	0	8.3	0	0	0	100	0	0	0	
Total %	0	0	47.3	0.1	0	0.2	0	0	0.1	0	0.3	51.6	0	0	0	0.2	0	0	0	0	0	0.2	0	0	0	
Cars	0	0	2354	7	2	8	0	0	3	0	14	2572	0	0	0	9	0	1	0	0	0	8	0	0	0	4978
% Cars	0	0	99	100	100	88.9	0	0	100	0	100	99.2	0	0	0	81.8	0	100	0	0	0	100	0	0	0	99
Heavy Vehicles	0	0	24	0	0	1	0	0	0	0	0	22	0	1	0	2	0	0	0	0	0	0	0	0	0	50
% Heavy Vehicles	0	0	1	0	0	11.1	0	0	0	0	0	0.8	0	100	0	18.2	0	0	0	0	0	0	0	0	0	1

	Needham Street From North						Parking Lot From East						Needham Street From South						South Site Drive From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 01:30 PM																															
01:30 PM	0	0	**231**	0	0	**231**	**1**	0	0	0	0	1	0	214	0	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0	446
01:45 PM	0	0	216	0	0	216	0	0	0	0	0	0	1	**236**	0	0	0	**237**	0	0	0	0	0	0	0	0	0	0	0	0	**453**
02:00 PM	0	0	202	**2**	0	204	1	0	0	**1**	0	**2**	**3**	221	0	0	0	224	0	0	0	0	0	0	0	**2**	0	0	0	**2**	432
02:15 PM	0	0	209	0	0	209	1	0	0	0	0	1	0	205	0	0	0	205	0	0	0	0	0	0	0	2	0	0	0	2	417
Total Volume	0	0	858	2	0	860	3	0	0	1	0	4	4	876	0	0	0	880	0	0	0	0	0	0	0	4	0	0	0	4	1748
% App. Total	0	0	99.8	0.2	0		75	0	0	25	0		0.5	99.5	0	0	0		0	0	0	0	0		0	100	0	0	0		
PHF	.000	.000	.929	.250	.000	.931	.750	.000	.000	.250	.000	.500	.333	.928	.000	.000	.000	.928	.000	.000	.000	.000	.000	.000	.000	.500	.000	.000	.000	.500	.965
Cars	0	0	855	2	0	857	3	0	0	1	0	4	4	875	0	0	0	879	0	0	0	0	0	0	0	4	0	0	0	4	1744
% Cars	0	0	99.7	100	0	99.7	100	0	0	100	0	100	100	99.9	0	0	0	99.9	0	0	0	0	0	0	0	100	0	0	0	100	99.8
Heavy Vehicles	0	0	3	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
% Heavy Vehicles	0	0	0.3	0	0	0.3	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.2

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: Needham Street
E/W: Parking Lot/South Site Dr/Loop Dr
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 D
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North					Parking Lot From East					Needham Street From South					South Site Drive From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
12:30 PM	0	0	204	2	1	0	0	0	1	0	1	199	0	0	0	2	0	1	0	0	0	0	0	0	0	411
12:45 PM	0	0	198	0	0	0	0	0	0	0	1	219	0	0	0	1	0	0	0	0	0	0	0	0	0	419
Total	0	0	402	2	1	0	0	0	1	0	2	418	0	0	0	3	0	1	0	0	0	0	0	0	0	830
01:00 PM	0	0	184	0	0	0	0	0	0	0	0	220	0	0	0	0	0	0	0	0	0	1	0	0	0	405
01:15 PM	0	0	191	0	0	0	0	0	0	0	1	214	0	0	0	3	0	0	0	0	0	2	0	0	0	411
01:30 PM	0	0	230	0	0	1	0	0	0	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0	0	445
01:45 PM	0	0	216	0	0	0	0	0	0	0	1	235	0	0	0	0	0	0	0	0	0	0	0	0	0	452
Total	0	0	821	0	0	1	0	0	0	0	2	883	0	0	0	3	0	0	0	0	0	3	0	0	0	1713
02:00 PM	0	0	201	2	0	1	0	0	1	0	3	221	0	0	0	0	0	0	0	0	0	2	0	0	0	431
02:15 PM	0	0	208	0	0	1	0	0	0	0	0	205	0	0	0	0	0	0	0	0	0	2	0	0	0	416
02:30 PM	0	0	170	0	0	2	0	0	0	0	2	215	0	0	0	0	0	0	0	0	0	0	0	0	0	389
02:45 PM	0	0	187	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	1	0	0	0	413
Total	0	0	766	2	0	4	0	0	1	0	5	866	0	0	0	0	0	0	0	0	0	5	0	0	0	1649
03:00 PM	0	0	180	1	1	1	0	0	1	0	3	215	0	0	0	0	0	0	0	0	0	0	0	0	0	402
03:15 PM	0	0	185	2	0	2	0	0	0	0	2	190	0	0	0	3	0	0	0	0	0	0	0	0	0	384
Grand Total	0	0	2354	7	2	8	0	0	3	0	14	2572	0	0	0	9	0	1	0	0	0	8	0	0	0	4978
Apprch %	0	0	99.6	0.3	0.1	72.7	0	0	27.3	0	0.5	99.5	0	0	0	90	0	10	0	0	0	100	0	0	0	
Total %	0	0	47.3	0.1	0	0.2	0	0	0.1	0	0.3	51.7	0	0	0	0.2	0	0	0	0	0	0.2	0	0	0	

	Needham Street From North						Parking Lot From East						Needham Street From South						South Site Drive From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																														
Peak Hour for Entire Intersection Begins at 01:30 PM																														
01:30 PM	0	0	**230**	0	0	**230**	**1**	0	0	0	0	1	0	214	0	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0	445
01:45 PM	0	0	216	0	0	216	0	0	0	0	0	0	1	**235**	0	0	0	**236**	0	0	0	0	0	0	0	0	0	0	0	0	**452**
02:00 PM	0	0	201	**2**	0	203	1	0	0	**1**	0	**2**	**3**	221	0	0	0	224	0	0	0	0	0	0	0	**2**	0	0	0	**2**	431
02:15 PM	0	0	208	0	0	208	1	0	0	0	0	1	0	205	0	0	0	205	0	0	0	0	0	0	0	2	0	0	0	2	416
Total Volume	0	0	855	2	0	857	3	0	0	1	0	4	4	875	0	0	0	879	0	0	0	0	0	0	0	4	0	0	0	4	1744
% App. Total	0	0	99.8	0.2	0		75	0	0	25	0		0.5	99.5	0	0	0		0	0	0	0	0		0	100	0	0	0		
PHF	.000	.000	.929	.250	.000	.932	.750	.000	.000	.250	.000	.500	.333	.931	.000	.000	.000	.931	.000	.000	.000	.000	.000	.000	.000	.500	.000	.000	.000	.500	.965

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N/S: Needham Street
E/W: Parking Lot/South Site Dr/Loop Dr
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 D
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North					Parking Lot From East					Needham Street From South					South Site Drive From West					Loop Driveway From Northwest					
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total
12:30 PM	0	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	11
12:45 PM	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	4	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	15
01:00 PM	0	0	1	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	5
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	2	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	7
02:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4
02:45 PM	0	0	5	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Total	0	0	9	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	14
03:00 PM	0	0	3	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7
03:15 PM	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Grand Total	0	0	24	0	0	1	0	0	0	0	0	22	0	1	0	2	0	0	0	0	0	0	0	0	0	50
Apprch %	0	0	100	0	0	100	0	0	0	0	0	95.7	0	4.3	0	100	0	0	0	0	0	0	0	0	0	
Total %	0	0	48	0	0	2	0	0	0	0	0	44	0	2	0	4	0	0	0	0	0	0	0	0	0	

	Needham Street From North						Parking Lot From East						Needham Street From South						South Site Drive From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																														
Peak Hour for Entire Intersection Begins at 02:30 PM																														
02:30 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	0	0	**2**	0	0	0	0	0	0	4
02:45 PM	0	0	5	0	0	5	0	0	0	0	0	0	0	**3**	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	**8**
03:00 PM	0	0	3	0	0	3	**1**	0	0	0	0	**1**	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	7
03:15 PM	0	0	**6**	0	0	**6**	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7
Total Volume	0	0	16	0	0	16	1	0	0	0	0	1	0	7	0	0	0	7	2	0	0	0	0	2	0	0	0	0	0	0	26
% App. Total	0	0	100	0	0		100	0	0	0	0		0	100	0	0	0		100	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.667	.000	.000	.667	.250	.000	.000	.000	.000	.250	.000	.583	.000	.000	.000	.583	.250	.000	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.813

N/S: Needham Street
E/W: Parking Lot/South Site Dr/Loop Dr
City, State: Newton, MA
Client: Stantec/ S. Wood

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
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File Name : 144128 D
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Peds and Bicycles

	Needham Street From North						Parking Lot From East						Needham Street From South						South Site Drive From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	Right	Bear Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Bear Left	Left	Peds WB	Peds EB	Right	Thru	Left	Hard Left	Peds NB	Peds SB	Hard Right	Bear Right	Bear Left	Hard Left	Peds NB	Peds SB	Int. Total
12:30 PM	0	0	4	0	0	0	0	0	0	0	3	2	0	2	0	0	0	0	0	0	0	0	4	4	0	0	0	0	4	4	27
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	5
Total	0	0	4	0	0	0	0	0	0	0	4	2	0	2	0	0	0	0	0	0	0	0	6	4	0	0	0	0	6	4	32
01:00 PM	0	0	1	0	0	0	0	0	0	0	2	3	0	1	0	0	0	0	0	0	0	0	3	4	0	0	0	0	3	3	20
01:15 PM	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	2	0	13
01:30 PM	0	0	1	0	0	0	0	0	0	0	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
01:45 PM	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	0	2	0	0	0	0	0	0	0	13	10	0	2	0	0	2	0	0	0	0	0	5	4	0	0	0	0	5	3	46
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:15 PM	0	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
02:30 PM	0	0	2	0	0	0	0	0	0	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
02:45 PM	0	0	2	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Total	0	0	4	0	1	0	0	0	0	0	9	14	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
03:00 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4
03:15 PM	0	0	0	0	0	0	0	0	0	0	2	5	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Grand Total	0	0	10	0	1	0	0	0	0	0	30	32	0	10	0	0	2	0	0	0	0	0	12	8	0	0	0	0	11	7	123
Apprch %	0	0	90.9	0	9.1	0	0	0	0	0	48.4	51.6	0	83.3	0	0	16.7	0	0	0	0	0	60	40	0	0	0	0	61.1	38.9	
Total %	0	0	8.1	0	0.8	0	0	0	0	0	24.4	26	0	8.1	0	0	1.6	0	0	0	0	0	9.8	6.5	0	0	0	0	8.9	5.7	

	Needham Street From North							Parking Lot From East							Needham Street From South							South Site Drive From West							Loop Driveway From Northwest							
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Bear Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Bear Left	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Hard Left	Peds NB	Peds SB	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																																				
Peak Hour for Entire Intersection Begins at 12:30 PM																																				
12:30 PM	0	0	**4**	0	0	0	**4**	0	0	0	0	3	2	5	0	**2**	0	0	0	0	**2**	0	0	0	0	**4**	**4**	**8**	0	0	0	0	**4**	**4**	**8**	**27**
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2	0	2	5
01:00 PM	0	0	1	0	0	0	1	0	0	0	0	2	3	5	0	1	0	0	0	0	1	0	0	0	0	3	4	7	0	0	0	0	3	3	6	20
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	**4**	**4**	**8**	0	0	0	0	**1**	0	1	0	0	0	0	2	0	2	0	0	0	0	2	0	2	13
Total Volume	0	0	5	0	0	0	5	0	0	0	0	10	9	19	0	3	0	0	1	0	4	0	0	0	0	11	8	19	0	0	0	0	11	7	18	65
% App. Total	0	0	100	0	0	0		0	0	0	0	52.6	47.4		0	75	0	0	25	0		0	0	0	0	57.9	42.1		0	0	0	0	61.1	38.9		
PHF	.000	.000	.313	.000	.000	.000	.313	.000	.000	.000	.000	.625	.563	.594	.000	.375	.000	.000	.250	.000	.500	.000	.000	.000	.000	.688	.500	.594	.000	.000	.000	.000	.688	.438	.563	.602

PRECISION
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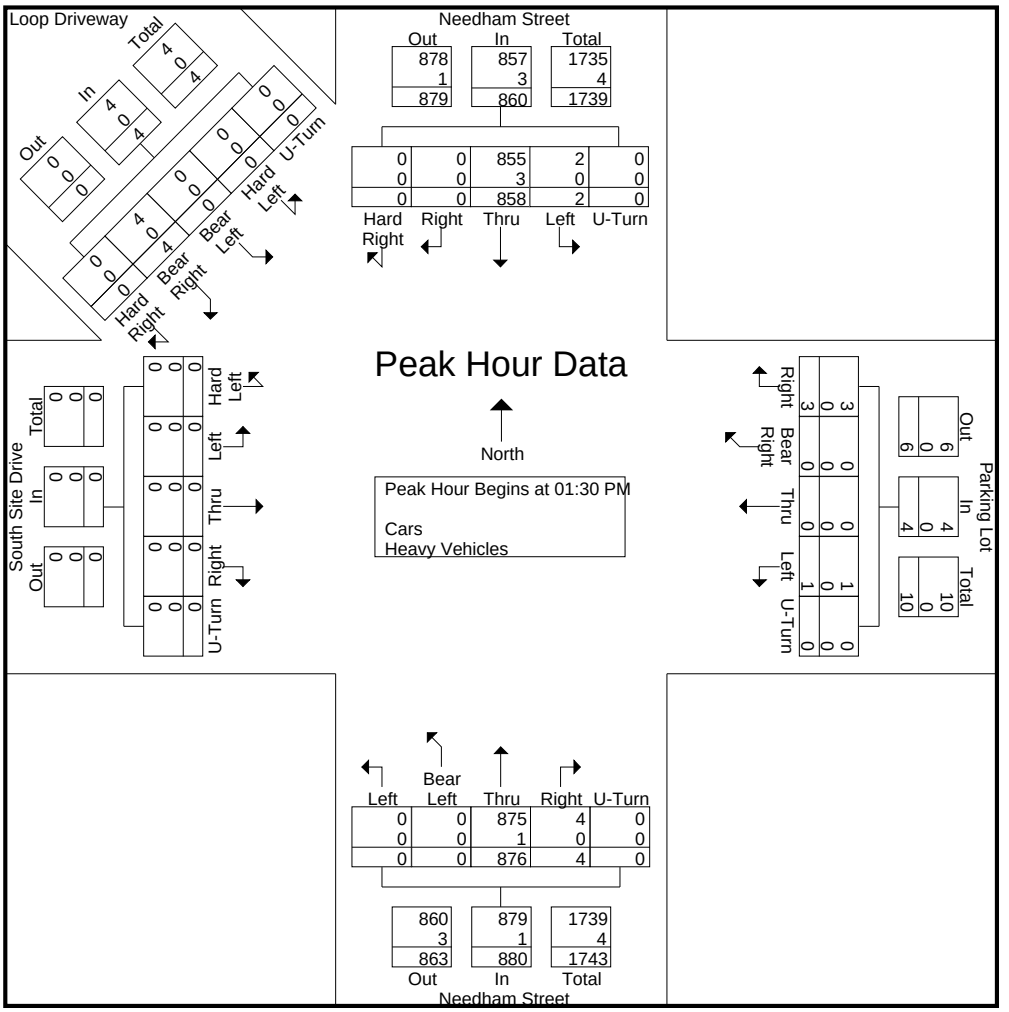
N/S: Needham Street
E/W: Parking Lot/South Site Dr/Loop Dr
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 D
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

	Needham Street From North						Parking Lot From East						Needham Street From South						South Site Drive From West						Loop Driveway From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 01:30 PM																															
01:30 PM	0	0	**231**	0	0	**231**	**1**	0	0	0	0	1	0	214	0	0	0	214	0	0	0	0	0	0	0	0	0	0	0	0	446
01:45 PM	0	0	216	0	0	216	0	0	0	0	0	0	1	**236**	0	0	0	**237**	0	0	0	0	0	0	0	0	0	0	0	0	**453**
02:00 PM	0	0	202	**2**	0	204	1	0	0	**1**	0	**2**	**3**	221	0	0	0	224	0	0	0	0	0	0	0	**2**	0	0	0	**2**	432
02:15 PM	0	0	209	0	0	209	1	0	0	0	0	1	0	205	0	0	0	205	0	0	0	0	0	0	0	2	0	0	0	2	417
Total Volume	0	0	858	2	0	860	3	0	0	1	0	4	4	876	0	0	0	880	0	0	0	0	0	0	0	4	0	0	0	4	1748
% App. Total	0	0	99.8	0.2	0		75	0	0	25	0		0.5	99.5	0	0	0		0	0	0	0	0		0	100	0	0	0		
PHF	.000	.000	.929	.250	.000	.931	.750	.000	.000	.250	.000	.500	.333	.928	.000	.000	.000	.928	.000	.000	.000	.000	.000	.000	.000	.500	.000	.000	.000	.500	.965
Cars	0	0	855	2	0	857	3	0	0	1	0	4	4	875	0	0	0	879	0	0	0	0	0	0	0	4	0	0	0	4	1744
% Cars	0	0	99.7	100	0	99.7	100	0	0	100	0	100	100	99.9	0	0	0	99.9	0	0	0	0	0	0	0	100	0	0	0	100	99.8
Heavy Vehicles	0	0	3	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
% Heavy Vehicles	0	0	0.3	0	0	0.3	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.2



PRECISION
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N/S: Needham Street
E/W: Driveway/ Center Site Driveway
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 E
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North				Site Driveway From East				Needham Street From South				Center Site Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	0	194	1	0	3	0	2	0	3	216	1	0	2	0	0	0	422
12:45 PM	0	193	1	0	2	0	4	0	1	216	1	0	1	0	0	0	419
Total	0	387	2	0	5	0	6	0	4	432	2	0	3	0	0	0	841
01:00 PM	0	185	0	0	5	0	1	0	1	227	0	0	1	0	0	0	420
01:15 PM	0	182	0	0	3	0	3	0	0	207	0	0	0	0	0	0	395
01:30 PM	0	212	1	0	4	0	5	0	1	208	3	0	1	0	0	0	435
01:45 PM	0	207	3	0	2	0	3	0	1	234	0	0	1	0	1	0	452
Total	0	786	4	0	14	0	12	0	3	876	3	0	3	0	1	0	1702
02:00 PM	0	202	0	0	6	0	1	0	2	219	1	0	2	0	0	0	433
02:15 PM	0	196	3	0	3	0	5	0	2	208	0	0	2	0	0	0	419
02:30 PM	0	155	0	0	7	0	5	0	1	219	0	0	0	0	0	0	387
02:45 PM	0	192	0	0	6	0	0	0	1	216	0	0	0	0	0	0	415
Total	0	745	3	0	22	0	11	0	6	862	1	0	4	0	0	0	1654
03:00 PM	0	173	0	0	5	0	2	0	2	226	0	0	0	0	0	0	408
03:15 PM	0	188	0	0	9	0	7	0	0	191	0	1	0	0	0	0	396
Grand Total	0	2279	9	0	55	0	38	0	15	2587	6	1	10	0	1	0	5001
Apprch %	0	99.6	0.4	0	59.1	0	40.9	0	0.6	99.2	0.2	0	90.9	0	9.1	0	
Total %	0	45.6	0.2	0	1.1	0	0.8	0	0.3	51.7	0.1	0	0.2	0	0	0	
Cars	0	2263	9	0	55	0	38	0	15	2564	6	1	10	0	1	0	4962
% Cars	0	99.3	100	0	100	0	100	0	100	99.1	100	100	100	0	100	0	99.2
Heavy Vehicles	0	16	0	0	0	0	0	0	0	23	0	0	0	0	0	0	39
% Heavy Vehicles	0	0.7	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.8

	Needham Street From North					Site Driveway From East					Needham Street From South					Center Site Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:30 PM																					
01:30 PM	0	**212**	1	0	**213**	4	0	**5**	0	**9**	1	208	**3**	0	212	1	0	0	0	1	435
01:45 PM	0	207	**3**	0	210	2	0	3	0	5	1	**234**	0	0	**235**	1	0	**1**	0	**2**	**452**
02:00 PM	0	202	0	0	202	**6**	0	1	0	7	**2**	219	1	0	222	**2**	0	0	0	2	433
02:15 PM	0	196	3	0	199	3	0	5	0	8	2	208	0	0	210	2	0	0	0	2	419
Total Volume	0	817	7	0	824	15	0	14	0	29	6	869	4	0	879	6	0	1	0	7	1739
% App. Total	0	99.2	0.8	0		51.7	0	48.3	0		0.7	98.9	0.5	0		85.7	0	14.3	0		
PHF	.000	.963	.583	.000	.967	.625	.000	.700	.000	.806	.750	.928	.333	.000	.935	.750	.000	.250	.000	.875	.962
Cars	0	814	7	0	821	15	0	14	0	29	6	867	4	0	877	6	0	1	0	7	1734
% Cars	0	99.6	100	0	99.6	100	0	100	0	100	100	99.8	100	0	99.8	100	0	100	0	100	99.7
Heavy Vehicles	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
% Heavy Vehicles	0	0.4	0	0	0.4	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0.3

PRECISION
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N/S: Needham Street
E/W: Driveway/ Center Site Driveway
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 E
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North				Site Driveway From East				Needham Street From South				Center Site Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	0	193	1	0	3	0	2	0	3	206	1	0	2	0	0	0	411
12:45 PM	0	189	1	0	2	0	4	0	1	215	1	0	1	0	0	0	414
Total	0	382	2	0	5	0	6	0	4	421	2	0	3	0	0	0	825
01:00 PM	0	184	0	0	5	0	1	0	1	224	0	0	1	0	0	0	416
01:15 PM	0	182	0	0	3	0	3	0	0	207	0	0	0	0	0	0	395
01:30 PM	0	211	1	0	4	0	5	0	1	208	3	0	1	0	0	0	434
01:45 PM	0	207	3	0	2	0	3	0	1	233	0	0	1	0	1	0	451
Total	0	784	4	0	14	0	12	0	3	872	3	0	3	0	1	0	1696
02:00 PM	0	201	0	0	6	0	1	0	2	219	1	0	2	0	0	0	432
02:15 PM	0	195	3	0	3	0	5	0	2	207	0	0	2	0	0	0	417
02:30 PM	0	154	0	0	7	0	5	0	1	219	0	0	0	0	0	0	386
02:45 PM	0	189	0	0	6	0	0	0	1	213	0	0	0	0	0	0	409
Total	0	739	3	0	22	0	11	0	6	858	1	0	4	0	0	0	1644
03:00 PM	0	173	0	0	5	0	2	0	2	223	0	0	0	0	0	0	405
03:15 PM	0	185	0	0	9	0	7	0	0	190	0	1	0	0	0	0	392
Grand Total	0	2263	9	0	55	0	38	0	15	2564	6	1	10	0	1	0	4962
Apprch %	0	99.6	0.4	0	59.1	0	40.9	0	0.6	99.1	0.2	0	90.9	0	9.1	0	
Total %	0	45.6	0.2	0	1.1	0	0.8	0	0.3	51.7	0.1	0	0.2	0	0	0	

	Needham Street From North					Site Driveway From East					Needham Street From South					Center Site Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:30 PM																					
01:30 PM	0	**211**	1	0	**212**	4	0	**5**	0	**9**	1	208	**3**	0	212	1	0	0	0	1	434
01:45 PM	0	207	**3**	0	210	2	0	3	0	5	1	**233**	0	0	**234**	1	0	**1**	0	**2**	**451**
02:00 PM	0	201	0	0	201	**6**	0	1	0	7	**2**	219	1	0	222	**2**	0	0	0	2	432
02:15 PM	0	195	3	0	198	3	0	5	0	8	2	207	0	0	209	2	0	0	0	2	417
Total Volume	0	814	7	0	821	15	0	14	0	29	6	867	4	0	877	6	0	1	0	7	1734
% App. Total	0	99.1	0.9	0		51.7	0	48.3	0		0.7	98.9	0.5	0		85.7	0	14.3	0		
PHF	.000	.964	.583	.000	.968	.625	.000	.700	.000	.806	.750	.930	.333	.000	.937	.750	.000	.250	.000	.875	.961

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N/S: Needham Street
E/W: Driveway/ Center Site Driveway
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 E
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North				Site Driveway From East				Needham Street From South				Center Site Driveway From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
12:30 PM	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	11
12:45 PM	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5
Total	0	5	0	0	0	0	0	0	0	11	0	0	0	0	0	0	16
01:00 PM	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Total	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0	0	6
02:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:15 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
02:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:45 PM	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
Total	0	6	0	0	0	0	0	0	0	4	0	0	0	0	0	0	10
03:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
03:15 PM	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4
Grand Total	0	16	0	0	0	0	0	0	0	23	0	0	0	0	0	0	39
Apprch %	0	100	0	0	0	0	0	0	0	100	0	0	0	0	0	0	
Total %	0	41	0	0	0	0	0	0	0	59	0	0	0	0	0	0	

	Needham Street From North					Site Driveway From East					Needham Street From South					Center Site Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	0	1	0	0	1	0	0	0	0	0	0	**10**	0	0	**10**	0	0	0	0	0	**11**
12:45 PM	0	**4**	0	0	**4**	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
01:00 PM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	6	0	0	6	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	20
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
PHF	.000	.375	.000	.000	.375	.000	.000	.000	.000	.000	.000	.350	.000	.000	.350	.000	.000	.000	.000	.000	.455

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N/S: Needham Street
E/W: Driveway/ Center Site Driveway
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 E
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Peds and Bicycles

	Needham Street From North					Site Driveway From East					Needham Street From South					Center Site Driveway From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
12:30 PM	0	4	0	0	0	0	0	0	4	1	0	2	0	1	0	0	0	0	4	2	18
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
Total	0	4	0	0	0	0	0	0	4	1	0	2	0	1	0	0	0	0	7	2	21
01:00 PM	0	1	0	0	0	0	0	0	2	3	0	1	0	0	0	0	0	0	2	3	12
01:15 PM	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	2	0	6
01:30 PM	0	1	0	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	0	6
01:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	0	0	0	0	0	0	6	8	0	3	0	0	0	0	0	0	4	3	26
02:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	3
02:15 PM	0	0	0	0	0	0	0	0	5	4	0	1	0	0	0	0	0	0	3	1	14
02:30 PM	0	2	0	0	0	0	0	0	0	4	0	2	0	0	0	0	0	0	1	0	9
02:45 PM	0	2	0	0	0	0	0	0	5	6	0	0	0	0	0	0	0	0	2	6	21
Total	0	4	0	0	0	0	0	0	10	15	0	3	0	0	0	0	0	0	8	7	47
03:00 PM	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	1	7
03:15 PM	0	0	0	0	0	0	0	0	2	6	0	3	0	0	0	0	0	0	3	1	15
Grand Total	0	10	0	0	0	0	0	0	25	33	0	11	0	1	0	0	0	0	22	14	116
Apprch %	0	100	0	0	0	0	0	0	43.1	56.9	0	91.7	0	8.3	0	0	0	0	61.1	38.9	
Total %	0	8.6	0	0	0	0	0	0	21.6	28.4	0	9.5	0	0.9	0	0	0	0	19	12.1	

	Needham Street From North						Site Driveway From East						Needham Street From South						Center Site Driveway From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:30 PM																									
02:30 PM	0	**2**	0	0	0	**2**	0	0	0	0	4	4	0	2	0	0	0	2	0	0	0	1	0	1	9
02:45 PM	0	2	0	0	0	2	0	0	0	**5**	**6**	**11**	0	0	0	0	0	0	0	0	0	2	**6**	**8**	**21**
03:00 PM	0	0	0	0	0	0	0	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0	1	1	7
03:15 PM	0	0	0	0	0	0	0	0	0	2	6	8	0	**3**	0	0	0	**3**	0	0	0	**3**	1	4	15
Total Volume	0	4	0	0	0	4	0	0	0	10	19	29	0	5	0	0	0	5	0	0	0	6	8	14	52
% App. Total	0	100	0	0	0		0	0	0	34.5	65.5		0	100	0	0	0		0	0	0	42.9	57.1		
PHF	.000	.500	.000	.000	.000	.500	.000	.000	.000	.500	.792	.659	.000	.417	.000	.000	.000	.417	.000	.000	.000	.500	.333	.438	.619

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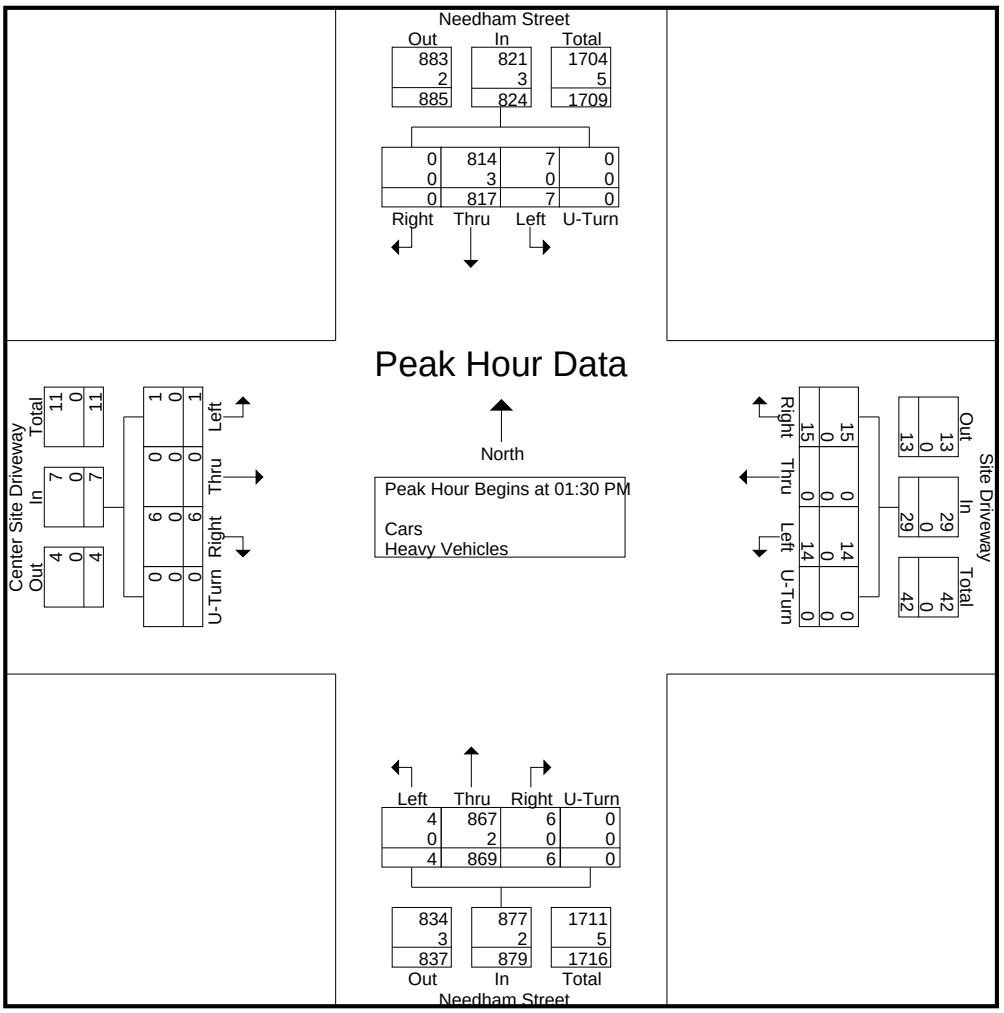
N/S: Needham Street
E/W: Driveway/ Center Site Driveway
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 E
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

	Needham Street From North					Site Driveway From East					Needham Street From South					Center Site Driveway From West					
Start Time	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	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:30 PM																					
01:30 PM	0	**212**	1	0	**213**	4	0	**5**	0	**9**	1	208	**3**	0	212	1	0	0	0	1	435
01:45 PM	0	207	**3**	0	210	2	0	3	0	5	1	**234**	0	0	**235**	1	0	**1**	0	**2**	**452**
02:00 PM	0	202	0	0	202	**6**	0	1	0	7	**2**	219	1	0	222	**2**	0	0	0	2	433
02:15 PM	0	196	3	0	199	3	0	5	0	8	2	208	0	0	210	2	0	0	0	2	419
Total Volume	0	817	7	0	824	15	0	14	0	29	6	869	4	0	879	6	0	1	0	7	1739
% App. Total	0	99.2	0.8	0		51.7	0	48.3	0		0.7	98.9	0.5	0		85.7	0	14.3	0		
PHF	.000	.963	.583	.000	.967	.625	.000	.700	.000	.806	.750	.928	.333	.000	.935	.750	.000	.250	.000	.875	.962
Cars	0	814	7	0	821	15	0	14	0	29	6	867	4	0	877	6	0	1	0	7	1734
% Cars	0	99.6	100	0	99.6	100	0	100	0	100	100	99.8	100	0	99.8	100	0	100	0	100	99.7
Heavy Vehicles	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
% Heavy Vehicles	0	0.4	0	0	0.4	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0.3



N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

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File Name : 144128 F
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
12:30 PM	0	192	0	218	0	0	0	0	0	410
12:45 PM	0	197	0	210	1	0	1	0	0	409
Total	0	389	0	428	1	0	1	0	0	819
01:00 PM	2	187	0	227	0	0	0	1	0	417
01:15 PM	1	181	0	215	0	0	0	0	0	397
01:30 PM	0	206	0	198	1	0	1	1	0	407
01:45 PM	0	215	0	237	0	0	0	0	0	452
Total	3	789	0	877	1	0	1	2	0	1673
02:00 PM	0	212	0	222	0	0	0	0	0	434
02:15 PM	0	195	0	206	1	0	1	0	0	403
02:30 PM	0	162	0	229	0	0	0	0	0	391
02:45 PM	0	199	0	238	0	0	0	0	0	437
Total	0	768	0	895	1	0	1	0	0	1665
03:00 PM	0	177	0	214	2	0	0	0	0	393
03:15 PM	0	184	0	187	0	0	2	0	0	373
Grand Total	3	2307	0	2601	5	0	5	2	0	4923
Apprch %	0.1	99.9	0	99.8	0.2	0	71.4	28.6	0	
Total %	0.1	46.9	0	52.8	0.1	0	0.1	0	0	
Cars	3	2291	0	2579	3	0	3	2	0	4881
% Cars	100	99.3	0	99.2	60	0	60	100	0	99.1
Heavy Vehicles	0	16	0	22	2	0	2	0	0	42
% Heavy Vehicles	0	0.7	0	0.8	40	0	40	0	0	0.9

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 01:30 PM													
01:30 PM	0	206	0	206	198	**1**	0	199	**1**	**1**	0	**2**	407
01:45 PM	0	**215**	0	**215**	**237**	0	0	**237**	0	0	0	0	**452**
02:00 PM	0	212	0	212	222	0	0	222	0	0	0	0	434
02:15 PM	0	195	0	195	206	1	0	207	1	0	0	1	403
Total Volume	0	828	0	828	863	2	0	865	2	1	0	3	1696
% App. Total	0	100	0		99.8	0.2	0		66.7	33.3	0		
PHF	.000	.963	.000	.963	.910	.500	.000	.912	.500	.250	.000	.375	.938
Cars	0	823	0	823	860	2	0	862	2	1	0	3	1688
% Cars	0	99.4	0	99.4	99.7	100	0	99.7	100	100	0	100	99.5
Heavy Vehicles	0	5	0	5	3	0	0	3	0	0	0	0	8
% Heavy Vehicles	0	0.6	0	0.6	0.3	0	0	0.3	0	0	0	0	0.5

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W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 F
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Cars

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
12:30 PM	0	191	0	208	0	0	0	0	0	399
12:45 PM	0	193	0	209	1	0	1	0	0	404
Total	0	384	0	417	1	0	1	0	0	803
01:00 PM	2	186	0	224	0	0	0	1	0	413
01:15 PM	1	181	0	215	0	0	0	0	0	397
01:30 PM	0	205	0	198	1	0	1	1	0	406
01:45 PM	0	214	0	235	0	0	0	0	0	449
Total	3	786	0	872	1	0	1	2	0	1665
02:00 PM	0	210	0	222	0	0	0	0	0	432
02:15 PM	0	194	0	205	1	0	1	0	0	401
02:30 PM	0	161	0	229	0	0	0	0	0	390
02:45 PM	0	196	0	235	0	0	0	0	0	431
Total	0	761	0	891	1	0	1	0	0	1654
03:00 PM	0	177	0	213	0	0	0	0	0	390
03:15 PM	0	183	0	186	0	0	0	0	0	369
Grand Total	3	2291	0	2579	3	0	3	2	0	4881
Apprch %	0.1	99.9	0	99.9	0.1	0	60	40	0	
Total %	0.1	46.9	0	52.8	0.1	0	0.1	0	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 01:30 PM													
01:30 PM	0	205	0	205	198	**1**	0	199	**1**	**1**	0	**2**	406
01:45 PM	0	**214**	0	**214**	**235**	0	0	**235**	0	0	0	0	**449**
02:00 PM	0	210	0	210	222	0	0	222	0	0	0	0	432
02:15 PM	0	194	0	194	205	1	0	206	1	0	0	1	401
Total Volume	0	823	0	823	860	2	0	862	2	1	0	3	1688
% App. Total	0	100	0		99.8	0.2	0		66.7	33.3	0		
PHF	.000	.961	.000	.961	.915	.500	.000	.917	.500	.250	.000	.375	.940

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N/S: Needham Street
W: Site Driveway North
City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 F
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Needham Street From North			Needham Street From South			Site Driveway North From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
12:30 PM	0	1	0	10	0	0	0	0	0	11
12:45 PM	0	4	0	1	0	0	0	0	0	5
Total	0	5	0	11	0	0	0	0	0	16
01:00 PM	0	1	0	3	0	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	1	0	0	0	0	0	0	0	1
01:45 PM	0	1	0	2	0	0	0	0	0	3
Total	0	3	0	5	0	0	0	0	0	8
02:00 PM	0	2	0	0	0	0	0	0	0	2
02:15 PM	0	1	0	1	0	0	0	0	0	2
02:30 PM	0	1	0	0	0	0	0	0	0	1
02:45 PM	0	3	0	3	0	0	0	0	0	6
Total	0	7	0	4	0	0	0	0	0	11
03:00 PM	0	0	0	1	2	0	0	0	0	3
03:15 PM	0	1	0	1	0	0	2	0	0	4
Grand Total	0	16	0	22	2	0	2	0	0	42
Apprch %	0	100	0	91.7	8.3	0	100	0	0	
Total %	0	38.1	0	52.4	4.8	0	4.8	0	0	

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:30 PM													
12:30 PM	0	1	0	1	**10**	0	0	**10**	0	0	0	0	**11**
12:45 PM	0	**4**	0	**4**	1	0	0	1	0	0	0	0	5
01:00 PM	0	1	0	1	3	0	0	3	0	0	0	0	4
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	6	0	6	14	0	0	14	0	0	0	0	20
% App. Total	0	100	0		100	0	0		0	0	0		
PHF	.000	.375	.000	.375	.350	.000	.000	.350	.000	.000	.000	.000	.455

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City, State: Newton, MA
Client: Stantec/ S. Wood

File Name : 144128 F
Site Code : 19530953
Start Date : 10/18/2014
Page No : 1

Groups Printed- Peds and Bicycles

	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
12:30 PM	0	4	0	0	2	0	1	0	0	0	3	2	12
12:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	4
Total	0	4	0	0	2	0	1	0	0	0	7	2	16
01:00 PM	0	1	0	0	1	0	0	0	0	0	2	3	7
01:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	3
01:30 PM	0	1	0	0	2	0	0	0	0	0	0	2	5
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	4	4
Total	0	2	0	0	3	0	0	0	0	0	5	9	19
02:00 PM	0	1	0	0	0	0	0	0	0	0	2	0	3
02:15 PM	0	0	0	0	1	0	0	0	0	0	1	1	3
02:30 PM	0	2	0	0	3	0	0	0	0	0	2	0	7
02:45 PM	0	2	0	0	0	0	0	1	0	0	2	7	12
Total	0	5	0	0	4	0	0	1	0	0	7	8	25
03:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	3	1	4
Grand Total	0	11	0	0	9	0	1	1	0	0	23	21	66
Apprch %	0	100	0	0	81.8	0	9.1	9.1	0	0	52.3	47.7	
Total %	0	16.7	0	0	13.6	0	1.5	1.5	0	0	34.8	31.8	

	Needham Street From North					Needham Street From South					Site Driveway North From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 12:30 PM																
12:30 PM	0	**4**	0	0	**4**	**2**	0	**1**	0	**3**	0	0	3	2	**5**	**12**
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	**4**	0	4	4
01:00 PM	0	1	0	0	1	1	0	0	0	1	0	0	2	**3**	5	7
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Total Volume	0	5	0	0	5	3	0	1	0	4	0	0	12	5	17	26
% App. Total	0	100	0	0		75	0	25	0		0	0	70.6	29.4		
PHF	.000	.313	.000	.000	.313	.375	.000	.250	.000	.333	.000	.000	.750	.417	.850	.542

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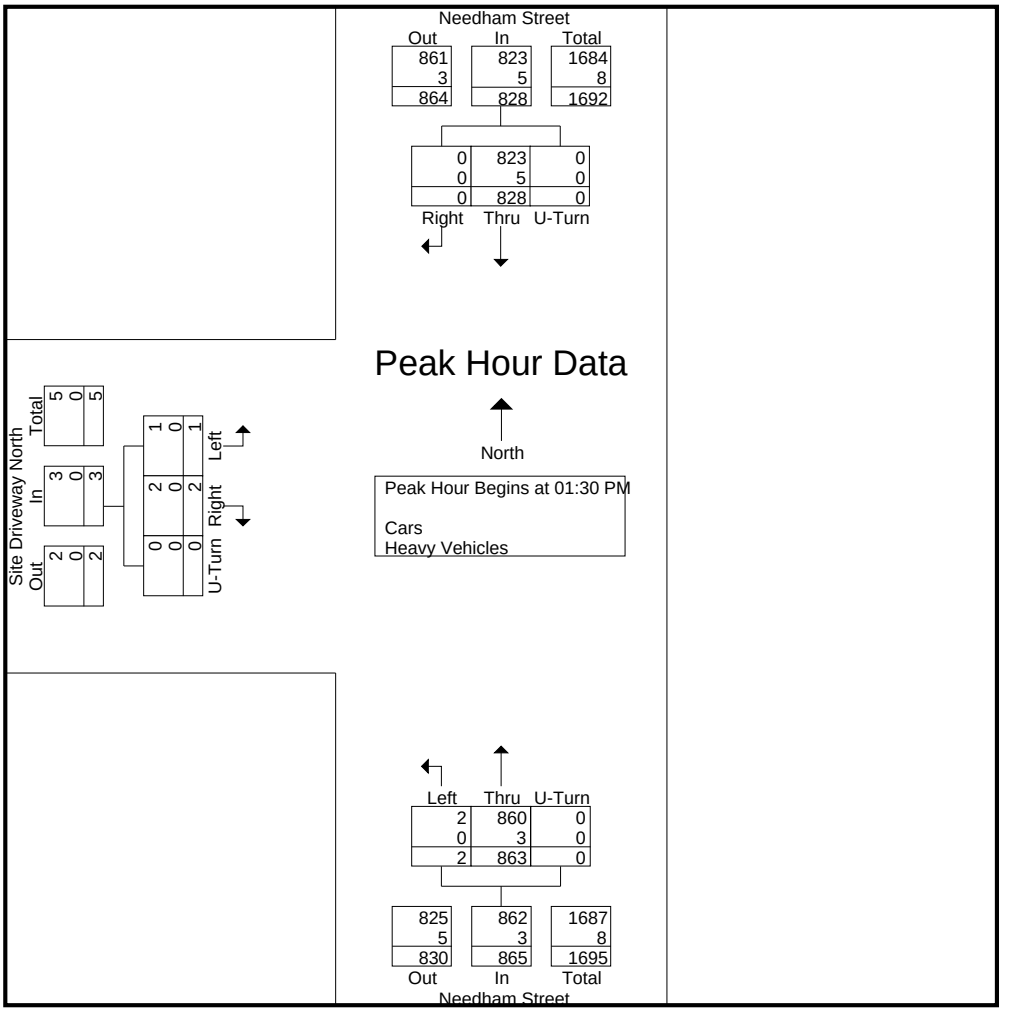
	Needham Street From North				Needham Street From South				Site Driveway North From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 01:30 PM													
01:30 PM	0	206	0	206	198	**1**	0	199	**1**	**1**	0	**2**	407
01:45 PM	0	**215**	0	**215**	**237**	0	0	**237**	0	0	0	0	**452**
02:00 PM	0	212	0	212	222	0	0	222	0	0	0	0	434
02:15 PM	0	195	0	195	206	1	0	207	1	0	0	1	403
Total Volume	0	828	0	828	863	2	0	865	2	1	0	3	1696
% App. Total	0	100	0		99.8	0.2	0		66.7	33.3	0		
PHF	.000	.963	.000	.963	.910	.500	.000	.912	.500	.250	.000	.375	.938
Cars	0	823	0	823	860	2	0	862	2	1	0	3	1688
% Cars	0	99.4	0	99.4	99.7	100	0	99.7	100	100	0	100	99.5
Heavy Vehicles	0	5	0	5	3	0	0	3	0	0	0	0	8
% Heavy Vehicles	0	0.6	0	0.6	0.3	0	0	0.3	0	0	0	0	0.5



Appendix C Existing Intersection Operations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	4	2	0	1	42	744	3	3	731	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	4	2	0	1	42	744	3	3	731	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.79	0.79	0.79	0.79	0.79		0.79					
vC, conflicting volume	1578	1578	741	1580	1586	746	751			747		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1599	1599	534	1603	1610	746	546			747		
tC, single (s)	7.1	6.5	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	97	100	100	95			100		
cM capacity (veh/h)	65	79	396	64	78	417	792			870		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	3	789	754
Volume Left	0	2	42	3
Volume Right	4	1	3	20
cSH	396	89	792	870
Volume to Capacity	0.01	0.03	0.05	0.00
Queue Length 95th (ft)	1	3	4	0
Control Delay (s)	14.2	46.8	1.4	0.1
Lane LOS	B	E	A	A
Approach Delay (s)	14.2	46.8	1.4	0.1
Approach LOS	B	E		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	80.2%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	1	9	697	807	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	9	697	807	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.69	0.69	0.69			
vC, conflicting volume	1530	814	822			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1542	513	523			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	99			
cM capacity (veh/h)	88	393	731			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	3	9	697	822
Volume Left	2	9	0	0
Volume Right	1	0	0	15
cSH	118	731	1700	1700
Volume to Capacity	0.03	0.01	0.41	0.48
Queue Length 95th (ft)	2	1	0	0
Control Delay (s)	36.2	10.0	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	36.2	0.1		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	9	5	0	6	45	696	4	1	747	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	9	5	0	6	45	696	4	1	747	49
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.70	0.70	0.70	0.70	0.70		0.70					
vC, conflicting volume	1568	1564	772	1570	1586	698	796			700		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1596	1590	466	1600	1622	698	501			700		
tC, single (s)	7.1	6.5	6.4	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	98	90	100	99	94			100		
cM capacity (veh/h)	58	72	393	51	69	444	757			906		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	14	11	745	797
Volume Left	5	5	45	1
Volume Right	9	6	4	49
cSH	128	98	757	906
Volume to Capacity	0.11	0.11	0.06	0.00
Queue Length 95th (ft)	9	9	5	0
Control Delay (s)	36.6	46.1	1.6	0.0
Lane LOS	E	E	A	A
Approach Delay (s)	36.6	46.1	1.6	0.0
Approach LOS	E	E		

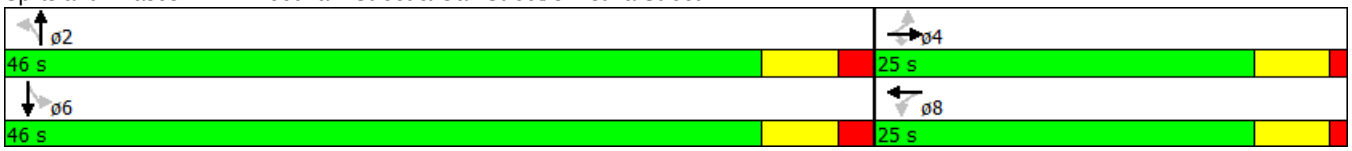
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	82.5%	ICU Level of Service	E	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	113	96	128	107	156	143	816	18	545
Lane Group Flow (vph)	0	233	142	0	327	151	923	19	682
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	46.0	46.0	46.0	46.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	64.8%	64.8%	64.8%	64.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.78	0.26		0.89	0.54	0.91	0.18	0.68
Control Delay		43.2	5.5		51.8	18.9	28.2	12.3	14.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		43.2	5.5		51.8	18.9	28.2	12.3	14.5
Queue Length 50th (ft)		92	0		131	38	325	4	185
Queue Length 95th (ft)		#199	38		#272	100	#598	16	301
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		340	590		415	301	1104	117	1087
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		0.69	0.24		0.79	0.50	0.84	0.16	0.63

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 66.7
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



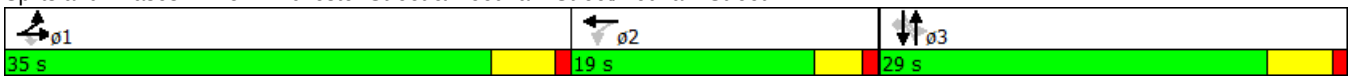
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	96	128	107	156	38	143	816	61	18	545	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.98		1.00	0.99		1.00	0.98	
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1767	1615		1905		1678	1804		1626	1769	
Flt Permitted		0.62	1.00		0.69		0.28	1.00		0.11	1.00	
Satd. Flow (perm)		1116	1615		1339		494	1804		193	1769	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	107	142	116	170	41	151	859	64	19	574	108
RTOR Reduction (vph)	0	0	104	0	7	0	0	4	0	0	10	0
Lane Group Flow (vph)	0	233	38	0	320	0	151	919	0	19	672	0
Heavy Vehicles (%)	7%	2%	0%	2%	4%	0%	4%	4%	7%	11%	5%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		18.0	18.0		18.0		37.6	37.6		37.6	37.6	
Effective Green, g (s)		18.0	18.0		18.0		37.6	37.6		37.6	37.6	
Actuated g/C Ratio		0.27	0.27		0.27		0.56	0.56		0.56	0.56	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		301	436		361		278	1018		108	998	
v/s Ratio Prot								c0.51			0.38	
v/s Ratio Perm		0.21	0.02		c0.24		0.31			0.10		
v/c Ratio		0.77	0.09		0.89		0.54	0.90		0.18	0.67	
Uniform Delay, d1		22.4	18.2		23.3		9.1	12.9		7.0	10.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.7	0.0		21.4		2.7	11.2		1.1	2.0	
Delay (s)		33.2	18.2		44.7		11.8	24.1		8.1	12.2	
Level of Service		C	B		D		B	C		A	B	
Approach Delay (s)		27.5			44.7			22.4			12.1	
Approach LOS		C			D			C			B	

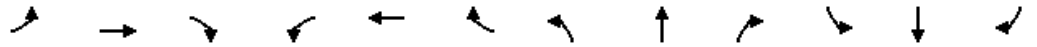
Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	11.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	606	99	39	17	160	33	286	42	267	658
Lane Group Flow (vph)	414	415	46	0	324	0	370	0	325	693
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.77	0.77	0.08		0.83		0.81		0.71	0.74
Control Delay	34.3	33.6	2.0		47.9		41.9		35.3	7.6
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	34.3	33.6	2.0		47.9		41.9		35.3	7.6
Queue Length 50th (ft)	192	192	0		148		176		150	0
Queue Length 95th (ft)	281	281	7		#293		#303		#243	92
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	631	639	645		409		517		517	973
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	0.66	0.65	0.07		0.79		0.72		0.63	0.71

Intersection Summary
Cycle Length: 83
Actuated Cycle Length: 76.6
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	606	99	39	17	160	121	33	286	6	42	267	658
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94			1.00			1.00	0.85
Flt Protected	0.95	0.97	1.00		1.00			0.99			0.99	1.00
Satd. Flow (prot)	1579	1600	1495		1976			1869			1843	1568
Flt Permitted	0.95	0.97	1.00		0.96			0.86			0.87	1.00
Satd. Flow (perm)	1579	1600	1495		1904			1613			1616	1568
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Adj. Flow (vph)	713	116	46	18	174	132	38	325	7	44	281	693
RTOR Reduction (vph)	0	0	30	0	29	0	0	1	0	0	0	496
Lane Group Flow (vph)	414	415	16	0	295	0	0	369	0	0	325	197
Heavy Vehicles (%)	5%	6%	8%	0%	2%	4%	0%	1%	0%	5%	2%	3%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	26.0	26.0	26.0		14.6			21.7			21.7	21.7
Effective Green, g (s)	26.0	26.0	26.0		14.6			21.7			21.7	21.7
Actuated g/C Ratio	0.34	0.34	0.34		0.19			0.28			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	538	545	509		364			458			459	445
v/s Ratio Prot	c0.26	0.26										
v/s Ratio Perm			0.01		c0.15			c0.23			0.20	0.13
v/c Ratio	0.77	0.76	0.03		0.81			0.81			0.71	0.44
Uniform Delay, d1	22.5	22.4	16.8		29.5			25.3			24.5	22.4
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	7.0	6.6	0.0		13.4			9.4			4.1	0.3
Delay (s)	29.4	29.0	16.8		42.9			34.8			28.5	22.6
Level of Service	C	C	B		D			C			C	C
Approach Delay (s)		28.6			42.9			34.8			24.5	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Volume (vph)	27	0	17	17	0	17	672	796
Lane Group Flow (vph)	0	32	20	0	28	18	717	873
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	NA
Protected Phases		4			8		2	6
Permitted Phases	4		4	8		2		
Detector Phase	4	4	4	8	8	2	2	6
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	Min	Min	Min
v/c Ratio		0.13	0.06		0.10	0.06	0.50	0.60
Control Delay		22.0	2.8		5.3	5.0	6.7	8.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		22.0	2.8		5.3	5.0	6.7	8.2
Queue Length 50th (ft)		10	0		0	1	92	127
Queue Length 95th (ft)		30	5		8	10	280	394
Internal Link Dist (ft)		71			182		282	601
Turn Bay Length (ft)								
Base Capacity (vph)		528	623		556	353	1541	1580
Starvation Cap Reductn		0	0		0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0
Reduced v/c Ratio		0.06	0.03		0.05	0.05	0.47	0.55

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 47.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	0	17	17	0	5	17	672	2	0	796	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Frt		1.00	0.85		0.97		1.00	1.00			1.00	
Flt Protected		0.95	1.00		0.96		0.95	1.00			1.00	
Satd. Flow (prot)		1570	1615		1775		1558	1809			1856	
Flt Permitted		0.87	1.00		0.78		0.25	1.00			1.00	
Satd. Flow (perm)		1437	1615		1432		415	1809			1856	
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	32	0	20	22	0	6	18	715	2	0	865	8
RTOR Reduction (vph)	0	0	18	0	25	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	32	2	0	3	0	18	717	0	0	873	0
Heavy Vehicles (%)	15%	0%	0%	0%	0%	0%	12%	5%	0%	0%	2%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		4.6	4.6		4.6		34.1	34.1			34.1	
Effective Green, g (s)		4.6	4.6		4.6		34.1	34.1			34.1	
Actuated g/C Ratio		0.09	0.09		0.09		0.69	0.69			0.69	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0			6.0	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		133	149		132		284	1241			1273	
v/s Ratio Prot								0.40			c0.47	
v/s Ratio Perm		c0.02	0.00		0.00		0.04					
v/c Ratio		0.24	0.01		0.02		0.06	0.58			0.69	
Uniform Delay, d1		20.9	20.5		20.5		2.6	4.1			4.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.3	0.0		0.0		0.0	0.4			1.2	
Delay (s)		21.3	20.5		20.5		2.6	4.5			5.9	
Level of Service		C	C		C		A	A			A	
Approach Delay (s)		21.0			20.5			4.4			5.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	65	0	0	7	3	825	2	2	627	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	0	65	0	0	7	3	825	2	2	627	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.99	0.99	0.99	0.99	0.99		0.99					
vC, conflicting volume	1470	1464	628	1528	1464	826	628			827		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1470	1464	616	1529	1464	826	616			827		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.8			2.2		
p0 queue free %	82	100	87	100	100	98	100			100		
cM capacity (veh/h)	99	127	488	82	127	375	705			813		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	83	7	830	630
Volume Left	18	0	3	2
Volume Right	65	7	2	1
cSH	264	375	705	813
Volume to Capacity	0.31	0.02	0.00	0.00
Queue Length 95th (ft)	33	1	0	0
Control Delay (s)	24.8	14.8	0.1	0.1
Lane LOS	C	B	A	A
Approach Delay (s)	24.8	14.8	0.1	0.1
Approach LOS	C	B		

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	7	2	874	574	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	7	2	874	574	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	1453	575	576			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1444	408	409			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	99	100			
cM capacity (veh/h)	124	549	983			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	2	874	576
Volume Left	18	2	0	0
Volume Right	7	0	0	2
cSH	158	983	1700	1700
Volume to Capacity	0.16	0.00	0.51	0.34
Queue Length 95th (ft)	14	0	0	0
Control Delay (s)	31.9	8.7	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	31.9	0.0		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	28	11	0	3	7	846	4	3	565	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	27	0	28	11	0	3	7	846	4	3	565	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.91	0.91	0.91	0.91	0.91		0.91					
vC, conflicting volume	1438	1438	568	1464	1438	848	570			850		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1432	1431	470	1460	1432	848	473			850		
tC, single (s)	7.2	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	72	100	95	88	100	99	99			100		
cM capacity (veh/h)	95	121	528	92	121	364	932			797		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	55	14	857	573
Volume Left	27	11	7	3
Volume Right	28	3	4	5
cSH	163	110	932	797
Volume to Capacity	0.34	0.13	0.01	0.00
Queue Length 95th (ft)	35	11	1	0
Control Delay (s)	37.9	42.6	0.2	0.1
Lane LOS	E	E	A	A
Approach Delay (s)	37.9	42.6	0.2	0.1
Approach LOS	E	E		

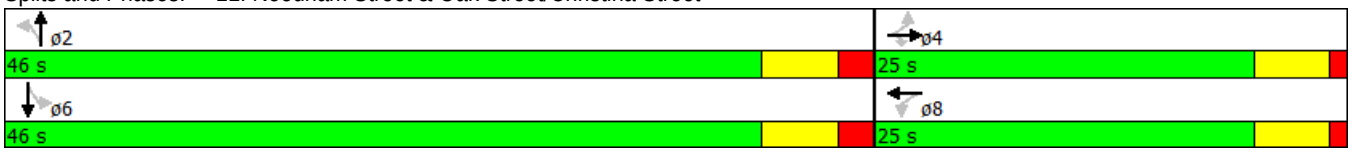
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	59.6%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	140	166	149	170	126	151	706	34	658
Lane Group Flow (vph)	0	356	173	0	348	156	848	35	798
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	46.0	46.0	46.0	46.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	64.8%	64.8%	64.8%	64.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.89	0.29		1.27	0.95	0.86	0.26	0.82
Control Delay		51.3	5.1		173.3	78.7	23.5	13.9	20.4
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		51.3	5.1		173.3	78.7	23.5	13.9	20.4
Queue Length 50th (ft)		152	0		~205	55	266	7	238
Queue Length 95th (ft)		#288	36		#360	#172	#463	26	388
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		401	604		274	188	1121	154	1112
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		0.89	0.29		1.27	0.83	0.76	0.23	0.72

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 66.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	166	149	170	126	34	151	706	116	34	658	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.99		1.00	0.98		1.00	0.98	
Flt Protected		0.98	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1849	1599		1926		1728	1841		1805	1824	
Flt Permitted		0.70	1.00		0.45		0.17	1.00		0.13	1.00	
Satd. Flow (perm)		1328	1599		890		311	1841		255	1824	
Peak-hour factor, PHF	0.86	0.86	0.86	0.95	0.95	0.95	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	163	193	173	179	133	36	156	728	120	35	671	127
RTOR Reduction (vph)	0	0	121	0	6	0	0	9	0	0	10	0
Lane Group Flow (vph)	0	356	52	0	342	0	156	839	0	35	788	0
Heavy Vehicles (%)	1%	0%	1%	1%	0%	6%	1%	1%	1%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		20.2	20.2		20.2		35.5	35.5		35.5	35.5	
Effective Green, g (s)		20.2	20.2		20.2		35.5	35.5		35.5	35.5	
Actuated g/C Ratio		0.30	0.30		0.30		0.53	0.53		0.53	0.53	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		402	484		269		165	979		135	970	
v/s Ratio Prot								0.46			0.43	
v/s Ratio Perm		0.27	0.03		c0.38		c0.50			0.14		
v/c Ratio		0.89	0.11		1.27		0.95	0.86		0.26	0.81	
Uniform Delay, d1		22.1	16.8		23.2		14.7	13.4		8.5	12.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		19.7	0.0		148.6		54.1	7.8		1.4	5.5	
Delay (s)		41.8	16.8		171.9		68.8	21.2		9.9	18.4	
Level of Service		D	B		F		E	C		A	B	
Approach Delay (s)		33.6			171.9			28.6			18.0	
Approach LOS		C			F			C			B	

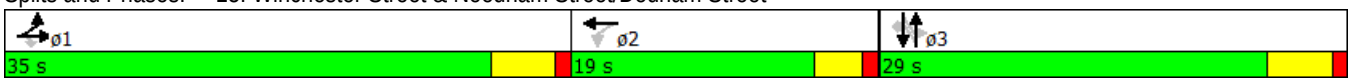
Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	757	128	63	25	82	18	253	78	227	515
Lane Group Flow (vph)	472	480	68	0	215	0	325	0	317	536
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.80	0.80	0.11		0.64		0.63		0.81	0.65
Control Delay	34.5	34.3	4.3		33.1		30.9		45.0	6.4
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	34.5	34.3	4.3		33.1		30.9		45.0	6.4
Queue Length 50th (ft)	222	226	0		78		141		148	0
Queue Length 95th (ft)	#392	#396	21		150		220		#285	74
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	673	684	709		407		594		451	879
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	0.70	0.70	0.10		0.53		0.55		0.70	0.61

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 75.4
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	757	128	63	25	82	100	18	253	11	78	227	515
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.93			0.99			1.00	0.85
Flt Protected	0.95	0.97	1.00		0.99			1.00			0.99	1.00
Satd. Flow (prot)	1641	1668	1615		1991			1867			1857	1583
Flt Permitted	0.95	0.97	1.00		0.90			0.96			0.73	1.00
Satd. Flow (perm)	1641	1668	1615		1793			1807			1378	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.96	0.96	0.96	0.87	0.87	0.87	0.96	0.96	0.96
Adj. Flow (vph)	814	138	68	26	85	104	21	291	13	81	236	536
RTOR Reduction (vph)	0	0	43	0	42	0	0	2	0	0	0	384
Lane Group Flow (vph)	472	480	25	0	173	0	0	323	0	0	317	152
Heavy Vehicles (%)	1%	1%	0%	4%	0%	0%	0%	1%	0%	1%	1%	2%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	27.2	27.2	27.2		12.4			21.3			21.3	21.3
Effective Green, g (s)	27.2	27.2	27.2		12.4			21.3			21.3	21.3
Actuated g/C Ratio	0.36	0.36	0.36		0.17			0.28			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	595	605	586		296			513			391	450
v/s Ratio Prot	0.29	c0.29										
v/s Ratio Perm			0.02		c0.10			0.18			c0.23	0.10
v/c Ratio	0.79	0.79	0.04		0.59			0.63			0.81	0.34
Uniform Delay, d1	21.3	21.3	15.4		28.9			23.4			24.9	21.2
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	7.6	7.5	0.0		3.5			1.7			11.4	0.2
Delay (s)	28.9	28.8	15.5		32.3			25.1			36.4	21.4
Level of Service	C	C	B		C			C			D	C
Approach Delay (s)		28.0			32.3			25.1			27.0	
Approach LOS		C			C			C			C	

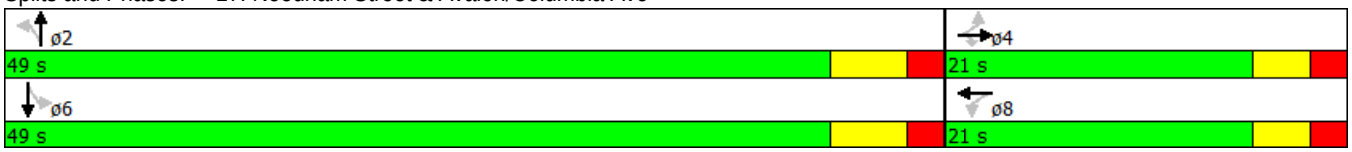
Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	29	0	15	12	2	21	850	2	584
Lane Group Flow (vph)	0	48	25	0	36	22	901	2	654
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.17	0.08		0.15	0.04	0.62	0.01	0.46
Control Delay		21.7	4.0		18.4	4.7	8.8	4.5	6.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		21.7	4.0		18.4	4.7	8.8	4.5	6.2
Queue Length 50th (ft)		12	0		7	2	137	0	80
Queue Length 95th (ft)		28	1		17	11	414	3	235
Internal Link Dist (ft)		71			182		282		601
Turn Bay Length (ft)									
Base Capacity (vph)		582	623		505	604	1630	371	1597
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		0.08	0.04		0.07	0.04	0.55	0.01	0.41

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 47.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	0	15	12	2	5	21	850	6	2	584	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1615		1694		1745	1879		1745	1841	
Flt Permitted		0.83	1.00		0.78		0.38	1.00		0.23	1.00	
Satd. Flow (perm)		1583	1615		1360		695	1879		428	1841	
Peak-hour factor, PHF	0.61	0.61	0.61	0.53	0.53	0.53	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	48	0	25	23	4	9	22	895	6	2	642	12
RTOR Reduction (vph)	0	0	23	0	8	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	48	2	0	28	0	22	901	0	2	653	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	20%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		4.8	4.8		4.8		33.3	33.3		33.3	33.3	
Effective Green, g (s)		4.8	4.8		4.8		33.3	33.3		33.3	33.3	
Actuated g/C Ratio		0.10	0.10		0.10		0.68	0.68		0.68	0.68	
Clearance Time (s)		5.0	5.0		5.0		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)		154	157		132		471	1274		290	1248	
v/s Ratio Prot								c0.48			0.35	
v/s Ratio Perm		c0.03	0.00		0.02		0.03			0.00		
v/c Ratio		0.31	0.02		0.21		0.05	0.71		0.01	0.52	
Uniform Delay, d1		20.6	20.0		20.4		2.6	4.9		2.6	3.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.0		0.3		0.0	1.5		0.0	0.2	
Delay (s)		21.0	20.0		20.7		2.6	6.4		2.6	4.1	
Level of Service		C	C		C		A	A		A	A	
Approach Delay (s)		20.7			20.7			6.3			4.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	4	1	0	3	0	876	4	2	858	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	4	1	0	3	0	876	4	2	858	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.74	0.74	0.74	0.74	0.74		0.74					
vC, conflicting volume	1743	1742	858	1744	1740	878	858			880		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1828	1827	632	1830	1824	878	632			880		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	98	100	99	100			100		
cM capacity (veh/h)	44	57	358	44	58	350	710			777		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	4	880	860
Volume Left	0	1	0	2
Volume Right	4	3	4	0
cSH	358	127	710	777
Volume to Capacity	0.01	0.03	0.00	0.00
Queue Length 95th (ft)	1	2	0	0
Control Delay (s)	15.2	34.3	0.0	0.1
Lane LOS	C	D		A
Approach Delay (s)	15.2	34.3	0.0	0.1
Approach LOS	C	D		

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	56.7%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	1	2	2	863	828	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	2	2	863	828	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.72	0.72	0.72			
vC, conflicting volume	1695	828	828			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1770	571	571			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	67	379	732			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	3	2	863	828
Volume Left	1	2	0	0
Volume Right	2	0	0	0
cSH	148	732	1700	1700
Volume to Capacity	0.02	0.00	0.51	0.49
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	29.8	9.9	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	29.8	0.0		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	0	6	14	0	15	4	869	6	7	817	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	0	6	14	0	15	4	869	6	7	817	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.71	0.71	0.71	0.71	0.71		0.71					
vC, conflicting volume	1726	1714	817	1717	1711	872	817			875		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1816	1799	544	1804	1795	872	544			875		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	98	68	100	96	99			99		
cM capacity (veh/h)	41	57	388	43	57	353	740			780		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	7	29	879	824
Volume Left	1	14	4	7
Volume Right	6	15	6	0
cSH	176	79	740	780
Volume to Capacity	0.04	0.37	0.01	0.01
Queue Length 95th (ft)	3	35	0	1
Control Delay (s)	26.3	74.6	0.2	0.2
Lane LOS	D	F	A	A
Approach Delay (s)	26.3	74.6	0.2	0.2
Approach LOS	D	F		

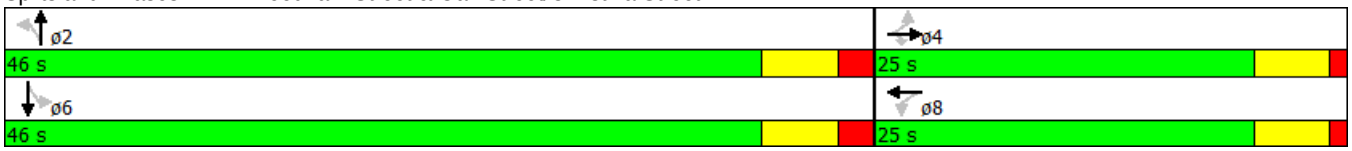
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	59.7%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	186	67	130	103	92	124	776	40	648
Lane Group Flow (vph)	0	294	151	0	287	125	832	42	840
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	46.0	46.0	46.0	46.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	64.8%	64.8%	64.8%	64.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.89	0.26		0.82	0.89	0.83	0.27	0.85
Control Delay		56.1	5.4		43.4	71.0	21.5	13.7	22.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		56.1	5.4		43.4	71.0	21.5	13.7	22.5
Queue Length 50th (ft)		124	0		110	41	258	9	259
Queue Length 95th (ft)		#249	34		#231	#144	417	29	#447
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		351	599		372	166	1169	179	1154
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	0.25		0.77	0.75	0.71	0.23	0.73

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 65.2
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	186	67	130	103	92	55	124	776	48	40	648	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583		1920		1745	1866		1805	1828	
Flt Permitted		0.60	1.00		0.58		0.15	1.00		0.15	1.00	
Satd. Flow (perm)		1124	1583		1145		267	1866		287	1828	
Peak-hour factor, PHF	0.86	0.86	0.86	0.87	0.87	0.87	0.99	0.99	0.99	0.95	0.95	0.95
Adj. Flow (vph)	216	78	151	118	106	63	125	784	48	42	682	158
RTOR Reduction (vph)	0	0	106	0	14	0	0	3	0	0	13	0
Lane Group Flow (vph)	0	294	45	0	273	0	125	829	0	42	827	0
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		19.2	19.2		19.2		34.9	34.9		34.9	34.9	
Effective Green, g (s)		19.2	19.2		19.2		34.9	34.9		34.9	34.9	
Actuated g/C Ratio		0.29	0.29		0.29		0.54	0.54		0.54	0.54	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		331	466		337		143	1000		153	979	
v/s Ratio Prot								0.44			0.45	
v/s Ratio Perm		c0.26	0.03		0.24		c0.47			0.15		
v/c Ratio		0.89	0.10		0.81		0.87	0.83		0.27	0.85	
Uniform Delay, d1		21.9	16.7		21.3		13.2	12.6		8.2	12.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		23.2	0.0		12.7		41.3	6.0		1.3	7.1	
Delay (s)		45.1	16.7		33.9		54.5	18.6		9.5	19.9	
Level of Service		D	B		C		D	B		A	B	
Approach Delay (s)		35.5			33.9			23.3			19.4	
Approach LOS		D			C			C			B	

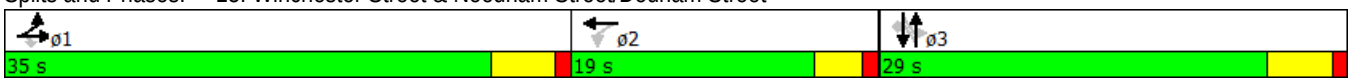
Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	687	100	74	11	126	32	169	101	154	646
Lane Group Flow (vph)	440	444	83	0	276	0	220	0	280	710
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.76	0.76	0.13		0.70		0.47		0.75	0.74
Control Delay	32.3	32.0	5.7		36.4		27.2		40.0	7.7
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	32.3	32.0	5.7		36.4		27.2		40.0	7.7
Queue Length 50th (ft)	206	208	1		113		92		129	0
Queue Length 95th (ft)	#321	321	29		#213		157		#237	91
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	689	697	724		447		577		463	1013
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	0.64	0.64	0.11		0.62		0.38		0.60	0.70

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 74.1
Natural Cycle: 65
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	687	100	74	11	126	122	32	169	8	101	154	646
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94			1.00			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00			0.99			0.98	1.00
Satd. Flow (prot)	1641	1661	1615		2012			1861			1863	1615
Flt Permitted	0.95	0.96	1.00		0.97			0.91			0.73	1.00
Satd. Flow (perm)	1641	1661	1615		1955			1714			1379	1615
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	772	112	83	12	134	130	34	178	8	111	169	710
RTOR Reduction (vph)	0	0	51	0	38	0	0	1	0	0	0	516
Lane Group Flow (vph)	440	444	32	0	238	0	0	219	0	0	280	194
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	26.1	26.1	26.1		13.4			20.1			20.1	20.1
Effective Green, g (s)	26.1	26.1	26.1		13.4			20.1			20.1	20.1
Actuated g/C Ratio	0.35	0.35	0.35		0.18			0.27			0.27	0.27
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	581	589	572		355			468			376	441
v/s Ratio Prot	c0.27	0.27										
v/s Ratio Perm			0.02		c0.12			0.13			c0.20	0.12
v/c Ratio	0.76	0.75	0.06		0.67			0.47			0.74	0.44
Uniform Delay, d1	21.0	20.9	15.6		28.0			22.3			24.4	22.1
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	6.0	5.8	0.1		5.2			0.3			6.9	0.3
Delay (s)	26.9	26.7	15.7		33.2			22.6			31.3	22.4
Level of Service	C	C	B		C			C			C	C
Approach Delay (s)		25.9			33.2			22.6			24.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	17	0	14	18	0	20	830	6	796
Lane Group Flow (vph)	0	22	18	0	36	22	931	6	837
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.07	0.06		0.11	0.05	0.57	0.02	0.52
Control Delay		20.1	2.2		7.1	4.2	7.1	4.2	6.0
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		20.1	2.2		7.1	4.2	7.1	4.2	6.0
Queue Length 50th (ft)		4	0		0	0	0	0	0
Queue Length 95th (ft)		21	2		15	12	437	5	355
Internal Link Dist (ft)		71			182		282		601
Turn Bay Length (ft)									
Base Capacity (vph)		730	649		667	467	1689	383	1673
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		0.03	0.03		0.05	0.05	0.55	0.02	0.50

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 45.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	0	14	18	0	13	20	830	8	6	796	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.94		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1615		1631		1745	1897		1745	1879	
Flt Permitted		1.00	1.00		0.99		0.29	1.00		0.23	1.00	
Satd. Flow (perm)		1900	1615		1661		524	1897		430	1879	
Peak-hour factor, PHF	0.78	0.78	0.78	0.86	0.86	0.86	0.90	0.90	0.90	0.96	0.96	0.96
Adj. Flow (vph)	22	0	18	21	0	15	22	922	9	6	829	8
RTOR Reduction (vph)	0	0	17	0	34	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	22	1	0	2	0	22	931	0	6	837	0
Heavy Vehicles (%)	0%	0%	0%	6%	0%	8%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		3.2	3.2		3.2		34.0	34.0		34.0	34.0	
Effective Green, g (s)		3.2	3.2		3.2		34.0	34.0		34.0	34.0	
Actuated g/C Ratio		0.07	0.07		0.07		0.71	0.71		0.71	0.71	
Clearance Time (s)		5.0	5.0		5.0		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)		126	107		110		369	1338		303	1325	
v/s Ratio Prot								c0.49			0.45	
v/s Ratio Perm		c0.01	0.00		0.00		0.04			0.01		
v/c Ratio		0.17	0.01		0.02		0.06	0.70		0.02	0.63	
Uniform Delay, d1		21.3	21.0		21.0		2.2	4.1		2.1	3.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2	0.0		0.0		0.0	1.3		0.0	0.7	
Delay (s)		21.5	21.0		21.1		2.2	5.4		2.1	4.5	
Level of Service		C	C		C		A	A		A	A	
Approach Delay (s)		21.3			21.1			5.3			4.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	48.2	Sum of lost time (s)	11.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D Crash Data

TABLE 4 – Crash Summary Intersections - Newton

	Needham Street and						
Needham Street and	Oak St/ Christina St	Charlemont St	Tower Rd/ Industrial Pl	Rockland St	Avalon Bay/ Columbia Ave	Easy St	Dedham St/ Winchester St
Year							
2007	2	1	5	2	0	1	10
2008	5	4	3	1	2	4	4
2009	5	5	2	0	1	1	5
2010	4	8	6	0	0	0	1
2011	8	9	7	0	1	1	3
Total	24	27	23	3	4	7	21
Average per year	4.8	5.4	4.6	0.6	0.8	1.4	4.2
Crash Rate	0.48	0.81	0.357	0.09	0.12	0.21	0.49
Severity							
Property Damage Only	17	17	18	2	2	5	17
Non-Fatal Injury	5	5	2	1	2	2	4
Fatal Injury	0	0	0	0	0	0	0
Not Reported	2	5	3	0	0	0	2
Total	24	25	21	3	4	7	21
Type of Accident							
Single Vehicle	0	1	0	0	0	0	2
Head-On	0	1	0	0	0	1	0
Angle	6	11	8	1	2	1	6
Rear-End	12	11	9	1	1	4	10
Sideswipe	3	1	2	1	0	1	4
Pedestrian/Bicyclist	2	0	2	0	0	0	0
Not Reported	1	2	2	0	1	0	1
Total	24	25	21	3	4	7	21

Location 1: Needham Street at Oak Street/Christina Street, Newton

The RSA team made the following observations with regard to intersection geometry, traffic signals, and pedestrian and bicycle accommodations at the intersection of Needham Street at Oak Street/Christina Street in Newton.

Observations:

Intersection Geometry

Oak Street intersects Needham Street approximately 60 feet south of Christina Street, creating an offset intersection. Vehicles traveling through the intersection between the two roadways must turn left in order to navigate the intersection. The Oak Street eastbound and Christina Street westbound approaches receive green indications concurrently, so these offset through movements occur simultaneously. As the intended vehicle paths are not clearly defined, these simultaneous through movements can result in sideswipe and angle crashes. One sideswipe crash occurred within the intersection between Oak Street eastbound and Christina Street westbound vehicles.

Oak Street and Christina Street are offset, creating awkward through movements.

The intersection offset can also cause confusion as to the intent of motorists approaching the intersection on Oak Street eastbound or Christina Street westbound. During the RSA, team members observed vehicles using their left turn indication to travel through the intersection due to the offset. Additionally, it is difficult initially to determine whether a vehicle is turning left or traveling through the intersection. Two crashes involved an Oak Street eastbound left-turning vehicle and a Christina Street westbound right-turning vehicle that both attempted to enter the Needham Street northbound departure lane.

The pavement and pavement markings on Oak Street are in poor condition. RSA team members suggested that illegible existing pavement markings in advance of the intersection could cause confusion about lane use at the intersection.

Traffic Signal

Team members noted that the all-red phase for the Oak Street eastbound approach and the Christina Street westbound approach may be too short, especially considering the shifting maneuver necessary to travel through the intersection. A short all-red phase may not be long enough for Oak Street eastbound and Christina Street westbound vehicles to clear the

intersection. This may cause Needham Street northbound and southbound vehicles to proceed after seeing a green light, but stop unexpectedly for Oak Street eastbound and Christina Street westbound vehicles to clear the intersection. One rear-end crash occurred on the Needham Street northbound approach, and four rear-end crashes occurred on the Needham Street southbound approach.

Signal indications are overhead with supplemental post-mounted signals. All Needham Street northbound and southbound left turns are permissive.

Traffic signal indications at the intersection are primarily provided on an overhead span wire that runs from the northwest corner of the intersection to the southeast corner of the intersection. Supplemental post-mounted signal indications are provided for each approach except for the Needham Street northbound approach. None of the signal indications have backplates. RSA team members suggested that backplates may not be able to be added to signal indications on the span wire because they would alter the wind loads on the span wire assembly.

All left turns at the intersection are permissive. Team members stated that it is difficult to make a left turn from Highland Avenue northbound or southbound during peak periods, which can lead to frustration or inattention. Six of the 21 crashes were attributed to motorist inattention, including four of the six rear-end crashes at the intersection.

Signal preemption is not provided at the intersection. Public safety officials at the RSA stated that the primary movement for emergency response vehicles is right turns from Oak Street onto Needham Street southbound due to a mutual aid agreement between the City of Newton and Town of Needham, and that it is typically easy to make this turn without preemption.

RSA team members noted that the traffic signal controller operates electromechanically, and that certain signal functions may be difficult to program into the existing controller.

Pedestrian Accommodations

Two crashes involving pedestrians occurred at the intersection. One of the crashes involved a pedestrian crossing the southern leg of Needham Street. While crosswalks are provided across all the other legs at the intersection, there is no crosswalk across the southern leg of Needham Street. The second crash occurred when a vehicle exiting #311 Needham Street struck a pedestrian crossing a driveway.

A crosswalk is not provided across the southern leg of Needham Street.

Pedestrian indications and push buttons are not provided at the intersection. Most signal posts are

located behind fences, so pedestrian push buttons could not be installed. Team members stated that it is likely not possible to add functionality for pedestrian indications with the existing signal controller.

According to team members, the Oak Street eastbound and Christina Street westbound approaches do not receive a green light unless a vehicle arrives at the intersection. This means that pedestrians who wish to cross Needham Street may not receive a gap in Needham Street traffic during off-peak periods if there is no traffic on Oak Street or Christina Street.

Team members noted that, while ramps are provided at the intersection, they are likely not compliant with the Americans with Disabilities Act (ADA). Additionally, RSA team members noted that apex ramps are not appropriate at the intersection.

Bicycle Accommodations

There are no bicycle accommodations at the intersection. Three crashes involved bicycles, and RSA team members stated that bicycle traffic is moderate along the Needham Street corridor. One bicycle crash occurred when a vehicle turning right on red struck a bicyclist who was crossing Oak Street using the sidewalk and crosswalk. A second bicycle crash occurred when a bicyclist was struck by an opening car door on Needham Street northbound. The third crash involving a bicycle occurred when both the vehicle and bicyclist were turning right from Christina Street westbound onto Needham Street northbound.

Potential Enhancements:

1. In the short term, consider resurfacing and restriping the Oak Street eastbound approach to the intersection to clarify its lane use. Reinforce lane use regulations with appropriate diagrammatic lane use signage.

2. Consider providing a dotted yellow centerline extension through the intersection to guide Oak Street eastbound and Christina Street westbound vehicles through the intersection and to help reduce sideswipe crashes.

3. Consider using split phasing for the Oak Street eastbound and Christina Street westbound approaches to eliminate the confusion that occurs when they run simultaneously. Consider the impacts to capacity and operations of making the phasing change.

4. As part of long-term reconstruction efforts to reduce motorist confusion, consider shifting one or both of the Oak Street eastbound or Christina Street westbound approaches to create a more traditional, 90-degree intersection. Corner radii should be kept as small as possible to increase pedestrian safety by reducing the speed of right-turning vehicles. Consider impacts to adjacent property.

5. As part of long-term reconstruction efforts, consider a modern roundabout at the intersection to reduce the occurrence of angle crashes. Consider the impacts to adjacent property and to traffic operations.

6. In the short term, consider adding retroreflective borders to the backplates on the post-mounted signals at the intersections for added visibility during nighttime driving or in times of possible solar glare.

7. As part of long-term reconstruction efforts, consider adding a post-mounted signal at the Needham Street northbound approach to the intersection.

8. Determine the proper all-red clearance time for the Oak Street eastbound and Christina Street westbound approaches and, if necessary, increase the all-red interval to the appropriate length. Consider that vehicles may travel more slowly through the intersection due to its geometry and close interaction with opposing vehicles.

9. In advance of reconstruction of the intersection, consider replacing the signal controller with a modern system to enable timing and phasing changes at the intersection.

10. Consider implementing protected-permissive signal phasing for the Needham Street northbound and southbound approaches to the intersection to relieve congestion and reduce the number of crashes attributed to inattention. Consider the use of a flashing yellow arrow during the permissive phase to alert motorists that they need to yield to oncoming through vehicles. Consider the tradeoffs between additional capacity and the potential for increased angle crashes at the intersection.

11. In the short term, consider putting the Oak Street eastbound and Christina Street westbound approaches on recall so that pedestrians wishing to cross Needham Street will be provided with a gap in Needham Street northbound and southbound traffic even if no vehicles are waiting on Oak Street or Christina Street.

12. Consider providing a crosswalk across the southern leg of Needham Street for increased pedestrian access and safety.

13. Provide pedestrian signals at the intersection when possible. Consider the operational benefits for both vehicles and pedestrians of allowing concurrent pedestrian crossings. If concurrent pedestrian crossings are used, consider the safety benefits of providing a leading pedestrian interval (LPI) so that pedestrians can enter the intersection ahead of turning vehicles. Provide ADA-accessible push-buttons at all crossings.

14. Provide ADA-accessible ramps at crosswalks as part of long-term reconstruction efforts.

15. Consider providing bicycle detection at the intersection when the signal controller is modernized.

16. Consider the use of bicycle boxes at the intersection to place bicyclists in the view of motorists at the stop line.

Table 2. Summary of Potential Safety Enhancements (continued)

Location	Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Corridor-wide Issues	Consider the use of pedestrian hybrid beacons at new and existing mid-block crossings along the Needham Street/Highland Avenue corridor to improve pedestrian safety.	High	Mid-term	High	MassDOT
	As part of long-term reconstruction efforts, consider providing median refuge islands at mid-block crosswalk locations to improve pedestrian comfort and safety. Consider vehicle turning movements into and out of side streets and commercial driveways.	High	Mid-term	High	MassDOT
	As part of long-term reconstruction efforts, consider providing bicycle lanes or, if feasible, protected cycle tracks, along Needham Street to provide bicyclists with a dedicated facility in which to ride, separated from motor vehicles. Consider using green pavement color at driveways to raise awareness of bicycles.	Medium/ High	Long-term	Low/ Medium	MassDOT
	Work with the MBTA to increase the frequency of service of the #59 bus along Needham Street in Newton to encourage transit use and to attract new visitors to the Needham Street corridor.	Medium	Short-term	High	MBTA/ City of Newton
	As part of long-term reconstruction efforts, work with the MBTA to determine the ideal number and locations of bus stops along Needham Street in order to help facilitate a pedestrian- and transit-friendly corridor. Improve existing bus stops to current MBTA standards regarding bus stop length, landing locations, and bus shelters.	Medium	Long-term	Low	MassDOT/MBTA/ City of Newton
Location 1: Needham Street at Oak Street/Christina Street, Newton	In the short term, consider resurfacing and restriping the Oak Street eastbound approach to the intersection to clarify its lane use.	Low	Short-term	Low	MassDOT/City of Newton
	Consider providing a dashed yellow centerline extension through the intersection to guide Oak Street eastbound and Christina Street westbound vehicles through the intersection and to help reduce sideswipe crashes.	Medium	Short-term	Low	MassDOT

Table 2. Summary of Potential Safety Enhancements (continued)

Location	Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Location 1: Needham Street at Oak Street/Christina Street, Newton	Consider using split phasing for the Oak Street eastbound and Christina Street westbound approaches to eliminate the confusion that occurs when they run simultaneously. Consider the impacts to capacity and operations of making the phasing change.	High	Mid-term	Low	MassDOT
	As part of long-term reconstruction efforts to reduce motorist confusion, consider shifting one or both of the Oak Street eastbound or Christina Street westbound approaches to create a more traditional, 90-degree intersection. Corner radii should be kept as small as possible to increase pedestrian safety by reducing the speed of right-turning vehicles. Consider impacts to adjacent property.	High	Long-term	High	MassDOT/Abutters
	As part of long-term reconstruction efforts, consider a modern roundabout at the intersection to reduce the occurrence of angle crashes. Consider the impacts to adjacent property and to traffic operations.	High	Long-term	High	MassDOT/Abutters
	In the short term, consider adding retroreflective backplates on the post-mounted signals at the intersections for added visibility during nighttime driving or in times of possible solar glare.	Low	Short-term	Low	MassDOT
	Determine the proper all-red clearance time for the Oak Street eastbound and Christina Street westbound approaches and, if necessary, increase the all-red interval to the appropriate length. Consider that vehicles may travel more slowly through the intersection due to its geometry and close interaction with opposing vehicles.	Medium	Short-term	Low	MassDOT
	In advance of reconstruction of the intersection, consider replacing the signal controller with a modern system to enable timing and phasing changes at the intersection.	High	Mid-term	High	MassDOT
	Consider implementing protected-permissive signal phasing for the Needham Street northbound and southbound approaches to the intersection to relieve congestion and reduce the number of crashes attributed to inattention. Consider the use of a flashing yellow arrow during the permissive phase to alert motorists that they need to yield to oncoming through vehicles. Consider the tradeoffs between additional capacity and the potential for increased angle crashes at the intersection.	Medium	Mid-term	High	MassDOT

Table 2. Summary of Potential Safety Enhancements (continued)

Location	Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Location 1: Needham Street at Oak Street/Christina Street, Newton	In the short term, consider putting the Oak Street eastbound and Christina Street westbound approaches on recall so that pedestrians wishing to cross Needham Street will be provided with a gap in Needham Street northbound and southbound traffic even if no vehicles are waiting on Oak Street or Christina Street.	Medium	Mid-term	Low	MassDOT
	Consider providing a crosswalk across the southern leg of Needham Street for increased pedestrian access and safety.	Medium	Short-term	Low	MassDOT
	Provide pedestrian signals at the intersection when possible. Consider the operational benefits for both vehicles and pedestrians of allowing concurrent pedestrian crossings. If concurrent pedestrian crossings are used, consider the safety benefits of providing a leading pedestrian interval (LPI) so that pedestrians can enter the intersection ahead of turning vehicles. Provide ADA-accessible push-buttons at crossings unless pedestrian phasing is put on recall.	High	Mid-term	High	MassDOT
	Provide ADA-accessible ramps at crosswalks as part of long-term reconstruction efforts.	High	Long-term	Medium	MassDOT
	Consider providing bicycle detection at the intersection when the signal controller is modernized.	Medium	Mid-term	Medium	MassDOT
	Consider the use of bicycle boxes at the intersection to place bicyclists in the view of motorists at the stop line.	Medium	Mid-term	Medium	MassDOT
Location 2: Highland Avenue at 1st Avenue/Wexford Street, Needham	Provide additional signage stating “To I-95” with arrows along Kendrick Street directing vehicles to use 4th Avenue and 2nd Avenue to access I-95 in order to reduce the number of vehicles using 1st Avenue and Wexford Street to access Highland Avenue southbound. Provide additional signage directing traffic on 1st Avenue to use A Street and 2nd Avenue in case motorists miss the signage to use 4th Avenue.	Medium	Short-term	Low	MassDOT/Town of Needham

MassDOT
Massachusetts Department of Transportation
Highway Division

COLLISION DIAGRAM

SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle	Head on	
Backing Vehicle	Rear End	Injury
Non-Involved Vehicle	Angle	
Pedestrian	Turning Movement	Fatal
Bicycle	Sideswipe	
Animal	Out of Control	
Parked Vehicle	Night Time Crash	
Fixed Object		

Newton, MA

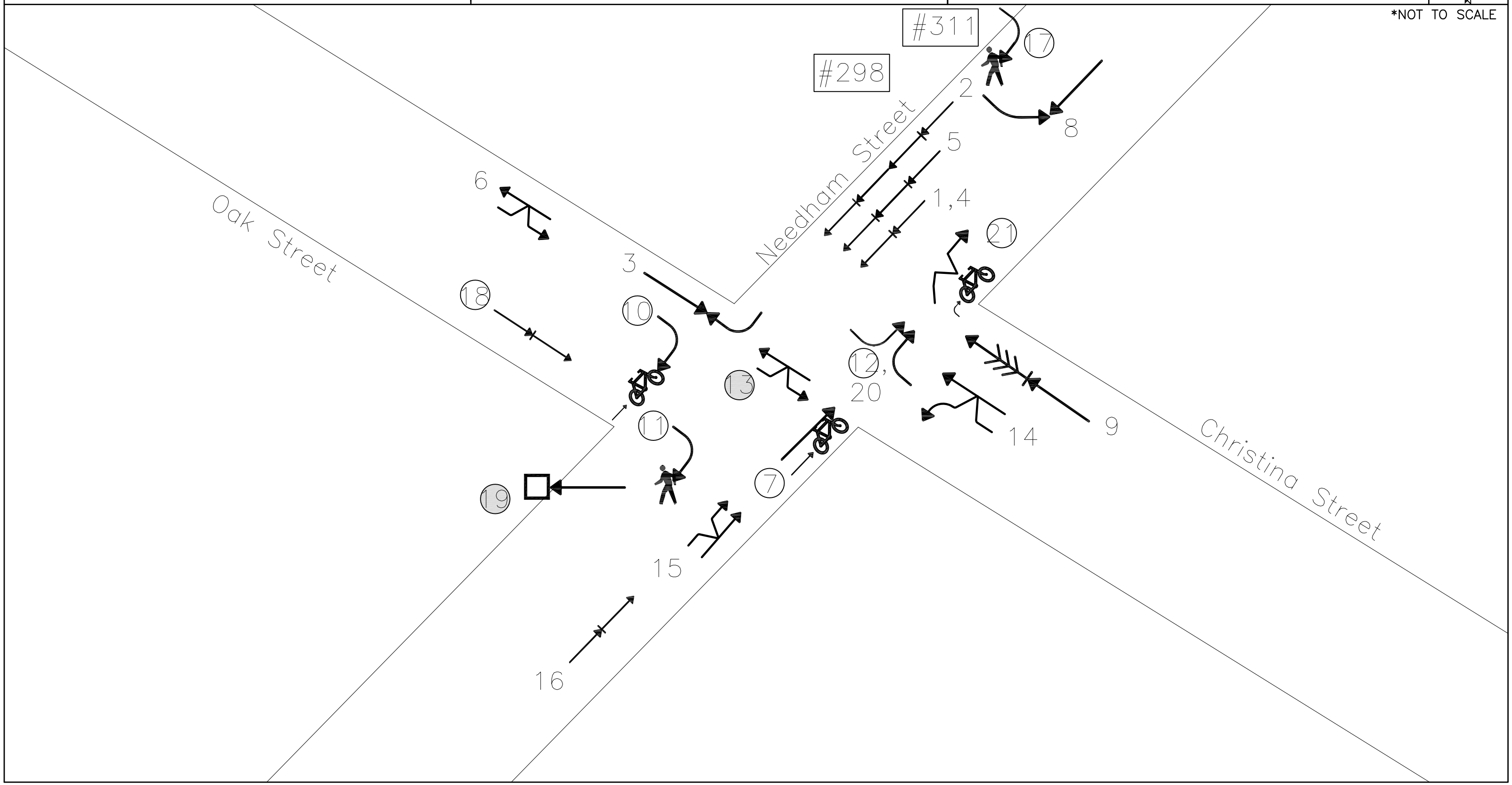
Oak, Christina and Needham Streets

REGION: MAPC

TIME PERIOD ANALYZED: 2010 – 2013
SOURCE OF CRASH REPORTS: Newton Police
DATE PREPARED: 2/11/2014
PREPARED BY: Craig Roberts

N

*NOT TO SCALE



Crash Data Summary Table

Oak and Christina Streets at Needham Street, Newton, MA

January 2010 - December 2013

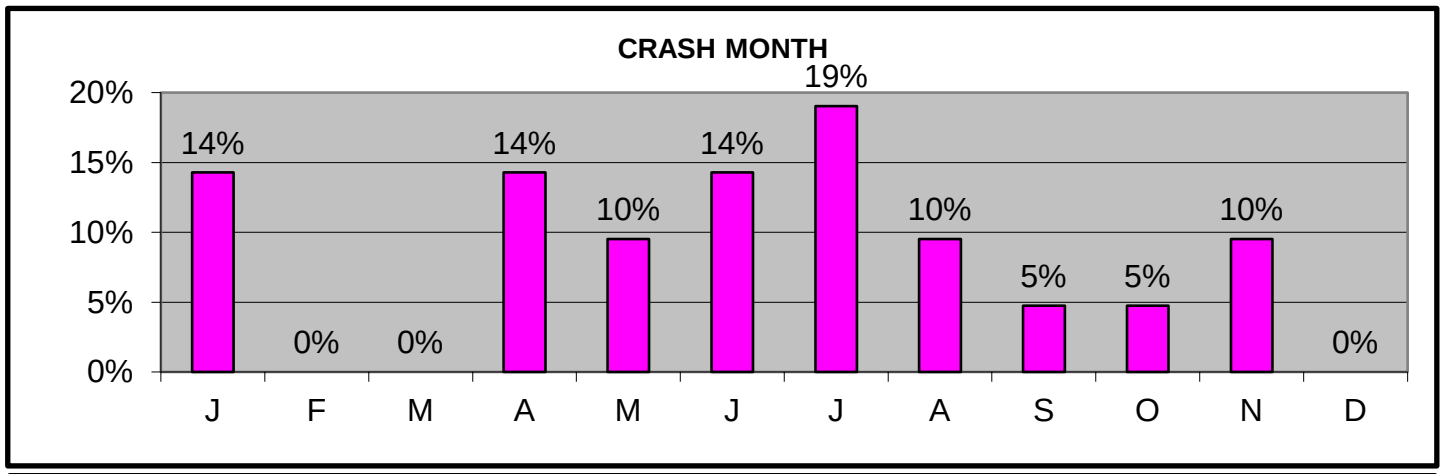
Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Condition	Road Surface	Driver Contributing Code	Ages				Comments
	m/d/y			*Type*	*Type*	*Type*	*Type*	*Type*	*D1*	*D2*	*D3*	*D4*	
1	1/27/10	Wednesday	7:12 AM	Rear-end	Daylight	Clear	Dry	Inattention	17	59			
2	6/4/10	Friday	11:01 AM	Rear-end	Daylight	Clear	Dry	Inattention	45	78	79	47	
3	10/27/10	Wednesday	7:59 AM	Angle	Daylight	Rain	Wet	Inattention	67	52			Vehicle 1 swerved to avoid one collision and collided with Vehicle 2.
4	11/29/10	Monday	3:24 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	44	unk			Vehicle 1 rear ended Vehicle 2, Vehicle 2 fled the scene.
5	1/31/11	Monday	8:19 AM	Rear-end	Daylight	Clear	Dry	Inattention	49	27	52		
6	6/14/11	Tuesday	4:45 PM	Sideswipe, opposite direction	Daylight	Clear	Dry	No Improper Driving	46	unk			Vehicle 2 traveling southbound attempted to pass a bus and clipped Vehicle 1. Vehicle 2 fled the scene.
7	6/30/11	Thursday	6:20 PM	Single Vehicle Crash	Daylight	Clear	Dry	No Improper Driving	66	25			Bicyclist ran into open door of Vehicle 1.
8	7/11/2011	Monday	5:33 PM	Angle	Daylight	Clear	Dry		28	52			
9	8/10/11	Wednesday	1:19 PM	Rear-end	Daylight	Clear	Dry	Inattention	83	27			Vehicle 1 stopped too far in front of the stop line at a red light, attempted to back up out of the intersection and backed into Vehicle 2.
10	8/12/11	Friday	6:01 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	43	39			Vehilce 1 stopped at a red light to turn right on red, failed to see Bicyclist traveling EB on sidewalk before impacting it.
11	9/13/11	Tuesday	11:00 AM	Single Vehicle Crash	Daylight	Clear	Dry	Unknown	58				Vehicle 1 struck Pedestrian 1. Pedestrian 1 stated she was fine and carried on her way.
12	11/9/11	Wednesday	3:22 PM	Angle	Daylight	Clear	Dry	Unknown	83	41			Courtesy Crash.
13	1/19/12	Thursday	7:37 PM	Sideswipe, opposite direction	Dark - lighted roadway	Clear	Dry	Failure to keep in proper lane or running off road	71	23			Vehicle 2 crossed over into the lane of Vehicle 1 and struck the driver side. Vehicle 2 fled the scene.
14	4/10/12	Tuesday	8:07 AM	Sideswipe, same direction	Daylight	Clear	Dry	Over-correcting/over-steering	62	43			Vehicles 1 and 2 traveling same direction, Vehicle 2 attempted to pass Vehicle 1 but side swiped his car.
15	5/8/12	Tuesday	4:35 PM	Sideswipe, same direction	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	54	25			Vehicles 1 and 2 traveling same direction, Vehicle 2 attempted to pass Vehicle 1 but side swiped his car.
16	7/1/12	Sunday	4:11 PM	Sideswipe, same direction	Daylight	Cloudy	Dry	Inattention	39	79			V2 struck V1 while trying to switch lanes to the left turn lane
17	4/8/13	Monday	7:53 PM	Single Vehicle Crash	Daylight	Clear	Dry	Made an improper turn	52	67			Pedestrian 1 was crossing the driveway of #311 Needham St in front of Vehicle 1, Vehicle 1 didn't see the pedestrian and struck her.
18	4/24/13	Wednesday	10:32 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	20	39			
19	5/25/13	Saturday	1:11 AM	Single Vehicle Crash	Dark - lighted roadway	Cloudy	Wet	Illness	56	113			Vehicle 1 took a turn too wide and struck a traffic light.
20	7/11/13	Thursday	11:21 AM	Angle	Daylight	Cloudy	Wet	Failed to yield right of way	78	81			
21	7/11/13	Thursday	3:02 PM	Sideswipe, same direction	Daylight	Clear	Dry	Other improper action	41	54			Vehicle 1 attempting to make a right turn collided with Bicyclist 1 also attempting to make a right turn.

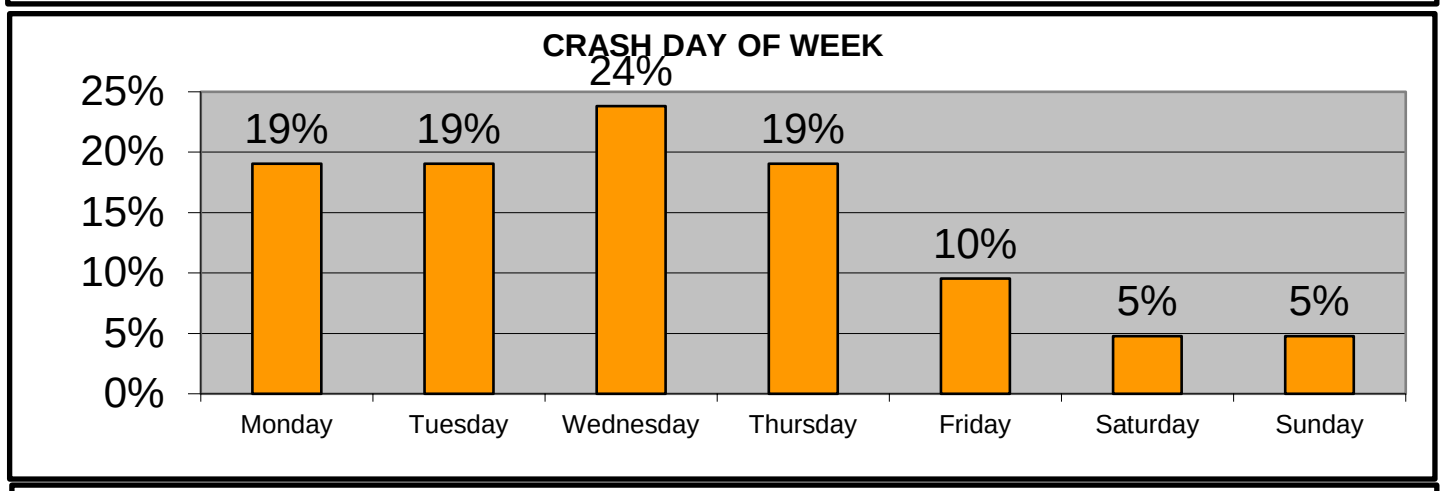
*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

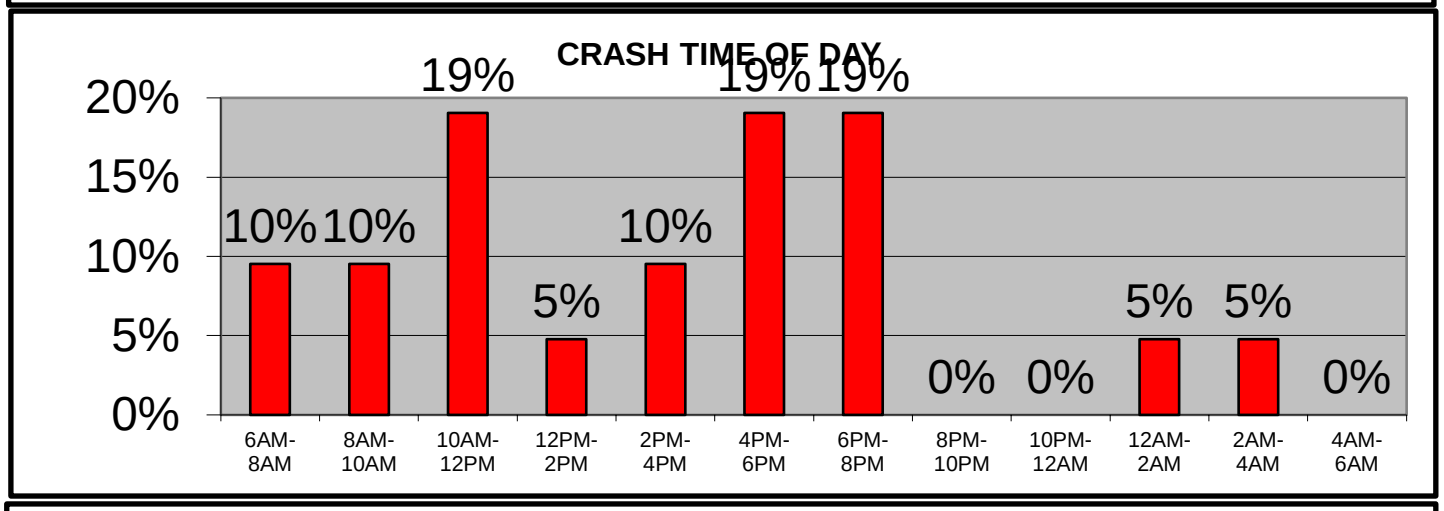
Summary based on Crash Reports obtained from: The Newton Police

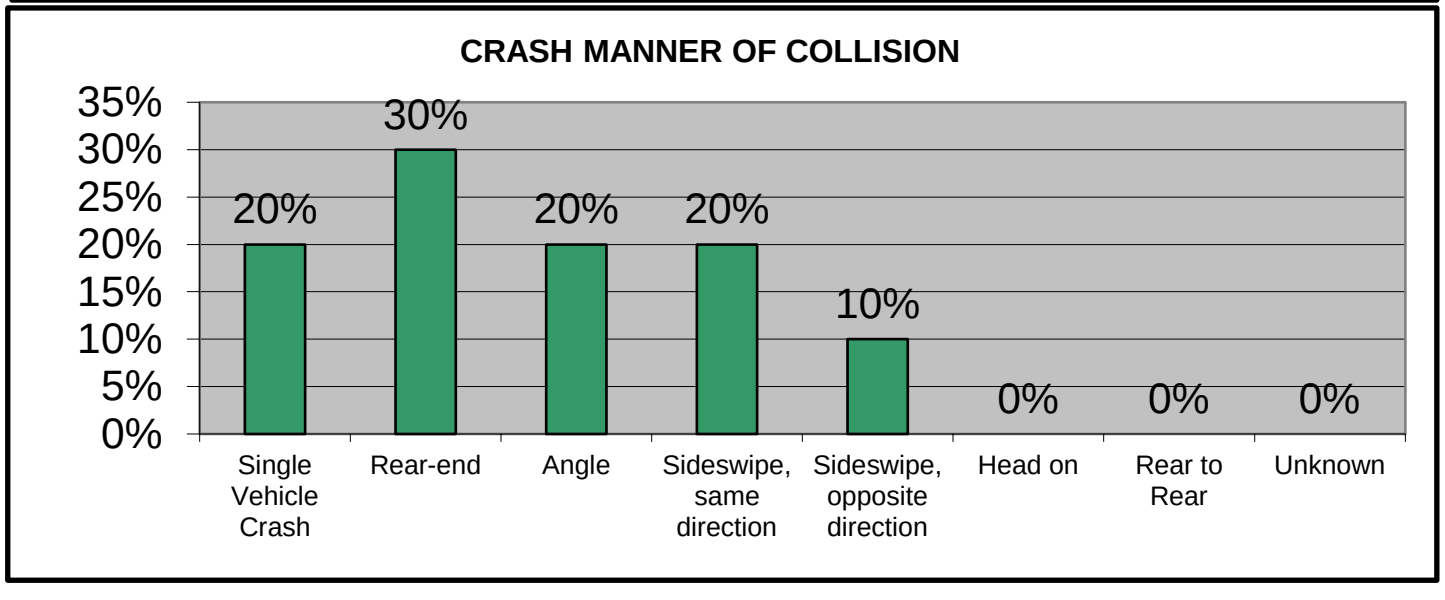
Crash Data Summary Tables and Charts

Oak and Christina Streets at Needham Street, Newton, MA



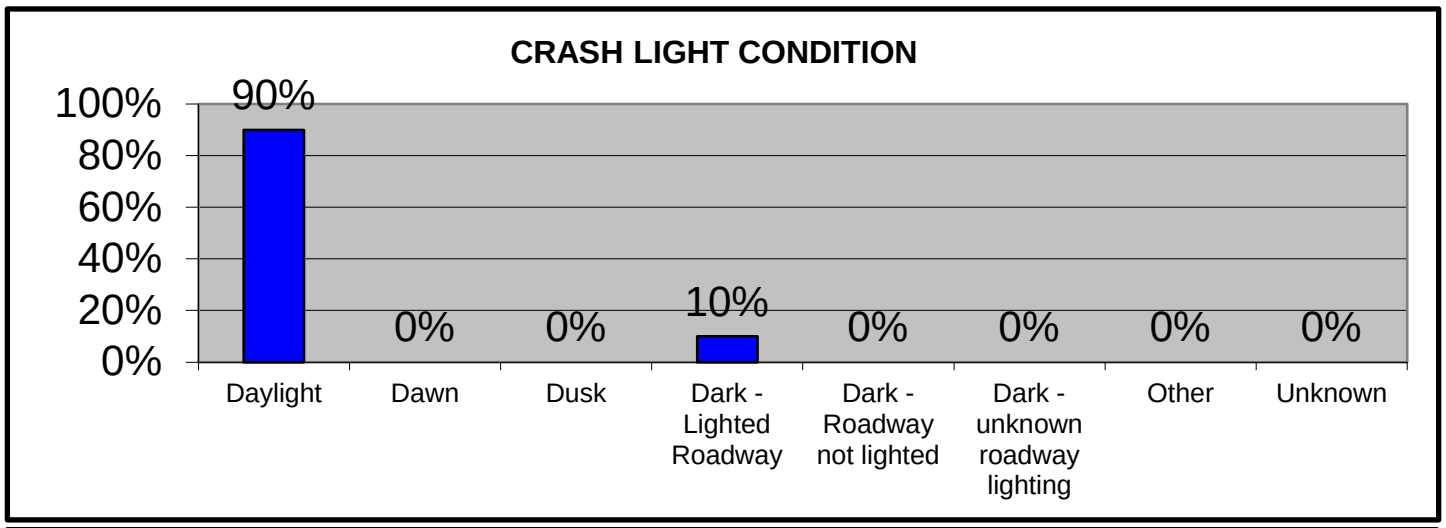


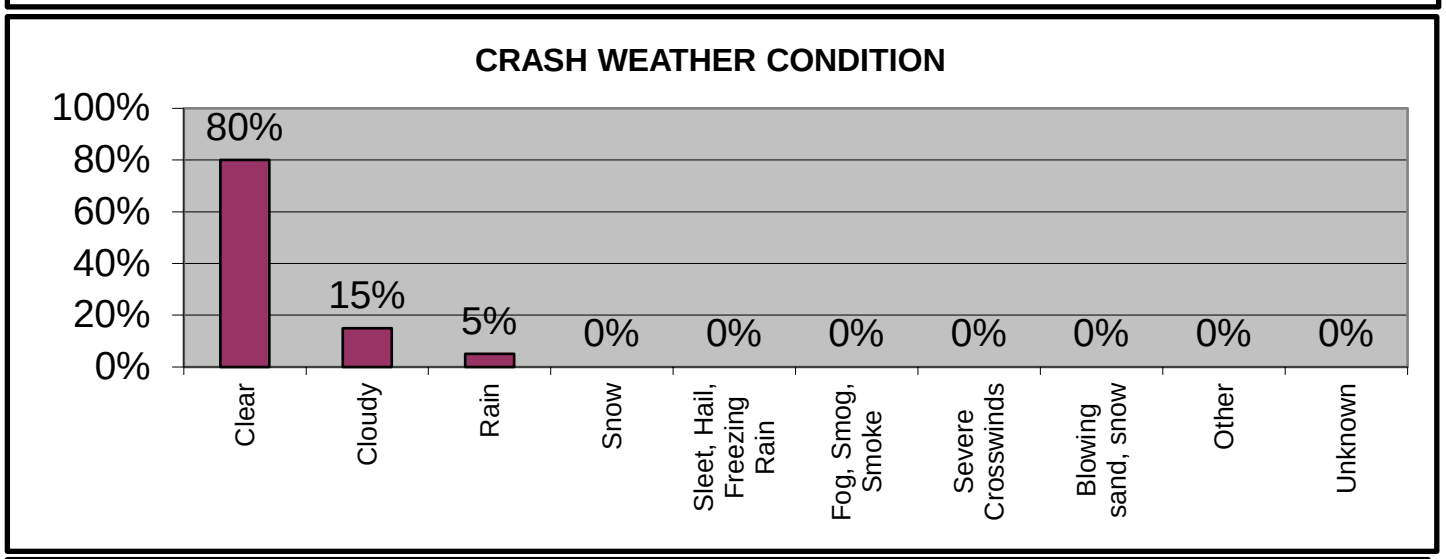


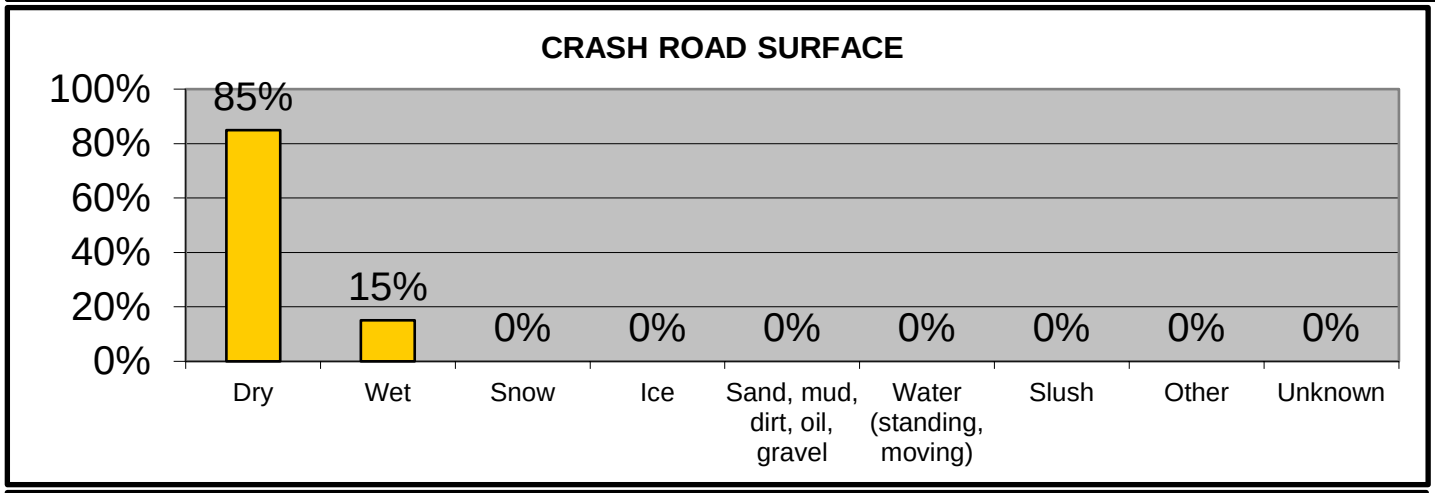


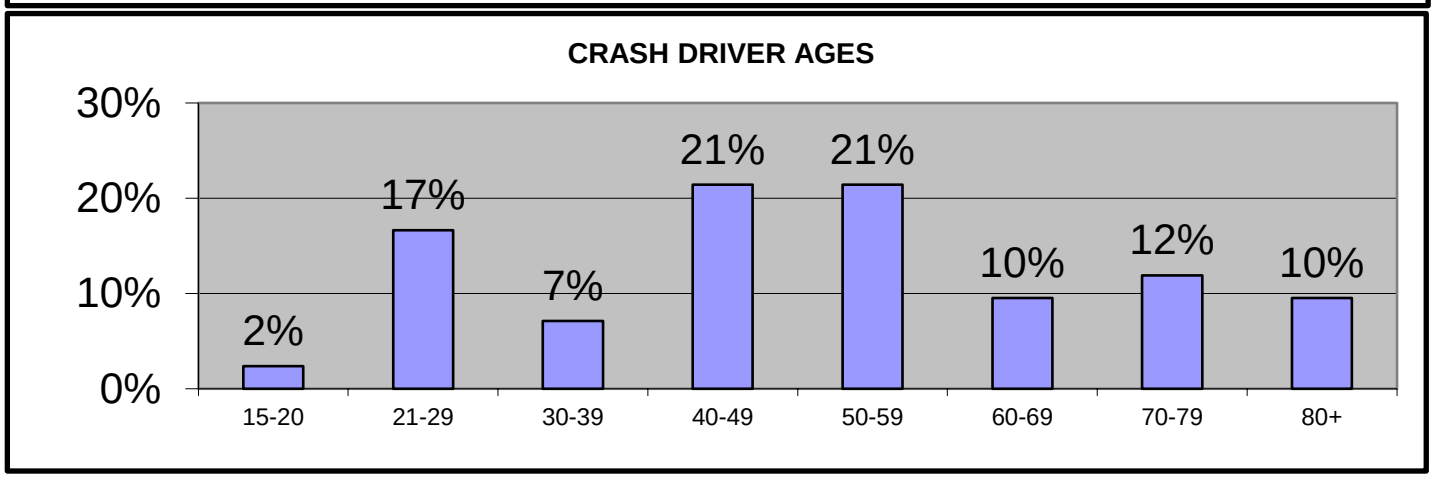
Crash Data Summary Tables and Charts

Oak and Christina Streets at Needham Street, Newton, MA





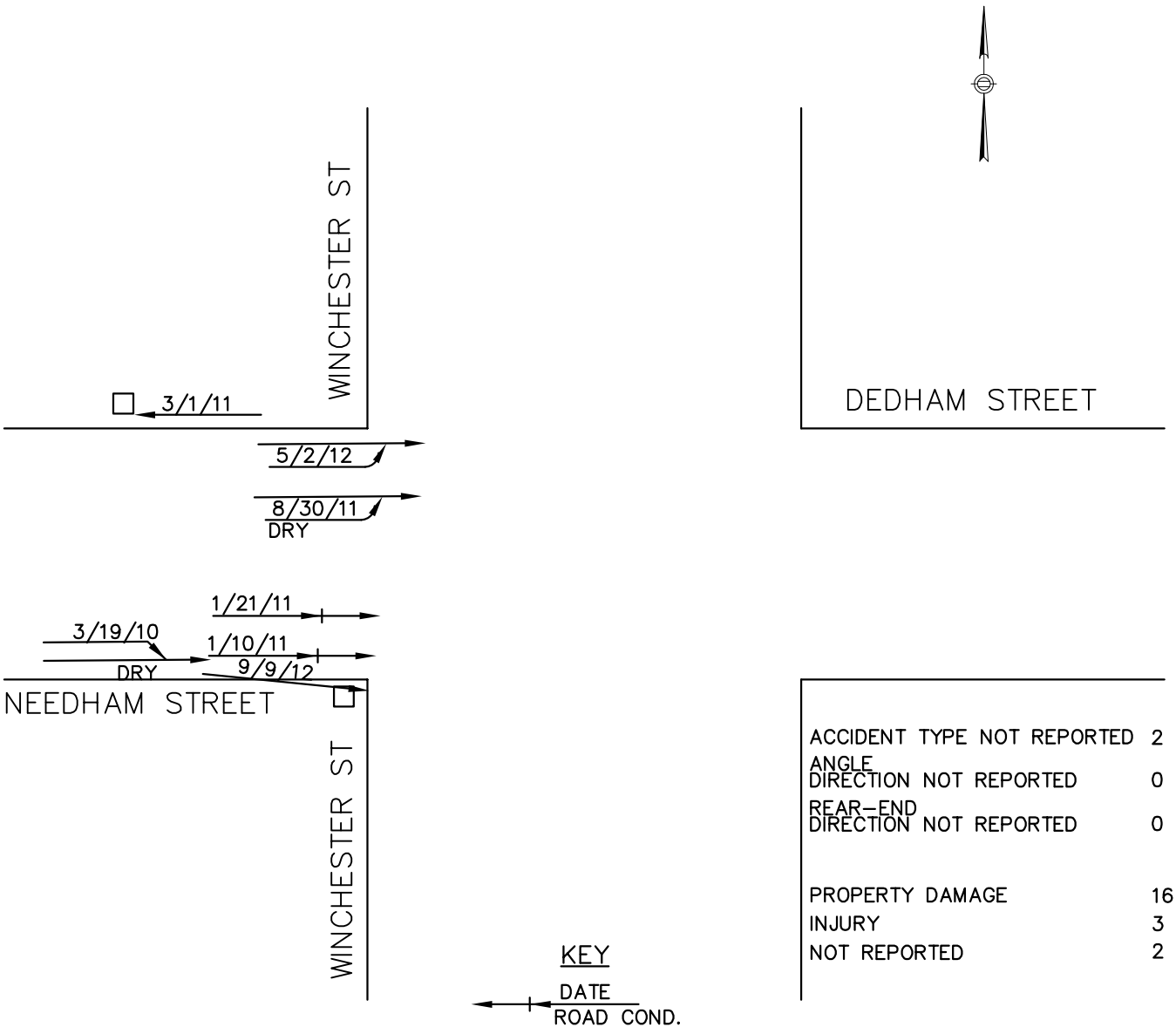




INTERSECTION: NEEDHAM STREET AND: WINCHESTER ST/DEDHAM ST

PERIOD: 2010–2012 FROM: JANUARY TO: DECEMBER

CITY/TOWN: NEWTON PREPARED BY: FST, INC.



ACCIDENT TYPE NOT REPORTED	2
ANGLE DIRECTION NOT REPORTED	0
REAR–END DIRECTION NOT REPORTED	0
PROPERTY DAMAGE	16
INJURY	3
NOT REPORTED	2

SYMBOL	ACCIDENT TYPE
MOVING VEHICLE	REAR END
BACKING VEHICLE	HEAD ON
NON–INVOLVED VEHICLE	SIDE – SWIPE
PEDESTRIAN	OUT OF CONTROL
PARKED VEHICLE	LEFT TURN
FIXED OBJECT	RIGHT ANGLE
FATAL ACCIDENT	
INJURY ACCIDENT	

FIGURE 8
COLLISION DIAGRAM

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Newton COUNT DATE : 12/15/10

DISTRICT : 4 UNSIGNALIZED : [ ] SIGNALIZED : X

MHD USE ONLY

Source # [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Needham Street RIN # [ ]

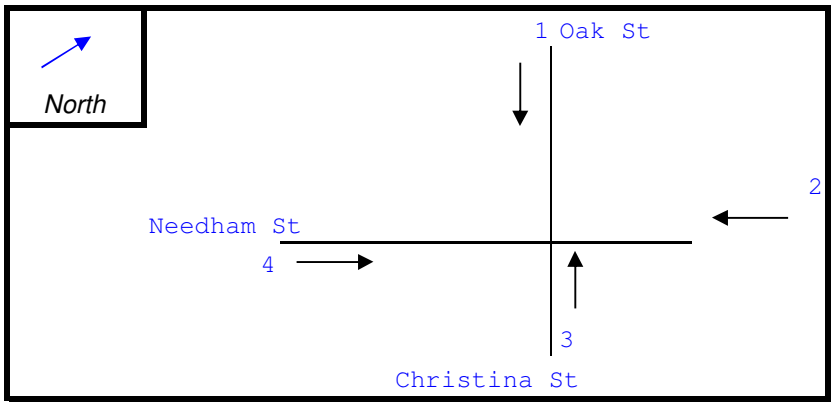
MINOR STREET(S) : Oak Street & Christina Street RIN # [ ]

RIN # [ ]

RIN # [ ]

RIN # [ ]

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF # [ ]

Peak Hour Volumes *(PM)*

APPROACH :	1	2	3	4	5	6
DIRECTION :	SE	SW	NW	NE		
VOLUMES (PM) :	468	818	250	913		

" K " FACTOR : 0.090 APPROACH ADT : 27,211 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :	# OF YEARS	AVERAGE # OF ACCIDENTS (**A**) :
24	5	4.80

CRASH RATE CALCULATION : **0.483**

$$\text{RATE} = \frac{(\text{A} \times 1{,}000{,}000)}{(\text{ADT} \times 365)}$$

Comments :

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : **Newton** COUNT DATE : 12/15/10

DISTRICT : **4** UNSIGNALIZED : SIGNALIZED : **X**

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : **Needham Street** RIN #

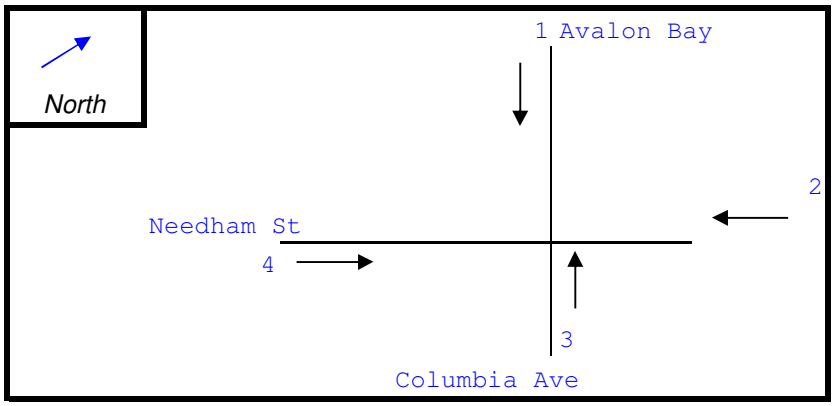
MINOR STREET(S) : **Avalon Bay & Columbia Avenue** RIN #

RIN #

RIN #

RIN #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes *(PM)*

APPROACH :	1	2	3	4	5	6
DIRECTION :	SE	SW	NW	NE		
VOLUMES (PM) :	28	692	25	968		

" K " FACTOR : 0.092 APPROACH ADT : 18,565 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 4 # OF YEARS 5 AVERAGE # OF ACCIDENTS (**A**) : 0.80

CRASH RATE CALCULATION : **0.118**

$$\text{RATE} = \frac{(\text{A} \times 1{,}000{,}000)}{(\text{ADT} \times 365)}$$

Comments :

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : **Newton** COUNT DATE : 12/15/10

DISTRICT : **4** UNSIGNALIZED : SIGNALIZED : **X**

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : **Needham Street** RIN #

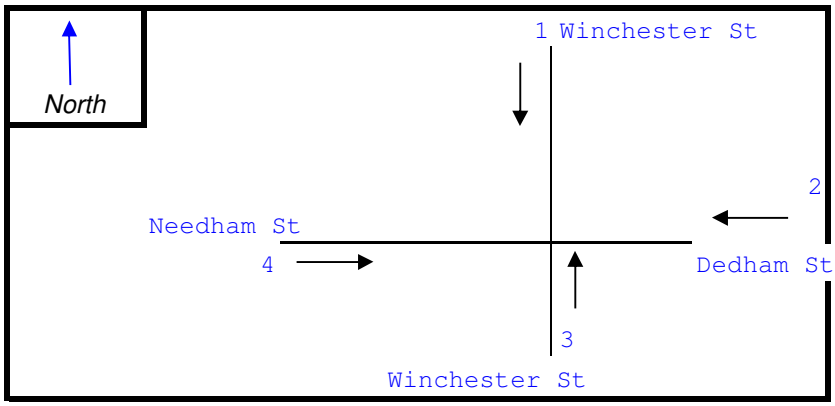
MINOR STREET(S) : **Winchester Street & Dedham Street** RIN #

RIN #

RIN #

RIN #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes *(PM)*

APPROACH :	1	2	3	4	5	6
DIRECTION :	SB	WB	NB	EB		
VOLUMES (PM) :	949	202	311	1013		

" K " FACTOR : 0.097 APPROACH ADT : 25,632 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :	# OF YEARS	AVERAGE # OF ACCIDENTS (**A**) :
23	5	4.60

CRASH RATE CALCULATION : **0.492**

$$\text{RATE} = \frac{(\text{A} \times 1{,}000{,}000)}{(\text{ADT} \times 365)}$$

Comments :

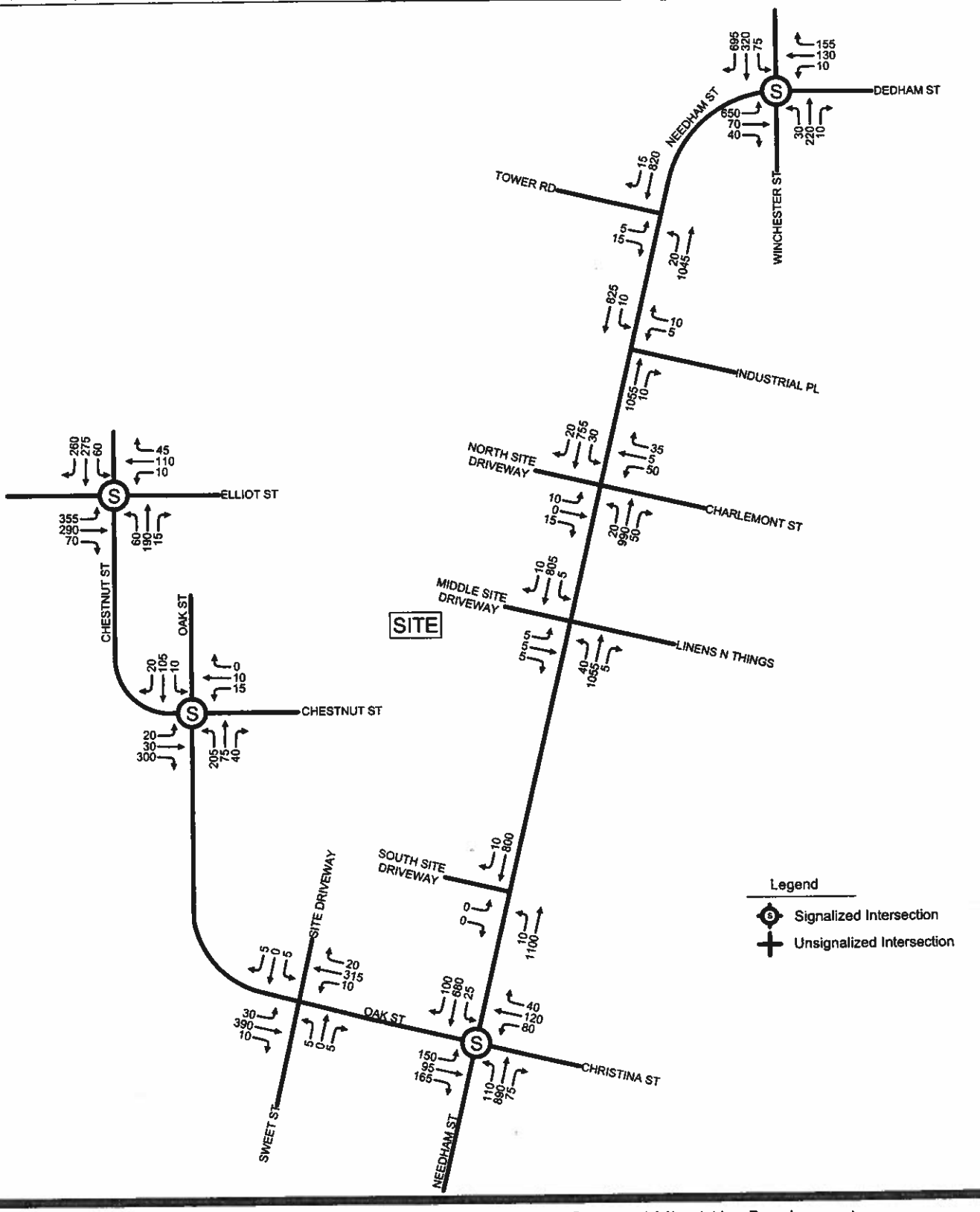
Appendix E Historic Traffic Count Data & Traffic Projections

Traffic Impact Study
Proposed Mixed use Development
55 Tower Road
Needham, Massachusetts

Submitted to:
Northland Investment Corporation

July, 2007

J:\Project\12700281\Graphics\May 2007\12700281_net.dwg



NOT TO SCALE

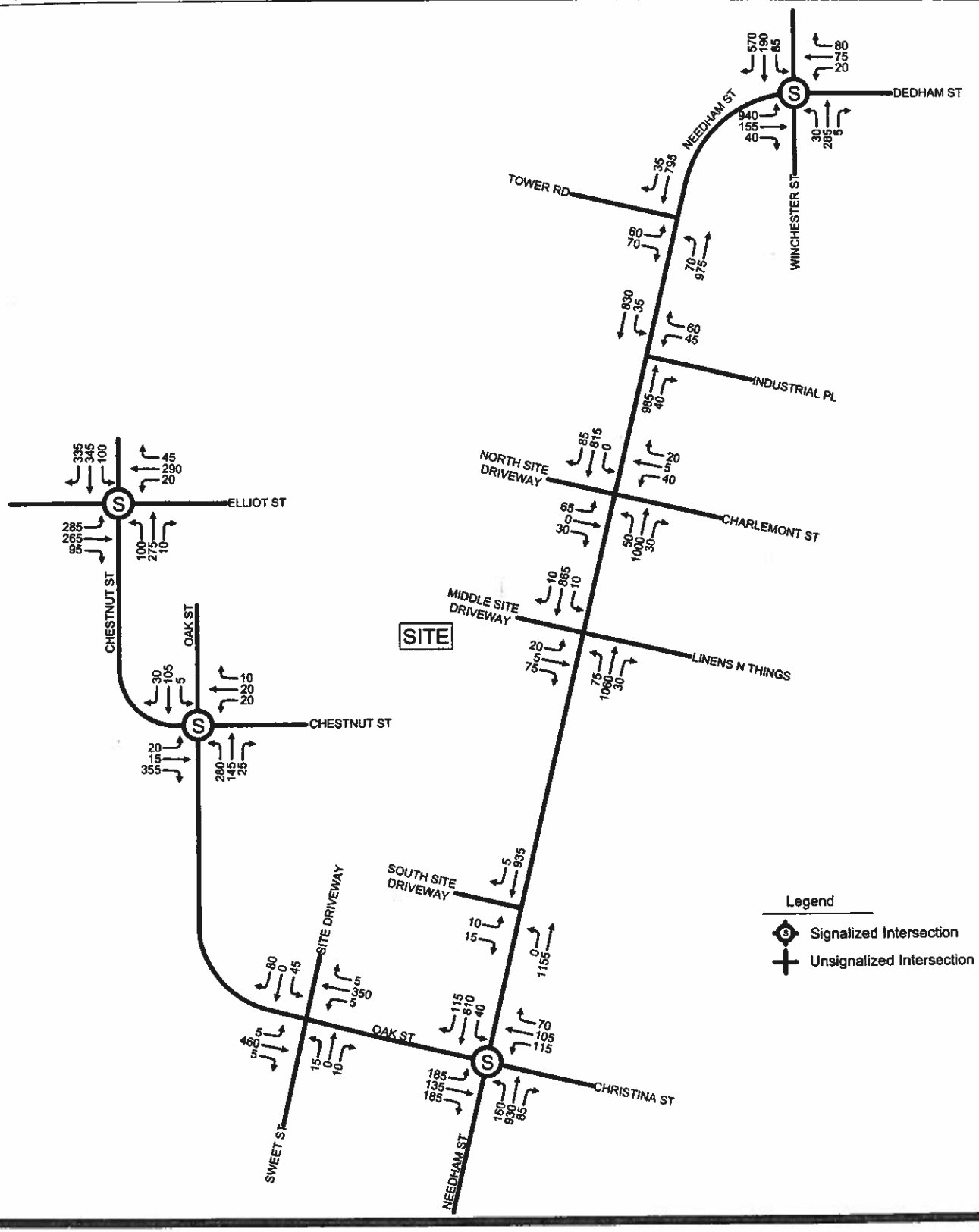
TETRA TECH RIZZO

Proposed Mixed-Use Development
55 Tower Road
Newton, Massachusetts

2005 Existing AM Peak Hour
Peak Hour Traffic Volumes

Figure 3

J:\Project\12700281\Graphics\May 2007\12700281_net.dwg



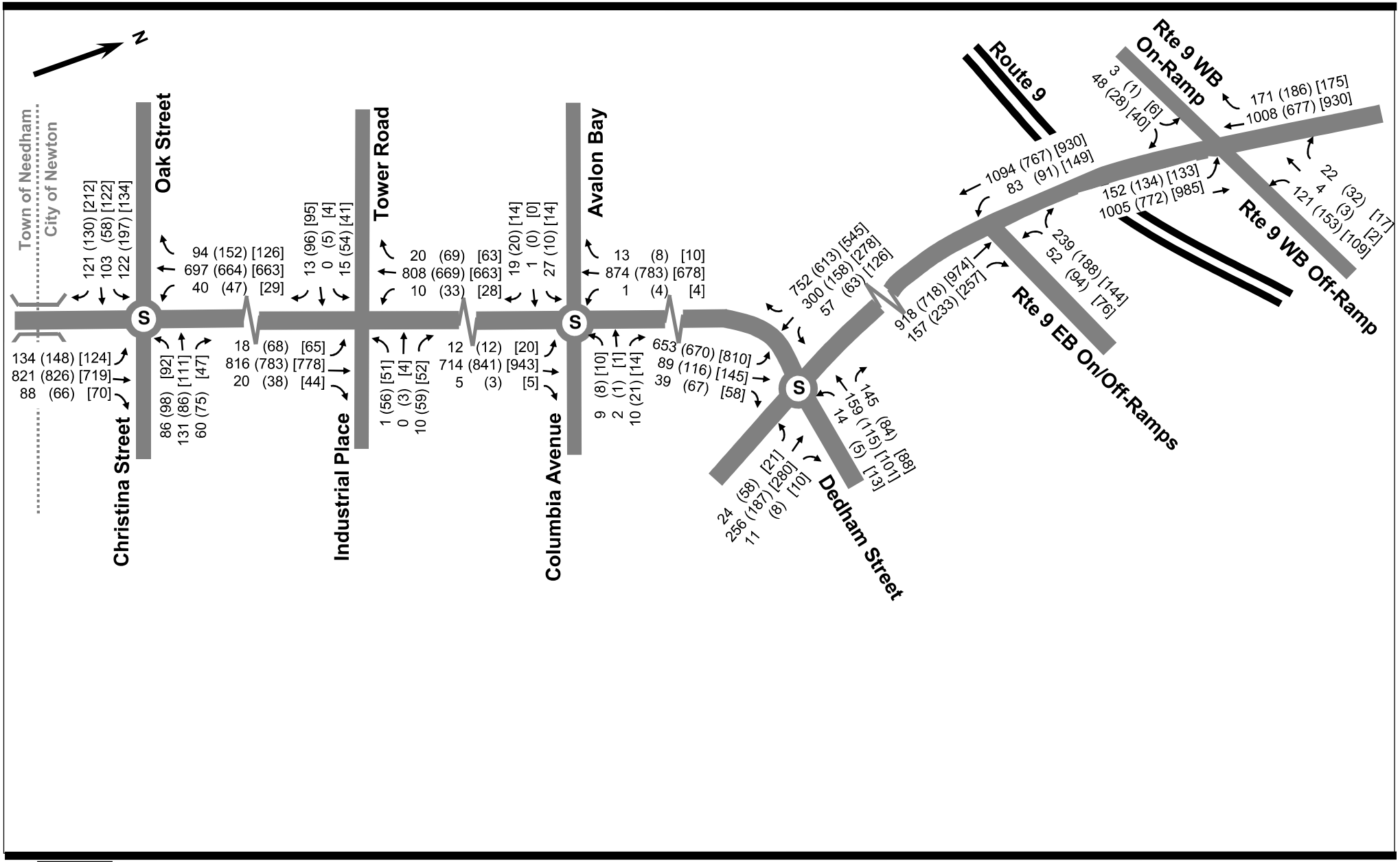
NOT TO SCALE

TETRA TECH RIZZO

Proposed Mixed-Use Development
55 Tower Road
Newton, Massachusetts

2005 Existing PM Peak Hour Peak Hour Traffic Volumes

Figure 4



Schematic Diagram:
Not to Scale

Fay, Spofford & Thorndike, LLC
Engineers • Planners • Scientists

Figure 2b
2011 Existing AM (Mid-Day) [PM] Peak Hour Traffic Volumes

Needham Street/Highland Avenue Corridor
Newton and Needham, Massachusetts

Data Collected in December 2010

S Signalized Intersection

1.2 Traffic Volumes

Traffic volume data was collected for the original report in May 2009 and December 2010. In the original FDR, the weekday seasonal factors worksheet was utilized and no seasonal adjustments were originally made. For this updated analysis, at MassDOT's request, the nearest count station was reviewed to determine if the May and December traffic count data required a seasonal adjustment. Data from the closest MassDOT permanent count station (Station #4118 on I-95) was researched. Based on this data, May traffic volumes are 1% higher than average while December traffic volumes are approximately 4 percent lower than average. Therefore, the December traffic volumes were adjusted for seasonality by 4%.

Since the May 2011 FDR was completed, there have been a number of background projects that have been completed and opened while new projects have been proposed. Therefore the 2024 Traffic Volumes have been adjusted to account for the projects that have been completed as well as new proposals. For this project, the 2024 planning horizon that was used for the previous FDR was maintained, as it is still reasonable based on the scale of the proposed roadway improvements and to be consistent with MassDOT design criteria. The future traffic volumes were developed by applying an annual background growth rate to current volumes to account for general traffic growth in the region and then adding traffic anticipated to be generated by planned developments in the immediate vicinity. A background growth rate of 1% per year was used to be consistent with the previous Functional Design Report. A list of the currently proposed projects is as follows:

<u>Projects that have opened since the Traffic Counts were collected.</u>

- Charles River Landing residential development – This project consists of 350 apartment units located at 300 Second Avenue in Needham. This project was under construction and not occupied when the traffic volume data was collected.
- Chestnut Hill Square project- Newton, Massachusetts - This project consists of a combination of 94,932 square feet of retail and restaurant space, a 60,700 square foot medical office building, a 51,536 square foot grocery story, a 29,640 square foot health club, and 91 residential units to be accessed via two new site driveways on Route 9.
- Wingate Senior Living - Gould Street Needham – This project consisted of an additional 91 Senior Living Units.

<u>A summary of specific planned development projects was obtained from the City of Newton and was assumed to consist of the following;</u>

- Filene's Basement Expansion, Newton, Massachusetts - This project consists of a redevelopment of the former Filene's Basement site, replacing the existing building with a larger one. The proposed retail area is approximately 70,870 square feet.

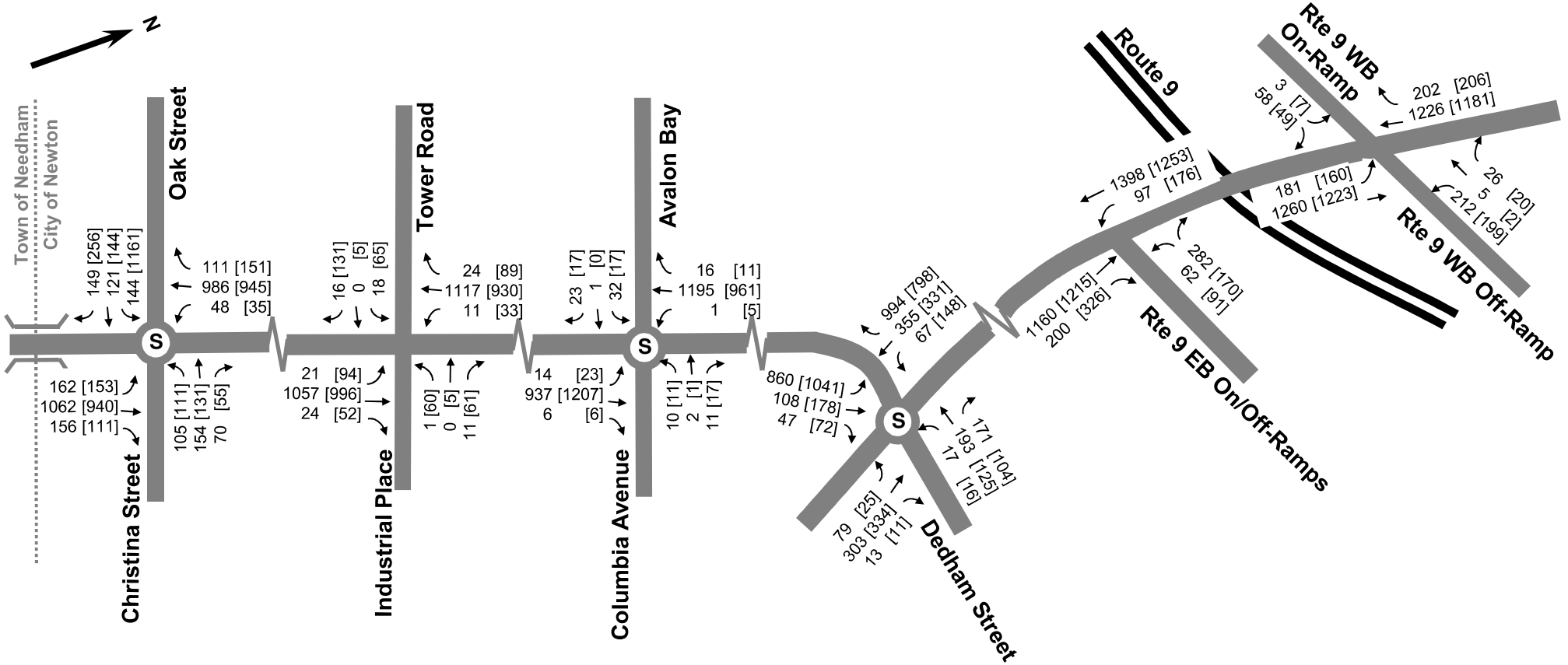
- Chestnut Hill Shopping Center - As proposed, the existing shopping center is to be increased by 48,400 square feet of office and retail uses in one newly constructed part of an existing building for a new total of 427,711 square feet for the entire property.
- 135 Wells Avenue – Newton - This project consists of a 334 unit apartment development.
- 170 Needham Street – Newton - This project consists of demolishing an existing 14,084 single story building and replacing it with a 7,140 sf building to be used for retail and restaurant purposes.
- 300 Needham Street – Newton - There is a proposal to locate a 120 seat restaurant in one of the retail spaces that has not been occupied since the building was originally constructed.
- 45-71 Needham Street – Newton – This project consists of the construction of two single story commercial buildings at the site of the former Skipjacks restaurant and the current Bicycle Center.
- 70 Linden Street – Newton - Proposed MyGym, The space was previously used as an office for Microfluidics Corporation.
- Filenes Site – Filenes is currently vacant and likely to be redeveloped in the near future. This store was operational and generating traffic at the time when the traffic volumes were collected.
- Center 128 – 400 First Avenue Needham – This project includes 740,000 sf of office/research and development space as well as a 128 unit hotel at full build. The hotel has been constructed.

Of these projects, the majority will not have a major impact on traffic operations due to location or size or will have a large percentage of pass-by traffic. However, the Center 128 (400 First Avenue in Needham) project will generate a significant amount of traffic entering/exiting the site on First Avenue and Second Avenue onto the project corridor. Traffic volume increases associated with each of the development projects were obtained from the respective traffic impact studies or were estimated for each project.

Northland Investment Corporation is planning on possibly redeveloping the 22-acre industrial parcel at the northern corner of the Needham Street/ Oak Street intersection. However, a formal proposal has not been submitted. Since there is no current development scenario, traffic volumes associated with a project at that site were not incorporated into the analysis.

In addition, General Dynamics has put its 26 acre parcel on the market and is entertaining several bids. Therefore additional development may occur on this parcel. Since there is no current development scenario, traffic volumes associated with a project at this site were not incorporated into the analysis.

In addition to the planned development projects above, traffic volumes on Highland Avenue



Schematic Diagram:
Not to Scale

Fay, Spofford & Thorndike, LLC
Engineers • Planners • Scientists

Figure 3
2024 Future AM [PM]
Peak Hour Traffic Volumes

Needham Street/Highland Avenue Corridor
Newton and Needham, Massachusetts

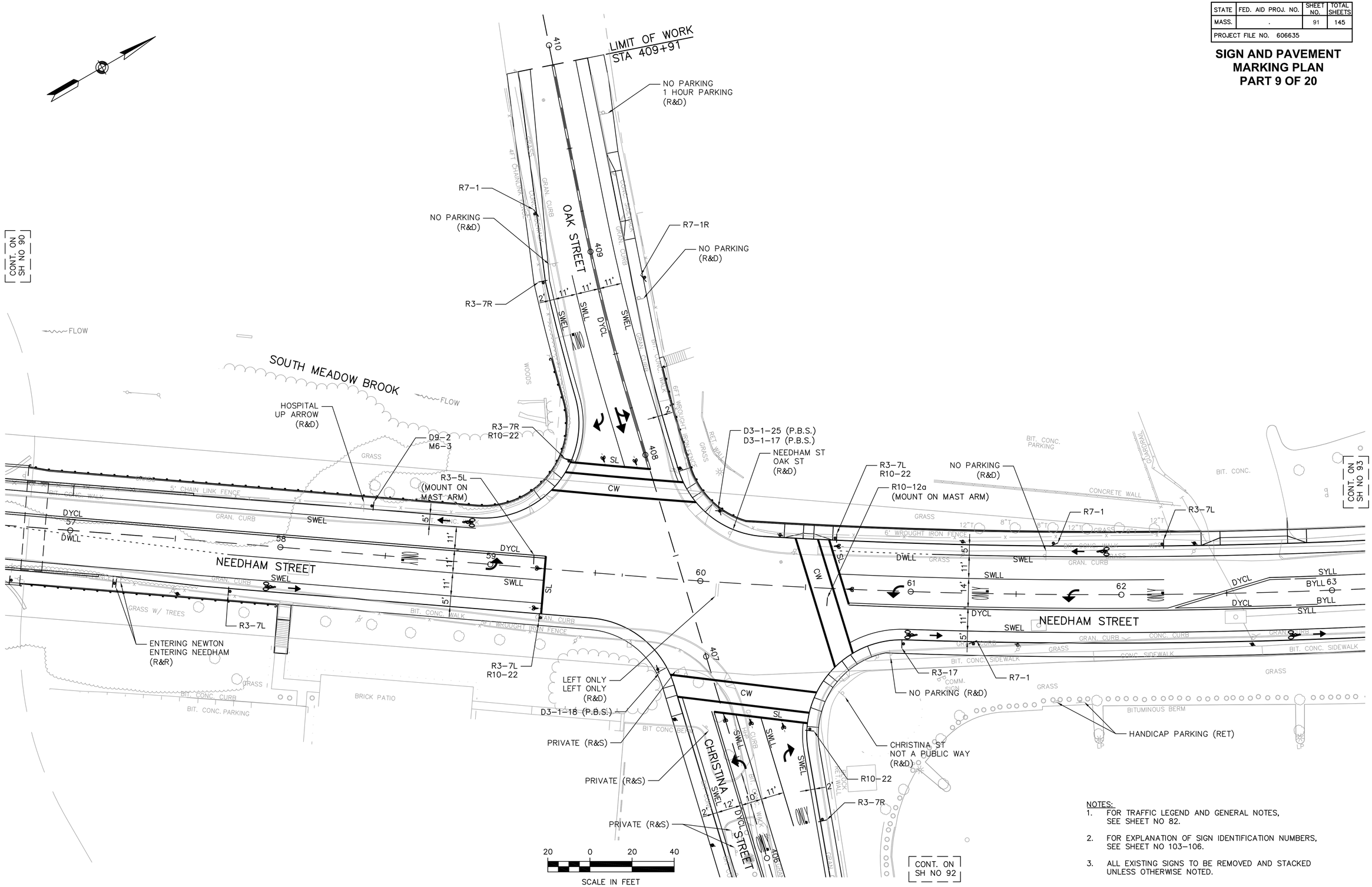
S Signalized Intersection

Appendix F FS&T 25 Percent Design Plans

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	91	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 9 OF 20



NOTES:
1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

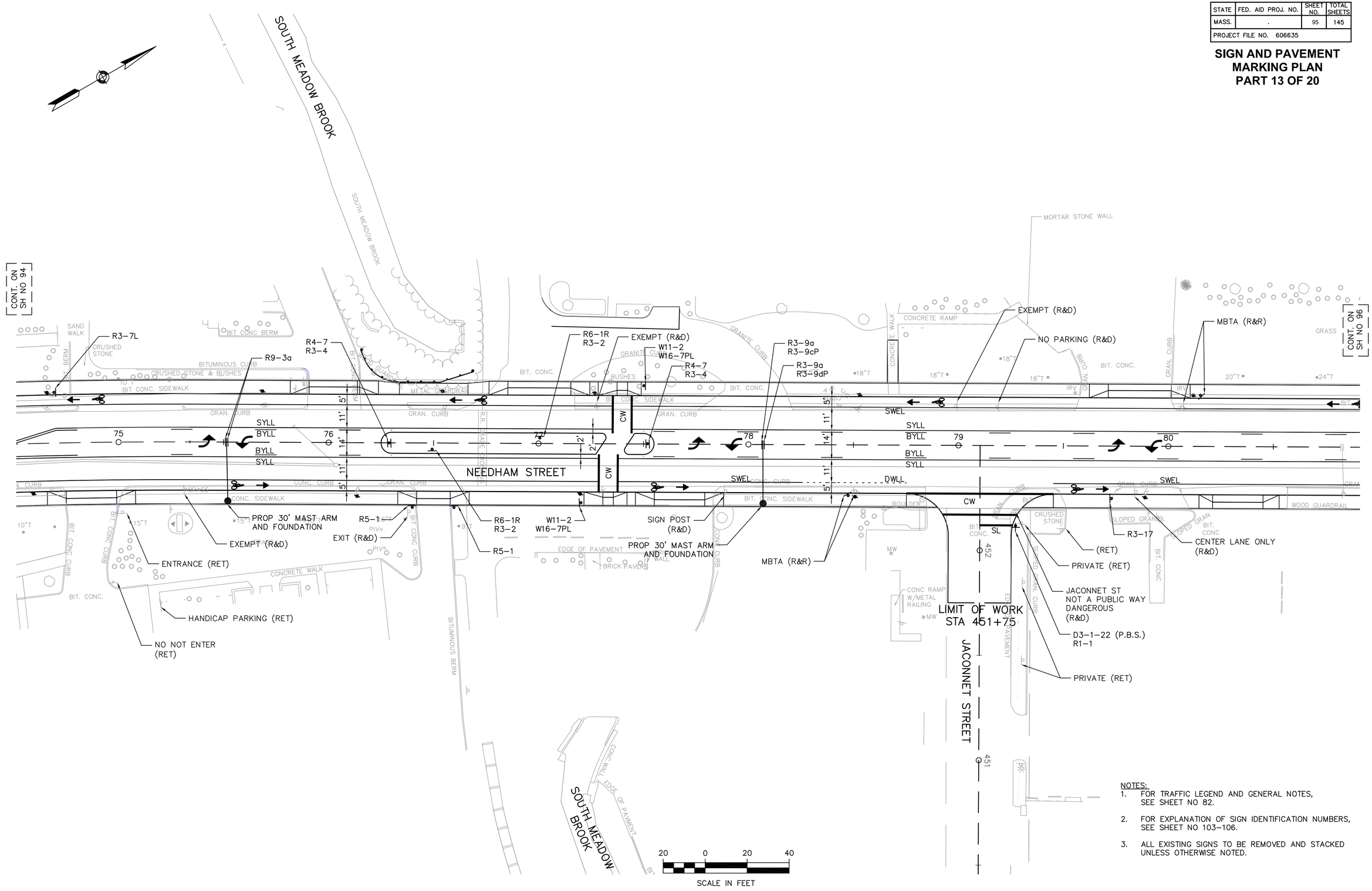
FS&T PROJECT NO.			
QM–167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

FILE NAME: T:\QM–167 Needham Newton Corr\CADD\05 Highway\33 Sign Pavmt Mrkng.dwg LAYOUT NAME: 09 – CHRISTINA PLOTTED: Monday, December 23, 2013 – 4:01pm USER: Dunkel_A

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	95	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 13 OF 20



NOTES:
1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

FS&T PROJECT NO.			
QM–167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

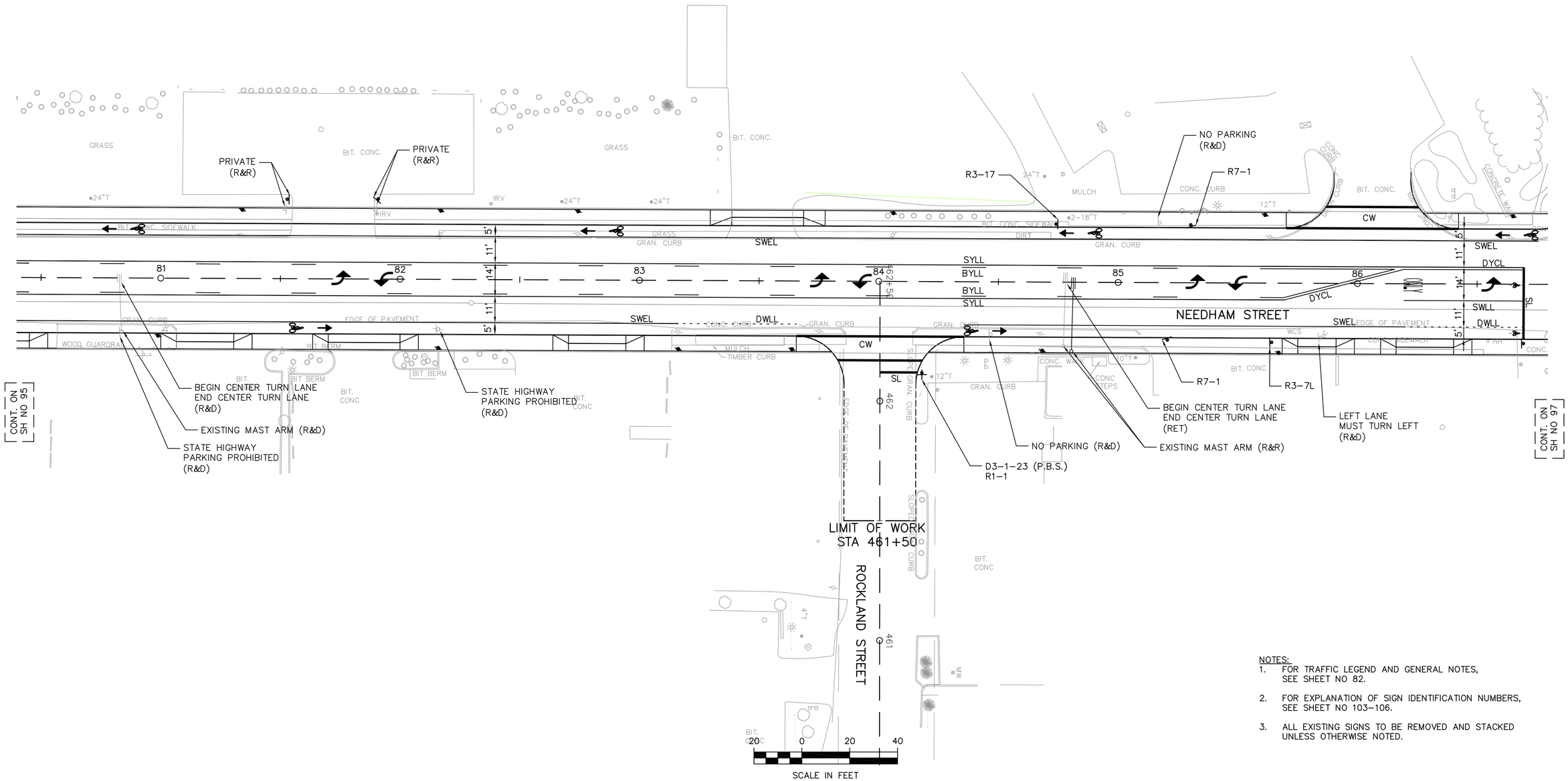
FILE NAME: T:\QM–167 Needham Newton Corr\CADD\05 Highway\33 Sign Pavmt Mrkng.dwg LAYOUT NAME: 13 PLOTTED: Monday, December 23, 2013 – 4:03pm USER: DunkeL_A

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	96	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 14 OF 20

AREA UNDER CONSTRUCTION



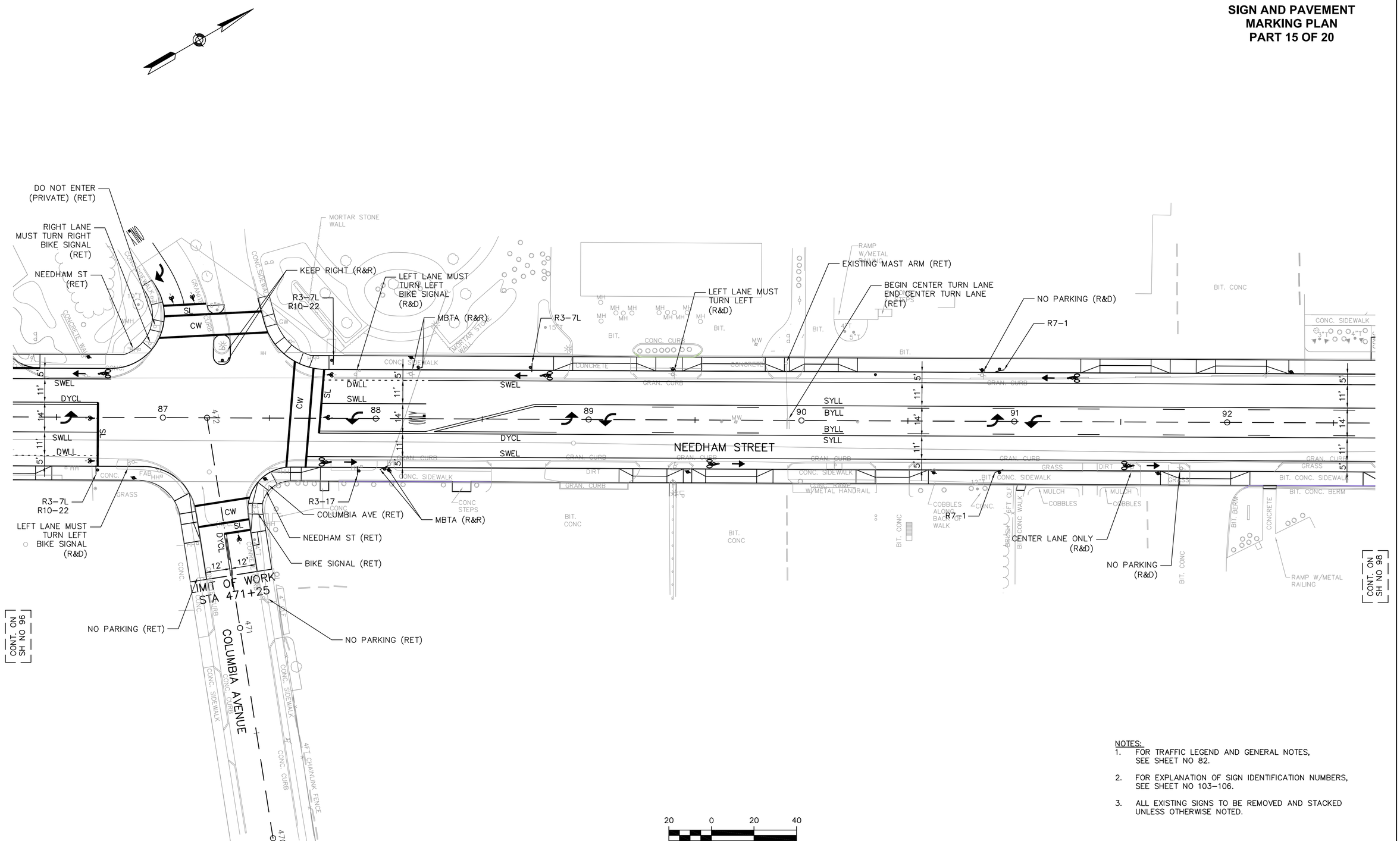
NOTES:
1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

FS&T PROJECT NO.			
QM–167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	97	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 15 OF 20



NOTES:
1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

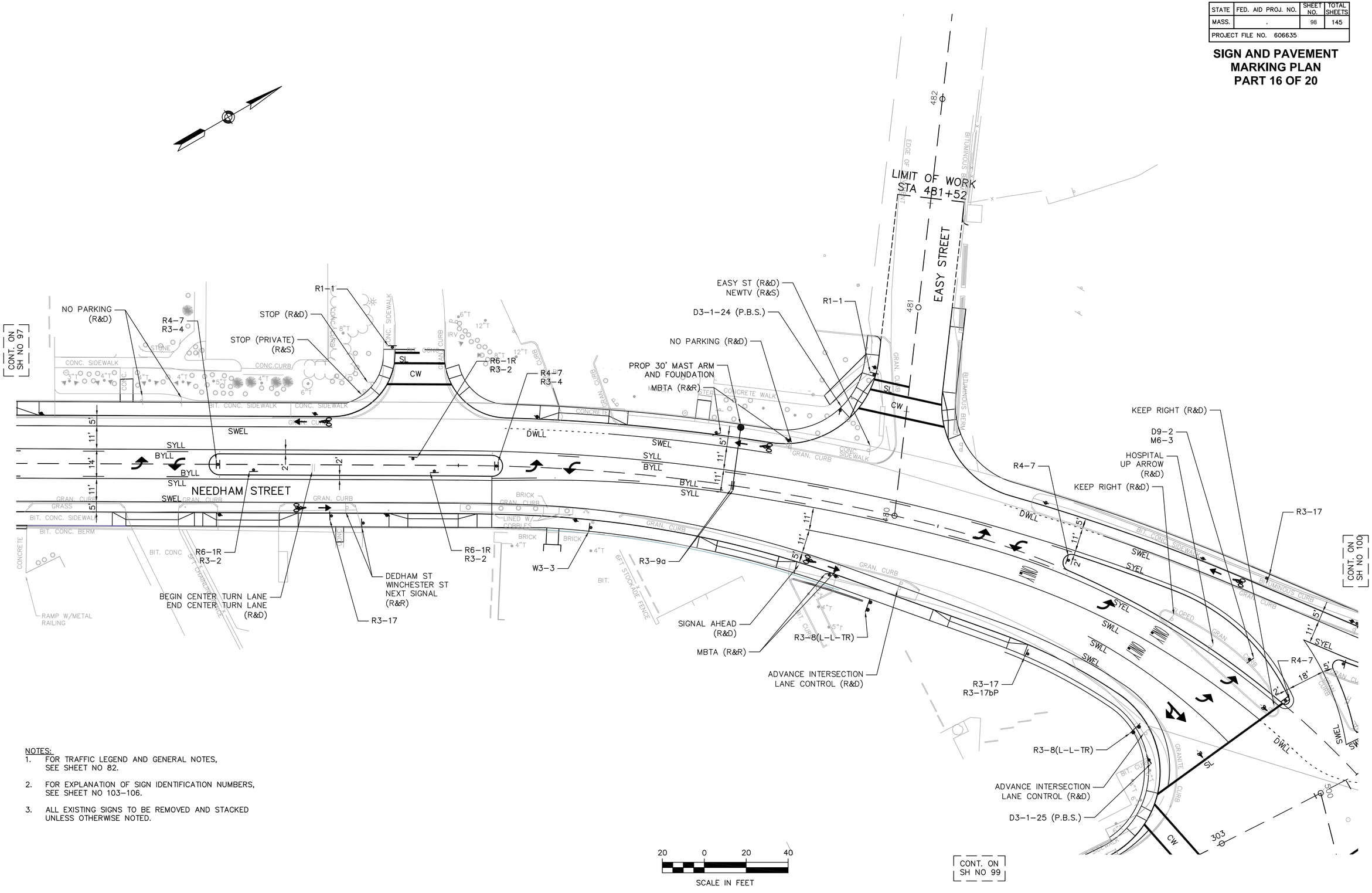
20 0 20 40
SCALE IN FEET

FS&T PROJECT NO.			
QM–167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	98	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 16 OF 20



NOTES:
1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

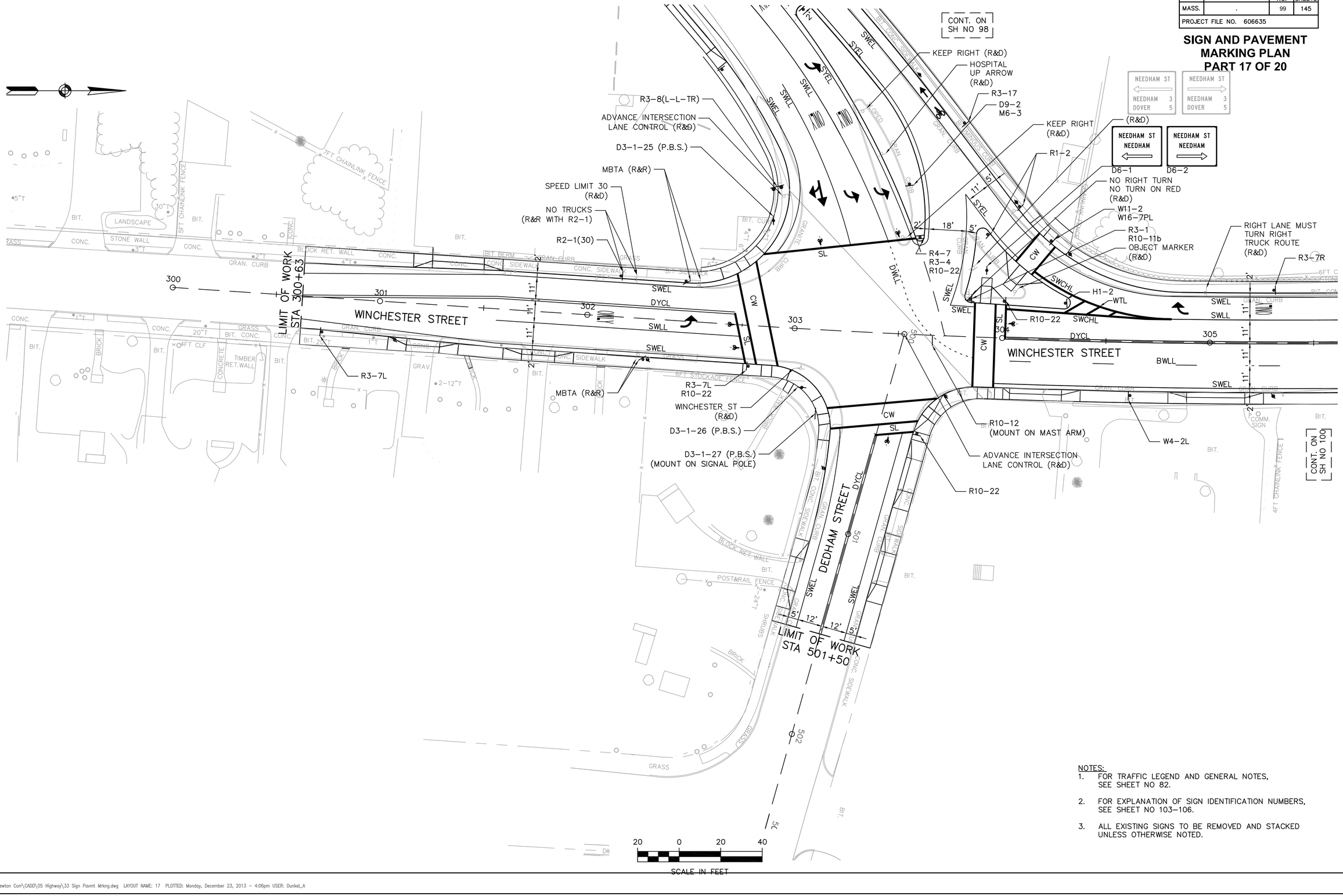
20 0 20 40
SCALE IN FEET

FS&T PROJECT NO.			
QM–167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	99	145
PROJECT FILE NO. 606635			

SIGN AND PAVEMENT MARKING PLAN PART 17 OF 20



NOTES:

1. FOR TRAFFIC LEGEND AND GENERAL NOTES, SEE SHEET NO 82.
2. FOR EXPLANATION OF SIGN IDENTIFICATION NUMBERS, SEE SHEET NO 103–106.
3. ALL EXISTING SIGNS TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED.

FS&T PROJECT NO.			
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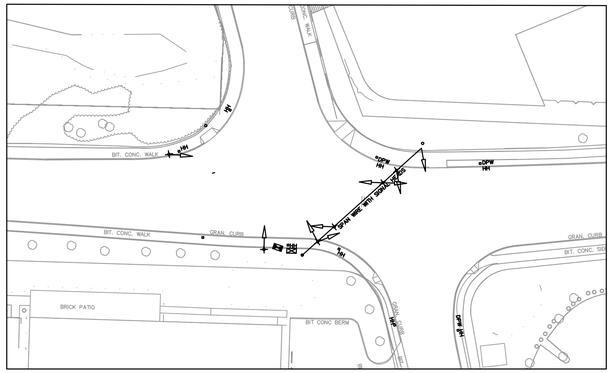
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

FILE NAME: T:\QM–167 Needham Newton Corr\CADD\05 Highway\33 Sign Pavmt Mrkng.dwg LAYOUT NAME: 17 PLOTTED: Monday, December 23, 2013 – 4:06pm USER: Dunkel_A

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	115	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 5
CHRISTINA ST AND OAK ST
SHEET 1 OF 2
NEWTON



EXISTING SIGNAL PLAN
1" = 40'

PROP 40' MAST ARM AND FOUNDATION
PROP OPTICAL EMERGENCY VEHICLE PRE-EMPTION DETECTOR (TYP)
PROP EMERGENCY VEHICLE PRE-EMPTION CONFIRMATION STROBE
PROP 30' MAST ARM AND FOUNDATION
PROP 8' TRAFFIC SIGNAL POST AND FOUNDATION (TYP)
PROP TRAFFIC SIGNAL CABINENT AND FOUNDATION
PROP 25' MAST ARM AND FOUNDATION
PROP 35' MAST ARM AND FOUNDATION

OAK STREET
NEEDHAM STREET
CHRISTINA STREET
BRICK PATIO
BIT. CONC. PARKING
CONCRETE WALL
BITUMINOUS BERM
SLOPED BITUMINOUS BERM

SCALE IN FEET
20 0 20 40

FS&T PROJECT NO.			
QM-167			
DES	—	CHK	—
DR	—	CHK	—
EST	—	CHK	—
ENGINEER IN CHARGE			

FILE NAME: T:\QM-167 Needham Newton Corr\CADD\05 Highway\55 Traff Signal.dwg LAYOUT NAME: CHRISTINA PLOTTED: Monday, December 23, 2013 - 4:13pm USER: DunkeL_A

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	116	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 5
CHRISTINA ST AND OAK ST
SHEET 2 OF 2
NEWTON

SEQUENCE AND TIMING FOR FULLY-ACTUATED TRAFFIC SIGNAL CONTROL

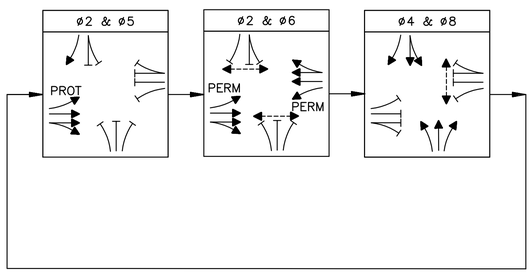
			NOT USED				NOT USED								NOT USED				NOT USED			FLASHING OPERATION
STREET	DIR	HOUSING	ø1			ø2			ø3			ø4			ø5			ø6			ø7			ø8			ø9			
NEEDHAM ST	SB	A,B,C				R	R	R				R	R	R	R	R	R	G	Y	R				R	R	R				(Y)
NEEDHAM ST	NB	D,E				<FY	<Y	<R				R	R	R	<G	<Y/<FY	<R	R	R	R				R	R	R				(Y)
NEEDHAM ST	NB	F,G				G	Y	R				R	R	R	R	R	R	R	R	R				R	R	R				(Y)
OAK ST	EB	H,J				R	R	R				G	Y	R	R	R	R	R	R	R				R	R	R				(R)
OAK ST	EB	K				R	R	R				G	Y	R	R/G>	R/Y>	R	R	R	R				R	R	R				(R)
CHRISTINA ST	WB	L,M,N				R	R	R				R	R	R	R	R	R	R	R	R				G	Y	R				(R)
PEDESTRIAN		P1-P2				DW	DW	DW				DW	DW	DW	DW	DW	DW	W	FDW	DW				DW	DW	DW				OUT
PEDESTRIAN		P3-P4				DW	DW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW				W	FDW	DW				OUT
PEDESTRIAN		P5-P6				W	FDW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW				DW	DW	DW				OUT
INTERVALS (IN SECONDS)	MINIMUM GREEN					10						6			6			10						6						EMERGENCY ONLY
	EXTENSION INTERVAL					2						2			2			2						2						
	MAXIMUM I					50						26			10			50						26						
	MAXIMUM II					50						26			10			50						26						
	CLEARANCE INTERVAL						4	3					4	2		4	3		4	3					4	2				
	"WALK" INTERVAL					7												7						7						
	PED CLEARANCE INTERVAL						19	3											18	3					17	2				
DETECTOR MEMORY						NON-LOCK						NON-LOCK						NON-LOCK						NON-LOCK						
RECALL SWITCH						SOFT						OFF						SOFT						OFF						

EMERGENCY PRE-EMPTION												
	øF1			øF2			øF3			øF4		
	G	Y	R	R	R	R	R	R	R	R	R	R
	R	R	R	<G	<Y	<R	R	R	R	R	R	R
	R	R	R	G	Y	R	R	R	R	R	R	R
	R	R	R	R	R	R	R	R	R	G	Y	R
	R	R	R	R	R	R	R	R	R	G	Y	R
	R	R	R	R	R	R	G	Y	R	R	R	R
	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
	6			6			6			6		
		4	3		4	3		4	2		4	2

PROGRAM/COORDINATION

CYCLE NO.	LENGTH	OFFSET % / SEC
1	90	
2	90	

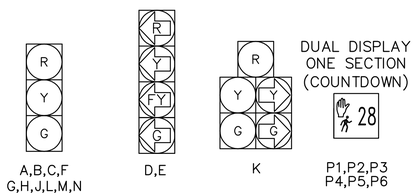
PREFERENTIAL PHASING DIAGRAM



VEHICLE MOVEMENT

PEDESTRIAN MOVEMENT – ON PED ACTUATION

SIGNAL FACES



1. ALL TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH ±5" LOUVERED BACKPLATES WITH RETROREFLECTIVE BORDER (YELLOW).
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH L.E.D. MODULES WITH 12" LENSES AND BE EQUIPPED WITH CAP VISORS.
3. ALL PEDESTRIAN INDICATIONS SHALL BE 16" COUNTDOWN L.E.D. AND BE EQUIPPED WITH SUN CAP VISORS.

TECHNICAL NOTES

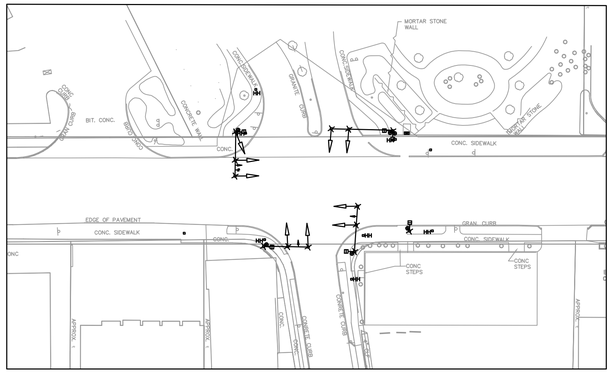
1. ANY PHASE NOT CALLED WILL BE SKIPPED. SIGNAL INDICATION WILL NOT CHANGE IF THE ASSIGNED RIGHT OF WAY DOES NOT CHANGE DURING THE NEXT PHASE CALLED.
2. THE RIGHT-OF-WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES. IF CALLS EXIST ON ALL PHASES, THE RIGHT-OF-WAY SHALL BE ASSIGNED IN ACCORDANCE WITH THE PREFERENTIAL PHASING SEQUENCE.
3. FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.28 THROUGH SECTION 4D.31
4. CYCLE 1 = 6 AM – 10 AM M-F
   CYCLE 2 = 3 PM – 7 PM M-F
   FREE OPERATION = ALL OTHER TIMES

FS&T PROJECT NO.			
QM-167			
DES	ATC	CHK	ATC
DR	SEB	CHK	ATC
EST	–	CHK	–
ENGINEER IN CHARGE			

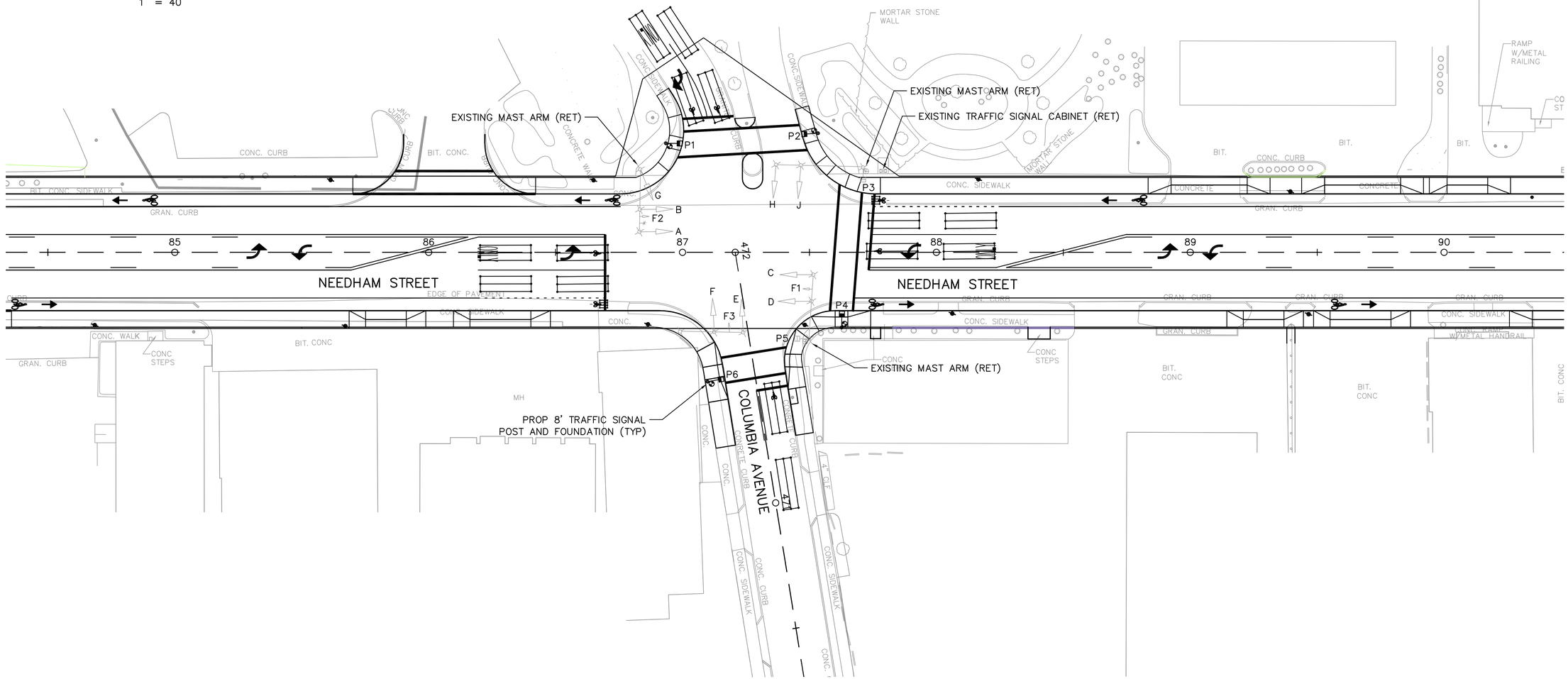
NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	119	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 7
COLUMBIA AVENUE
SHEET 1 OF 2
NEWTON



EXISTING SIGNAL PLAN
1" = 40'



FS&T PROJECT NO.			
QM-167			
DES	–	CHK	–
DR	–	CHK	–
EST	–	CHK	–
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

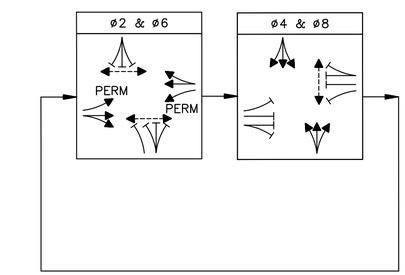
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	120	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 7
COLUMBIA AVENUE
SHEET 2 OF 2
NEWTON

SEQUENCE AND TIMING FOR FULLY-ACTUATED TRAFFIC SIGNAL CONTROL

STREET	DIR	HOUSING	ø1	ø2			ø3			ø4			ø5			ø6			ø7			ø8			ø9			FLASHING OPERATION	øF1			øF2			øF3		
			NOT USED				NOT USED				NOT USED				NOT USED				NOT USED				NOT USED														
NEEDHAM ST	SB	A,B		R	R	R				R	R	R				G	Y	R				R	R	R				(Y)	R	R	R	G	Y	R	R	R	R
NEEDHAM ST	NB	C,D		G	Y	R				R	R	R				R	R	R				R	R	R				(Y)	G	Y	R	R	R	R	R	R	R
AVALON BAY	EB	E,F		R	R	R				G	Y	R				R	R	R				R	R	R				(R)	R	R	R	R	R	R	R	R	R
COLUMBIA AVE	WB	G,H,J		R	R	R				R	R	R				R	R	R				G	Y	R				(R)	R	R	R	R	R	R	G	Y	R
PEDESTRIAN		P1-P2		DW	DW	DW				DW	DW	DW				W	FDW	DW				DW	DW	DW				OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW
PEDESTRIAN		P3-P4		DW	DW	DW				DW	DW	DW				DW	DW	DW				W	FDW	DW				OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW
PEDESTRIAN		P5-P6		W	FDW	DW				DW	DW	DW				DW	DW	DW				DW	DW	DW				OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW
INTERVALS (IN SECONDS) MINIMUM GREEN				10						4						10						4						EMERGENCY ONLY	6			6			6		
EXTENSION INTERVAL				2						2						2						2															
MAXIMUM I				65						12						65						12															
MAXIMUM II				65						12						65						12															
CLEARANCE INTERVAL					4	2					3	3					4	2					3	3						4	2		4	2		3	3
"WALK" INTERVAL				7												7						7															
PED CLEARANCE INTERVAL					7	2											14	2					14	3													
DETECTOR MEMORY				NON-LOCK						NON-LOCK						NON-LOCK						NON-LOCK															
RECALL SWITCH				SOFT						OFF						SOFT						OFF															
PROGRAM/COORDINATION																																					
CYCLE NO.	LENGTH	OFFSET % / SEC																																			
1	90																																				
2	90																																				

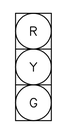
PREFERENTIAL PHASING DIAGRAM



VEHICLE MOVEMENT

PEDESTRIAN MOVEMENT – ON PED ACTUATION

SIGNAL FACES



A,B,C,D
E,F,G,H,J

DUAL DISPLAY
ONE SECTION
(COUNTDOWN)

P1,P2,P3
P4,P5,P6

1. ALL TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH ±5" LOUVERED BACKPLATES WITH RETROREFLECTIVE BORDER (YELLOW).
2. ALL PROPOSED SIGNAL HEADS SHALL BE EQUIPPED WITH L.E.D. MODULES WITH 12" LENSES AND BE EQUIPPED WITH CAP VISORS.
3. ALL PEDESTRIAN INDICATIONS SHALL BE 16" COUNTDOWN L.E.D. AND BE EQUIPPED WITH SUN CAP VISORS.

TECHNICAL NOTES

1. ANY PHASE NOT CALLED WILL BE SKIPPED. SIGNAL INDICATION WILL NOT CHANGE IF THE ASSIGNED RIGHT OF WAY DOES NOT CHANGE DURING THE NEXT PHASE CALLED.
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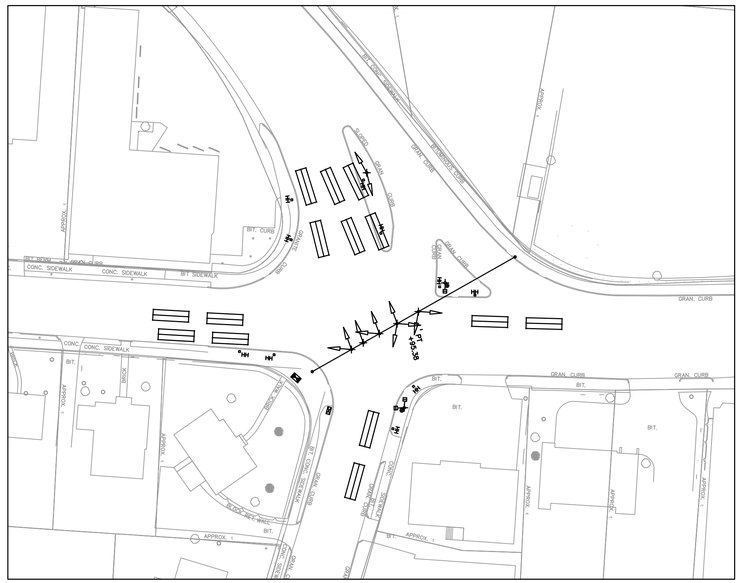
4. CYCLE 1 = 6 AM – 10 AM M-F
   CYCLE 2 = 3 PM – 7 PM M-F
   FREE OPERATION = ALL OTHER TIMES

FS&T PROJECT NO.			
QM-167			
DES	ATC	CHK	ATC
DR	SEB	CHK	ATC
EST	–	CHK	–
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	121	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 8
WINCHESTER ST AND DEDHAM ST
SHEET 1 OF 2
NEWTON



EXISTING SIGNAL PLAN
1" = 40'

FS&T PROJECT NO.			
QM-167			
DES	—	CHK	—
DR	—	CHK	—
EST	—	CHK	—
ENGINEER IN CHARGE			

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	.	122	145
PROJECT FILE NO. 606635			

TRAFFIC SIGNAL PLANS
LOCATION 8
WINCHESTER ST AND DEDHAM ST
SHEET 2 OF 2
NEWTON

SEQUENCE AND TIMING FOR FULLY–ACTUATED TRAFFIC SIGNAL CONTROL

STREET	DIR	HOUSING	ø1	ø2	ø3	ø4	ø5	ø6	ø7	ø8	ø9	FLASHING OPERATION
			NOT USED	NOT USED	NOT USED				NOT USED			
WINCHESTER ST	SB	A,B				R R R	R R R	R R R		G Y R	R R R	(R)
WINCHESTER ST	NB	C,D,E,F				G Y R	R R R	R R R		R R R	R R R	(R)
NEEDHAM ST	EB	G,K,L				R R R	G Y R	R R R		R R R	R R R	(Y)
NEEDHAM ST	EB	H,J				<R <R <R	<G <Y <R	<R <R <R		<R <R <R	<R <R <R	(Y)
DEDHAM ST	WB	M,N				R R R	R R R	G Y R		R R R	R R R	(R)
PEDESTRIAN		P1–P6				DW DW DW	DW DW DW	DW DW DW		DW DW DW	W FDW DW	OUT
INTERVALS (IN SECONDS) MINIMUM GREEN			4	4		6	10	6		6		EMERGENCY ONLY
INTERVALS (IN SECONDS) EXTENSION INTERVAL			2	2		2	2	2		2		
INTERVALS (IN SECONDS) MAXIMUM I						30	30	15		30		
INTERVALS (IN SECONDS) MAXIMUM II						30	30	15		30		
INTERVALS (IN SECONDS) CLEARANCE INTERVAL						4 3	4 3	3 3		4 3		
INTERVALS (IN SECONDS) "WALK" INTERVAL											7	
INTERVALS (IN SECONDS) PED CLEARANCE INTERVAL											14 3	
DETECTOR MEMORY						NON–LOCK	NON–LOCK	NON–LOCK		NON–LOCK		
RECALL SWITCH						SOFT	SOFT	OFF		SOFT		

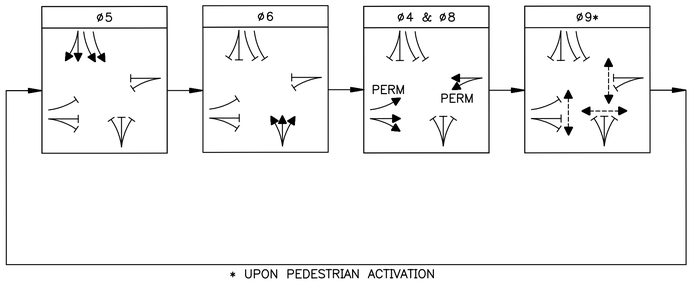
PROGRAM/COORDINATION

CYCLE NO.	LENGTH	OFFSET % / SEC
1	90	
2	90	

EMERGENCY PRE–EMPTION

STREET	DIR	HOUSING	øF1	øF2	øF3	øF4
WINCHESTER ST	SB	A,B	R R R	R R R	R R R	G Y R
WINCHESTER ST	NB	C,D,E,F	R R R	R R R	G Y R	R R R
NEEDHAM ST	EB	G,K,L	G Y R	R R R	R R R	R R R
NEEDHAM ST	EB	H,J	<G <Y <R	<R <R <R	<R <R <R	<R <R <R
DEDHAM ST	WB	M,N	R R R	G Y R	R R R	R R R
PEDESTRIAN		P1–P6	DW DW DW	DW DW DW	DW DW DW	DW DW DW
INTERVALS (IN SECONDS) MINIMUM GREEN			6	6	6	6
INTERVALS (IN SECONDS) EXTENSION INTERVAL						
INTERVALS (IN SECONDS) MAXIMUM I						
INTERVALS (IN SECONDS) MAXIMUM II						
INTERVALS (IN SECONDS) CLEARANCE INTERVAL			4 3	3 3	4 2	4 2
INTERVALS (IN SECONDS) "WALK" INTERVAL						
INTERVALS (IN SECONDS) PED CLEARANCE INTERVAL						

PREFERENTIAL PHASING DIAGRAM

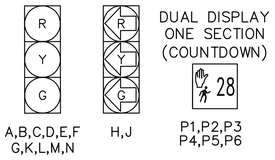


* UPON PEDESTRIAN ACTIVATION

VEHICLE MOVEMENT

PEDESTRIAN MOVEMENT – ON PED ACTUATION

SIGNAL FACES



A,B,C,D,E,F G,K,L,M,N — H,J — P1,P2,P3 P4,P5,P6

1. ALL TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH ±5" LOUVERED BACKPLATES WITH RETROREFLECTIVE BORDER (YELLOW).
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH L.E.D. MODULES WITH 12" LENSES AND BE EQUIPPED WITH CAP VISORS.
3. ALL PEDESTRIAN INDICATIONS SHALL BE 16" COUNTDOWN L.E.D. AND BE EQUIPPED WITH SUN CAP VISORS.

TECHNICAL NOTES

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4. CYCLE 1 = 6 AM – 10 AM M–F
   CYCLE 2 = 3 PM – 7 PM M–F
   FREE OPERATION = ALL OTHER TIMES

FS&T PROJECT NO.			
QM–167			
DES	ATC	CHK	ATC
DR	SEB	CHK	ATC
EST	–	CHK	–
ENGINEER IN CHARGE			

Appendix G Trip Generation

Independent Variable (X):	**55.056**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

NEW	Ln (T) = A x Ln (X) + B	or	T = C x X
	or $T = A \times X + B$		

Where:	A=	B=	T=	C =	T =	%	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Peak	0.8	1.57	**119**	1.56	86	88%	104	14	0.83
Wkdy PM Peak	*1.12*	*78.45*	***140***	1.49	82	17%	*24*	*116*	*0.82*
Wkdy Daily	0.76	3.68	**834**	11.03	607	50%	417	417	0.59
Saturday Site Peak				0.43	24	54%	0	0	0.80
Saturday Daily	*2.03*	*31.75*	***144***	2.46	135	50%	*72*	*72*	*0.66*

Source: Trip Generation, Ninth Edition, Institute of Transportation Engineers, 2012.
Land Use Code 710 - General Office Building

Independent Variable (X):	**20**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

Formula:	Ln (T) = A x Ln (X) + B	or	T = C x X
	or $T = A \times X + B$		

Where:	A=	B=	T=	C =	T =	%	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Street Peak	0	0	**1**	3.40	68	62%	1	0	0.51
Wkdy PM Street Peak	0.74	3.25	**237**	9.48	190	51%	121	116	0.75
Wkdy AM Site Peak	*0*	*0*	***0***	7.07	141	49%	*0*	*0*	*0.91*
Wkdy PM Site Peak	*0*	*0*	**0**	8.37	167	53%	0	0	0.87
Wkdy Daily	*66.95*	*1391.56*	**2731**	102.24	2045	50%	*1365*	*1365*	*0.52*
Saturday Site Peak	0.57	4.18	**361**	10.65	213	51%	184	177	0.55
Saturday Daily	0	0	1	177.59	3552	50%	1776	1776	

Source: Trip Generation, Ninth Edition, Institute of Transportation Engineers, 2012.
Land Use Code 850 - Supermarket

Independent Variable (X):	**66.96**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

Formula:	Ln (T) = A x Ln (X) + B	or	T = C x X
	or $T = A \times X + B$		

Where:	A=	B=	T=	C =	T =	%	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Street Peak	0.61	2.24	**122**	0.96	64	61%	74	48	0.52
Wkdy PM Street Peak	0.67	3.31	**458**	3.71	248	49%	224	234	0.81
Wkdy Daily	0.65	5.83	**5233**	42.70	2859	50%	2616	2616	0.78
Saturday Site Peak	0.65	3.78	**674**	4.82	323	52%	350	323	0.84
Saturday Daily	0.63	6.23	**7177**	49.97	3346	50%	3588	3588	0.82

Wkdy PM Pass-By % (T)	-0.29	5.00	**46%**
Saturday Peak Pass-By % (T)	-0.02	38.59	**37%**

Source: Trip Generation, Ninth Edition, Institute of Transportation Engineers, 2012.
Land Use Code 820 - Shopping Center

Land use assumptions per Draft Site Development Plans (01-06-15)

PASS BY ITE	PASS BY USED		AM IN	AM OUT	PM IN	PM OUT	SAT IN	SAT OUT
		OFFICE						
		NEW						
		PASS BY						
		TOTAL	76	10	14	68	13	11
		SHOPS						
		NEW	20	13	61	63	84	77
45%	50%	PASS BY	20	13	61	63	84	77
		TOTAL	39	25	122	127	168	155
		SUPERMKT						
		NEW	25	16	58	56	65	63
36%	40%	PASS BY	17	10	39	37	43	42
		TOTAL	42	26	97	93	109	104
		ALL						
		NEW	45	28	119	119	149	140
		PASS BY	36	23	100	101	127	119
		TOTAL	157	61	232	288	289	270
				218		520		559

Appendix H Future Intersection Operations

H.1 NEAR-TERM BUILD OPERATIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	0	15	2	0	1	29	718	3	3	727	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	0	15	2	0	1	29	718	3	3	727	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.82	0.82	0.82	0.82	0.82		0.82					
vC, conflicting volume	1518	1518	733	1532	1522	720	739			721		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1521	1522	560	1539	1528	720	567			721		
tC, single (s)	7.1	6.5	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	96	97	100	100	96			100		
cM capacity (veh/h)	77	93	397	73	93	432	808			890		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	3	750	742
Volume Left	1	2	29	3
Volume Right	15	1	3	12
cSH	316	100	808	890
Volume to Capacity	0.05	0.03	0.04	0.00
Queue Length 95th (ft)	4	2	3	0
Control Delay (s)	17.0	41.9	0.9	0.1
Lane LOS	C	E	A	A
Approach Delay (s)	17.0	41.9	0.9	0.1
Approach LOS	C	E		

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	69.0%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	14	2	6	692	777	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	2	6	692	777	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.71	0.71	0.71			
vC, conflicting volume	1490	786	796			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1487	500	513			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	100	99			
cM capacity (veh/h)	98	410	758			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	16	6	692	796
Volume Left	14	6	0	0
Volume Right	2	0	0	19
cSH	108	758	1700	1700
Volume to Capacity	0.15	0.01	0.41	0.47
Queue Length 95th (ft)	12	1	0	0
Control Delay (s)	43.9	9.8	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	43.9	0.1		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	22	5	0	6	40	675	4	1	722	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	0	22	5	0	6	40	675	4	1	722	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.73	0.73	0.73	0.73	0.73		0.73					
vC, conflicting volume	1510	1506	744	1526	1526	677	767			679		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1513	1508	468	1535	1535	677	499			679		
tC, single (s)	7.1	6.5	6.4	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	74	100	95	91	100	99	95			100		
cM capacity (veh/h)	69	85	407	57	81	456	788			923		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	40	11	719	768
Volume Left	18	5	40	1
Volume Right	22	6	4	45
cSH	127	110	788	923
Volume to Capacity	0.32	0.10	0.05	0.00
Queue Length 95th (ft)	31	8	4	0
Control Delay (s)	45.9	41.4	1.3	0.0
Lane LOS	E	E	A	A
Approach Delay (s)	45.9	41.4	1.3	0.0
Approach LOS	E	E		

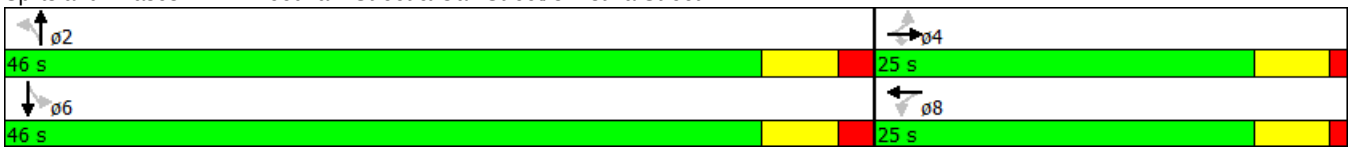
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	77.3%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	108	96	128	107	156	143	784	18	551
Lane Group Flow (vph)	0	227	142	0	325	151	889	19	689
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	46.0	46.0	46.0	46.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	64.8%	64.8%	64.8%	64.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.75	0.26		0.87	0.56	0.88	0.15	0.69
Control Delay		40.2	5.6		47.8	19.8	25.3	10.8	14.8
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		40.2	5.6		47.8	19.8	25.3	10.8	14.8
Queue Length 50th (ft)		89	0		128	38	301	4	188
Queue Length 95th (ft)		#189	38		#265	103	#563	15	306
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		356	604		437	304	1136	145	1120
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		0.64	0.24		0.74	0.50	0.78	0.13	0.62

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 65.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	96	128	107	156	36	143	784	61	18	551	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.98		1.00	0.99		1.00	0.98	
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1769	1615		1905		1678	1803		1626	1769	
Flt Permitted		0.62	1.00		0.71		0.27	1.00		0.13	1.00	
Satd. Flow (perm)		1134	1615		1369		484	1803		230	1769	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	120	107	142	116	170	39	151	825	64	19	580	109
RTOR Reduction (vph)	0	0	104	0	7	0	0	4	0	0	10	0
Lane Group Flow (vph)	0	227	38	0	318	0	151	885	0	19	679	0
Heavy Vehicles (%)	7%	2%	0%	2%	4%	0%	4%	4%	7%	11%	5%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		17.5	17.5		17.5		36.5	36.5		36.5	36.5	
Effective Green, g (s)		17.5	17.5		17.5		36.5	36.5		36.5	36.5	
Actuated g/C Ratio		0.27	0.27		0.27		0.56	0.56		0.56	0.56	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		305	434		368		271	1012		129	993	
v/s Ratio Prot								c0.49			0.38	
v/s Ratio Perm		0.20	0.02		c0.23		0.31			0.08		
v/c Ratio		0.74	0.09		0.86		0.56	0.87		0.15	0.68	
Uniform Delay, d1		21.7	17.8		22.6		9.1	12.3		6.8	10.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.3	0.0		17.9		3.0	8.8		0.7	2.1	
Delay (s)		30.0	17.8		40.5		12.1	21.1		7.5	12.3	
Level of Service		C	B		D		B	C		A	B	
Approach Delay (s)		25.3			40.5			19.8			12.2	
Approach LOS		C			D			B			B	

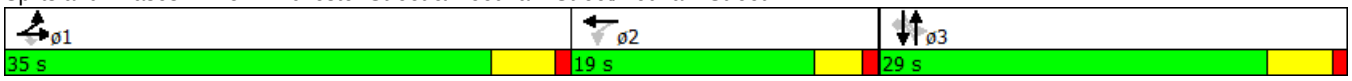
Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	612	99	40	17	158	30	286	42	267	634
Lane Group Flow (vph)	418	418	47	0	322	0	366	0	325	667
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.78	0.77	0.08		0.82		0.79		0.72	0.73
Control Delay	34.4	33.6	2.1		46.8		40.1		36.0	7.5
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	34.4	33.6	2.1		46.8		40.1		36.0	7.5
Queue Length 50th (ft)	195	194	0		146		172		150	0
Queue Length 95th (ft)	284	282	8		#289		#290		#244	89
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	635	643	649		412		534		519	957
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	0.66	0.65	0.07		0.78		0.69		0.63	0.70

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 76.2
Natural Cycle: 65
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	612	99	40	17	158	121	30	286	6	42	267	634
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94			1.00			1.00	0.85
Flt Protected	0.95	0.97	1.00		1.00			1.00			0.99	1.00
Satd. Flow (prot)	1579	1600	1495		1975			1870			1843	1568
Flt Permitted	0.95	0.97	1.00		0.96			0.88			0.87	1.00
Satd. Flow (perm)	1579	1600	1495		1902			1657			1613	1568
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Adj. Flow (vph)	720	116	47	18	172	132	34	325	7	44	281	667
RTOR Reduction (vph)	0	0	31	0	30	0	0	1	0	0	0	479
Lane Group Flow (vph)	418	418	16	0	292	0	0	365	0	0	325	188
Heavy Vehicles (%)	5%	6%	8%	0%	2%	4%	0%	1%	0%	5%	2%	3%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	26.0	26.0	26.0		14.6			21.4			21.4	21.4
Effective Green, g (s)	26.0	26.0	26.0		14.6			21.4			21.4	21.4
Actuated g/C Ratio	0.34	0.34	0.34		0.19			0.28			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	540	547	511		365			466			454	441
v/s Ratio Prot	c0.26	0.26										
v/s Ratio Perm			0.01		c0.15			c0.22			0.20	0.12
v/c Ratio	0.77	0.76	0.03		0.80			0.78			0.72	0.43
Uniform Delay, d1	22.4	22.3	16.6		29.3			25.2			24.6	22.3
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	7.2	6.7	0.0		12.5			7.8			4.4	0.2
Delay (s)	29.6	28.9	16.7		41.8			33.0			29.0	22.5
Level of Service	C	C	B		D			C			C	C
Approach Delay (s)		28.6			41.8			33.0			24.6	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Volume (vph)	27	0	17	17	0	17	679	770
Lane Group Flow (vph)	0	32	20	0	28	18	724	840
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	NA
Protected Phases		4			8		2	6
Permitted Phases	4		4	8		2		
Detector Phase	4	4	4	8	8	2	2	6
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	Min	Min	Min
v/c Ratio		0.13	0.06		0.10	0.05	0.51	0.58
Control Delay		21.3	2.8		5.2	5.0	6.9	7.8
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		21.3	2.8		5.2	5.0	6.9	7.8
Queue Length 50th (ft)		10	0		0	1	92	118
Queue Length 95th (ft)		30	5		8	10	284	363
Internal Link Dist (ft)		71			182		282	601
Turn Bay Length (ft)								
Base Capacity (vph)		551	635		578	384	1569	1612
Starvation Cap Reductn		0	0		0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0
Reduced v/c Ratio		0.06	0.03		0.05	0.05	0.46	0.52

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 46.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	0	17	17	0	5	17	679	2	0	770	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0			6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Frt		1.00	0.85		0.97		1.00	1.00			1.00	
Flt Protected		0.95	1.00		0.96		0.95	1.00			1.00	
Satd. Flow (prot)		1570	1615		1775		1558	1809			1860	
Flt Permitted		0.89	1.00		0.79		0.27	1.00			1.00	
Satd. Flow (perm)		1469	1615		1464		443	1809			1860	
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	32	0	20	22	0	6	18	722	2	0	837	3
RTOR Reduction (vph)	0	0	18	0	25	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	32	2	0	3	0	18	724	0	0	840	0
Heavy Vehicles (%)	15%	0%	0%	0%	0%	0%	12%	5%	0%	0%	2%	29%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		4.5	4.5		4.5		33.1	33.1			33.1	
Effective Green, g (s)		4.5	4.5		4.5		33.1	33.1			33.1	
Actuated g/C Ratio		0.09	0.09		0.09		0.68	0.68			0.68	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0			6.0	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		136	149		135		301	1232			1266	
v/s Ratio Prot								0.40			c0.45	
v/s Ratio Perm		c0.02	0.00		0.00		0.04					
v/c Ratio		0.24	0.01		0.02		0.06	0.59			0.66	
Uniform Delay, d1		20.5	20.0		20.0		2.6	4.1			4.5	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.3	0.0		0.0		0.0	0.5			1.0	
Delay (s)		20.8	20.0		20.1		2.6	4.6			5.5	
Level of Service		C	C		C		A	A			A	
Approach Delay (s)		20.5			20.1			4.5			5.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	0	77	0	0	7	45	834	2	2	608	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	0	77	0	0	7	45	834	2	2	608	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked												
vC, conflicting volume	1548	1542	612	1618	1544	835	615			836		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1548	1542	612	1618	1544	835	615			836		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.8			2.2		
p0 queue free %	84	100	85	100	100	98	94			100		
cM capacity (veh/h)	85	109	497	67	108	371	716			807		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	91	7	881	617
Volume Left	14	0	45	2
Volume Right	77	7	2	7
cSH	284	371	716	807
Volume to Capacity	0.32	0.02	0.06	0.00
Queue Length 95th (ft)	33	1	5	0
Control Delay (s)	23.5	14.9	1.7	0.1
Lane LOS	C	B	A	A
Approach Delay (s)	23.5	14.9	1.7	0.1
Approach LOS	C	B		

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	96.5%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	51	10	9	849	581	44
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	51	10	9	849	581	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1470	603	625			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1463	405	432			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	56	98	99			
cM capacity (veh/h)	116	533	933			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	61	9	849	625
Volume Left	51	9	0	0
Volume Right	10	0	0	44
cSH	133	933	1700	1700
Volume to Capacity	0.46	0.01	0.50	0.37
Queue Length 95th (ft)	52	1	0	0
Control Delay (s)	53.1	8.9	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	53.1	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	0	54	11	0	3	56	801	4	3	526	54
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	0	54	11	0	3	56	801	4	3	526	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.90	0.90	0.90	0.90	0.90		0.90					
vC, conflicting volume	1477	1476	553	1528	1501	803	580			805		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1474	1473	449	1531	1501	803	479			805		
tC, single (s)	7.2	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	36	100	90	85	100	99	94			100		
cM capacity (veh/h)	85	108	540	74	104	387	922			828		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	108	14	861	583
Volume Left	54	11	56	3
Volume Right	54	3	4	54
cSH	147	90	922	828
Volume to Capacity	0.74	0.16	0.06	0.00
Queue Length 95th (ft)	110	13	5	0
Control Delay (s)	78.1	52.2	1.6	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	78.1	52.2	1.6	0.1
Approach LOS	F	F		

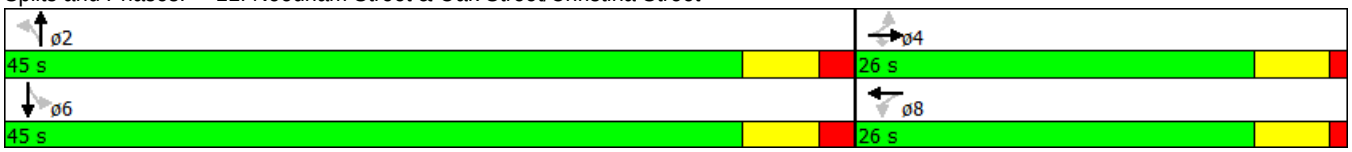
Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	92.9%	ICU Level of Service	F	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	147	166	149	170	126	151	748	34	652
Lane Group Flow (vph)	0	364	173	0	350	156	891	35	791
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	26.0	26.0	26.0	26.0	26.0	45.0	45.0	45.0	45.0
Total Split (%)	36.6%	36.6%	36.6%	36.6%	36.6%	63.4%	63.4%	63.4%	63.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.91	0.28		1.30	0.92	0.90	0.32	0.80
Control Delay		54.1	4.9		185.4	71.5	28.0	18.3	20.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		54.1	4.9		185.4	71.5	28.0	18.3	20.5
Queue Length 50th (ft)		154	0		~204	55	304	8	244
Queue Length 95th (ft)		#290	35		#359	#171	#563	31	398
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		401	608		269	181	1055	117	1044
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		0.91	0.28		1.30	0.86	0.84	0.30	0.76

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 68.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	166	149	170	126	36	151	748	116	34	652	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.99		1.00	0.98		1.00	0.98	
Flt Protected		0.98	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1848	1599		1925		1728	1843		1805	1824	
Flt Permitted		0.69	1.00		0.44		0.18	1.00		0.11	1.00	
Satd. Flow (perm)		1313	1599		863		319	1843		207	1824	
Peak-hour factor, PHF	0.86	0.86	0.86	0.95	0.95	0.95	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	171	193	173	179	133	38	156	771	120	35	665	126
RTOR Reduction (vph)	0	0	120	0	6	0	0	8	0	0	10	0
Lane Group Flow (vph)	0	364	53	0	344	0	156	883	0	35	781	0
Heavy Vehicles (%)	1%	0%	1%	1%	0%	6%	1%	1%	1%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		21.1	21.1		21.1		36.8	36.8		36.8	36.8	
Effective Green, g (s)		21.1	21.1		21.1		36.8	36.8		36.8	36.8	
Actuated g/C Ratio		0.31	0.31		0.31		0.53	0.53		0.53	0.53	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		402	489		264		170	984		110	974	
v/s Ratio Prot								0.48			0.43	
v/s Ratio Perm		0.28	0.03		c0.40		c0.49			0.17		
v/c Ratio		0.91	0.11		1.30		0.92	0.90		0.32	0.80	
Uniform Delay, d1		22.9	17.1		23.9		14.7	14.4		9.0	13.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		22.9	0.0		160.8		46.0	10.9		2.3	5.1	
Delay (s)		45.8	17.2		184.7		60.7	25.3		11.3	18.2	
Level of Service		D	B		F		E	C		B	B	
Approach Delay (s)		36.6			184.7			30.5			17.9	
Approach LOS		D			F			C			B	

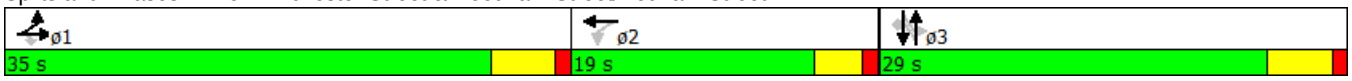
Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	68.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	759	127	64	25	84	25	253	78	227	555
Lane Group Flow (vph)	473	480	69	0	218	0	333	0	317	578
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.80	0.80	0.11		0.64		0.66		0.82	0.67
Control Delay	34.8	34.5	4.3		33.8		32.1		45.4	6.7
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	34.8	34.5	4.3		33.8		32.1		45.4	6.7
Queue Length 50th (ft)	223	226	0		81		147		149	0
Queue Length 95th (ft)	#394	#396	22		153		229		#286	78
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	670	682	706		405		580		448	906
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	0.71	0.70	0.10		0.54		0.57		0.71	0.64

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 75.6
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	759	127	64	25	84	100	25	253	11	78	227	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94			0.99			1.00	0.85
Flt Protected	0.95	0.97	1.00		0.99			1.00			0.99	1.00
Satd. Flow (prot)	1641	1668	1615		1993			1865			1857	1583
Flt Permitted	0.95	0.97	1.00		0.90			0.95			0.73	1.00
Satd. Flow (perm)	1641	1668	1615		1798			1771			1372	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.96	0.96	0.96	0.87	0.87	0.87	0.96	0.96	0.96
Adj. Flow (vph)	816	137	69	26	88	104	29	291	13	81	236	578
RTOR Reduction (vph)	0	0	44	0	40	0	0	1	0	0	0	414
Lane Group Flow (vph)	473	480	25	0	178	0	0	332	0	0	317	164
Heavy Vehicles (%)	1%	1%	0%	4%	0%	0%	0%	1%	0%	1%	1%	2%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	27.3	27.3	27.3		12.5			21.4			21.4	21.4
Effective Green, g (s)	27.3	27.3	27.3		12.5			21.4			21.4	21.4
Actuated g/C Ratio	0.36	0.36	0.36		0.17			0.28			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	595	605	586		298			503			390	450
v/s Ratio Prot	c0.29	0.29										
v/s Ratio Perm			0.02		c0.10			0.19			c0.23	0.10
v/c Ratio	0.79	0.79	0.04		0.60			0.66			0.81	0.37
Uniform Delay, d1	21.4	21.4	15.5		29.0			23.7			25.0	21.5
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	7.6	7.5	0.0		3.7			2.4			11.6	0.2
Delay (s)	29.1	28.9	15.5		32.8			26.1			36.6	21.7
Level of Service	C	C	B		C			C			D	C
Approach Delay (s)		28.1			32.8			26.1			27.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	24	0	15	12	2	21	857	2	633
Lane Group Flow (vph)	0	39	25	0	36	22	908	2	708
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.14	0.08		0.15	0.04	0.62	0.01	0.49
Control Delay		21.6	4.1		18.7	4.7	8.7	4.5	6.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		21.6	4.1		18.7	4.7	8.7	4.5	6.5
Queue Length 50th (ft)		11	0		7	2	136	0	89
Queue Length 95th (ft)		24	1		17	11	421	3	268
Internal Link Dist (ft)		71			182		282		601
Turn Bay Length (ft)									
Base Capacity (vph)		590	619		505	550	1622	366	1589
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		0.07	0.04		0.07	0.04	0.56	0.01	0.45

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 47.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	0	15	12	2	5	21	857	6	2	633	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1615		1694		1745	1879		1745	1841	
Flt Permitted		0.85	1.00		0.78		0.35	1.00		0.23	1.00	
Satd. Flow (perm)		1617	1615		1369		637	1879		425	1841	
Peak-hour factor, PHF	0.61	0.61	0.61	0.53	0.53	0.53	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	39	0	25	23	4	9	22	902	6	2	696	12
RTOR Reduction (vph)	0	0	23	0	8	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	39	2	0	28	0	22	908	0	2	707	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	20%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		4.7	4.7		4.7		33.8	33.8		33.8	33.8	
Effective Green, g (s)		4.7	4.7		4.7		33.8	33.8		33.8	33.8	
Actuated g/C Ratio		0.09	0.09		0.09		0.68	0.68		0.68	0.68	
Clearance Time (s)		5.0	5.0		5.0		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)		153	153		129		434	1283		290	1257	
v/s Ratio Prot								c0.48			0.38	
v/s Ratio Perm		c0.02	0.00		0.02		0.03			0.00		
v/c Ratio		0.25	0.02		0.22		0.05	0.71		0.01	0.56	
Uniform Delay, d1		20.8	20.3		20.7		2.6	4.8		2.5	4.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.0		0.3		0.0	1.5		0.0	0.3	
Delay (s)		21.1	20.3		21.0		2.6	6.3		2.5	4.4	
Level of Service		C	C		C		A	A		A	A	
Approach Delay (s)		20.8			21.0			6.2			4.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	0	58	1	0	3	58	890	4	2	867	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	0	58	1	0	3	58	890	4	2	867	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.79	0.79	0.79	0.79	0.79		0.79					
vC, conflicting volume	1886	1886	872	1942	1888	892	876			894		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1987	1985	709	2056	1988	892	715			894		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	100	83	96	100	99	92			100		
cM capacity (veh/h)	34	45	348	26	45	344	711			767		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	66	4	952	878
Volume Left	8	1	58	2
Volume Right	58	3	4	9
cSH	164	84	711	767
Volume to Capacity	0.40	0.05	0.08	0.00
Queue Length 95th (ft)	44	4	7	0
Control Delay (s)	40.9	50.2	2.3	0.1
Lane LOS	E	F	A	A
Approach Delay (s)	40.9	50.2	2.3	0.1
Approach LOS	E	F		

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	103.0%	ICU Level of Service	G	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	54	11	12	870	841	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	11	12	870	841	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.69	0.69	0.69			
vC, conflicting volume	1762	868	895			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1882	577	617			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	97	98			
cM capacity (veh/h)	53	356	666			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	65	12	870	895
Volume Left	54	12	0	0
Volume Right	11	0	0	54
cSH	62	666	1700	1700
Volume to Capacity	1.05	0.02	0.51	0.53
Queue Length 95th (ft)	128	1	0	0
Control Delay (s)	239.6	10.5	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	239.6	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	8.5		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	0	68	14	0	15	70	851	6	7	774	66
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	63	0	68	14	0	15	70	851	6	7	774	66
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.70	0.70	0.70	0.70	0.70		0.70					
vC, conflicting volume	1830	1818	807	1883	1848	854	840			857		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1969	1952	514	2045	1995	854	561			857		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	83	38	100	96	90			99		
cM capacity (veh/h)	29	41	397	22	38	361	717			792		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	131	29	927	847
Volume Left	63	14	70	7
Volume Right	68	15	6	66
cSH	57	44	717	792
Volume to Capacity	2.31	0.66	0.10	0.01
Queue Length 95th (ft)	326	63	8	1
Control Delay (s)	755.8	186.2	2.7	0.2
Lane LOS	F	F	A	A
Approach Delay (s)	755.8	186.2	2.7	0.2
Approach LOS	F	F		

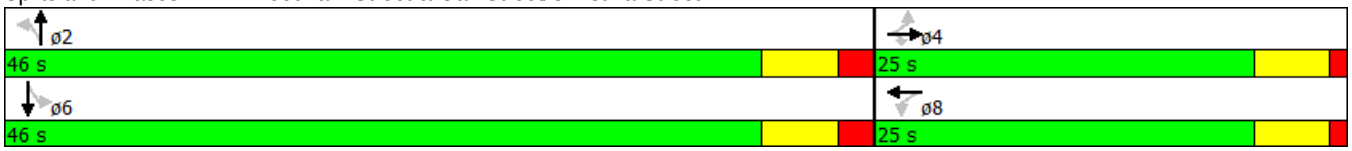
Intersection Summary				
Average Delay	55.4			
Intersection Capacity Utilization	108.5%	ICU Level of Service	G	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	196	67	130	103	92	124	835	42	700
Lane Group Flow (vph)	0	306	151	0	291	125	891	44	904
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	46.0	46.0	46.0	46.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	64.8%	64.8%	64.8%	64.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		1.00	0.27		0.94	1.00	0.85	0.32	0.87
Control Delay		80.3	5.3		65.4	105.3	22.6	16.0	24.3
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		80.3	5.3		65.4	105.3	22.6	16.0	24.3
Queue Length 50th (ft)		133	0		116	50	293	9	300
Queue Length 95th (ft)		#266	34		#249	#103	#549	34	#564
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)									
Base Capacity (vph)		307	554		309	125	1054	139	1041
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		1.00	0.27		0.94	1.00	0.85	0.32	0.87

Intersection Summary

Cycle Length: 71
Actuated Cycle Length: 71
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	67	130	103	92	58	124	835	48	42	700	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1818	1583		1918		1745	1867		1805	1829	
Flt Permitted		0.58	1.00		0.53		0.12	1.00		0.13	1.00	
Satd. Flow (perm)		1090	1583		1045		223	1867		247	1829	
Peak-hour factor, PHF	0.86	0.86	0.86	0.87	0.87	0.87	0.99	0.99	0.99	0.95	0.95	0.95
Adj. Flow (vph)	228	78	151	118	106	67	125	843	48	44	737	167
RTOR Reduction (vph)	0	0	108	0	15	0	0	3	0	0	11	0
Lane Group Flow (vph)	0	306	43	0	276	0	125	888	0	44	893	0
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		20.0	20.0		20.0		40.0	40.0		40.0	40.0	
Effective Green, g (s)		20.0	20.0		20.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio		0.28	0.28		0.28		0.56	0.56		0.56	0.56	
Clearance Time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.0	1.0		1.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		307	445		294		125	1051		139	1030	
v/s Ratio Prot								0.48			0.49	
v/s Ratio Perm		c0.28	0.03		0.26		c0.56			0.18		
v/c Ratio		1.00	0.10		0.94		1.00	0.84		0.32	0.87	
Uniform Delay, d1		25.5	18.8		24.9		15.5	12.9		8.2	13.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		50.1	0.0		35.7		80.5	6.6		1.8	8.1	
Delay (s)		75.6	18.9		60.6		96.0	19.5		10.0	21.3	
Level of Service		E	B		E		F	B		B	C	
Approach Delay (s)		56.8			60.6			28.9			20.8	
Approach LOS		E			E			C			C	

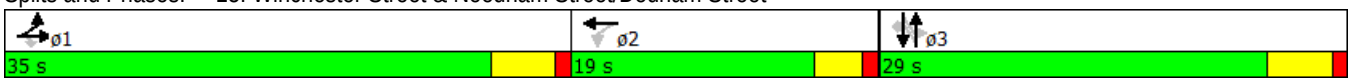
Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	736	102	83	11	129	41	169	101	154	700
Lane Group Flow (vph)	471	471	93	0	279	0	229	0	280	769
Turn Type	Split	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	1			2		3		3	
Permitted Phases			1	2		3		3		3
Detector Phase	1	1	1	2	2	3	3	3	3	3
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	19.0	19.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	19.0	19.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	42.2%	42.2%	42.2%	22.9%	22.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		4.0		5.0		5.0	5.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	Min	Min	Min	None	None	None	None	None	None	None
v/c Ratio	0.80	0.79	0.15		0.72		0.53		0.77	0.77
Control Delay	34.7	33.9	6.6		37.6		29.3		41.6	8.2
Queue Delay	0.0	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	34.7	33.9	6.6		37.6		29.3		41.6	8.2
Queue Length 50th (ft)	227	226	5		115		98		130	0
Queue Length 95th (ft)	#383	#378	33		#219		167		#240	97
Internal Link Dist (ft)		402			391		303		202	
Turn Bay Length (ft)			100							
Base Capacity (vph)	673	681	709		437		524		446	1046
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	0.70	0.69	0.13		0.64		0.44		0.63	0.74

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 75.5
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	736	102	83	11	129	122	41	169	8	101	154	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Lane Util. Factor	0.95	0.95	1.00		1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.94			1.00			1.00	0.85
Flt Protected	0.95	0.96	1.00		1.00			0.99			0.98	1.00
Satd. Flow (prot)	1641	1661	1615		2014			1859			1863	1615
Flt Permitted	0.95	0.96	1.00		0.97			0.85			0.72	1.00
Satd. Flow (perm)	1641	1661	1615		1954			1594			1361	1615
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	827	115	93	12	137	130	43	178	8	111	169	769
RTOR Reduction (vph)	0	0	50	0	38	0	0	1	0	0	0	561
Lane Group Flow (vph)	471	471	43	0	241	0	0	228	0	0	280	208
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Split	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	1			2			3			3	
Permitted Phases			1	2			3			3		3
Actuated Green, G (s)	27.2	27.2	27.2		13.5			20.3			20.3	20.3
Effective Green, g (s)	27.2	27.2	27.2		13.5			20.3			20.3	20.3
Actuated g/C Ratio	0.36	0.36	0.36		0.18			0.27			0.27	0.27
Clearance Time (s)	5.0	5.0	5.0		4.0			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0	4.0		4.0			2.0			2.0	2.0
Lane Grp Cap (vph)	595	602	585		351			431			368	437
v/s Ratio Prot	c0.29	0.28										
v/s Ratio Perm			0.03		c0.12			0.14			c0.21	0.13
v/c Ratio	0.79	0.78	0.07		0.69			0.53			0.76	0.48
Uniform Delay, d1	21.4	21.3	15.6		28.8			23.3			25.1	22.9
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	1.00
Incremental Delay, d2	7.5	6.9	0.1		6.0			0.5			8.1	0.3
Delay (s)	28.9	28.2	15.7		34.7			23.8			33.2	23.2
Level of Service	C	C	B		C			C			C	C
Approach Delay (s)		27.4			34.7			23.8			25.9	
Approach LOS		C			C			C			C	

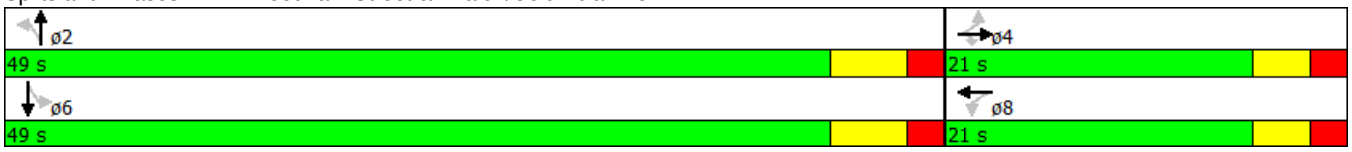
Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	17	0	14	18	0	20	890	6	863
Lane Group Flow (vph)	0	22	18	0	36	22	998	6	907
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	4	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	21.0	21.0	21.0	21.0	30.0	30.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	49.0	49.0	49.0	49.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	70.0%	70.0%	70.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0		5.0	6.0	6.0	6.0	6.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	Min	Min	Min	Min
v/c Ratio		0.07	0.06		0.12	0.05	0.61	0.02	0.56
Control Delay		21.6	2.3		7.3	4.2	7.9	4.2	6.6
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		21.6	2.3		7.3	4.2	7.9	4.2	6.6
Queue Length 50th (ft)		5	0		0	0	0	0	0
Queue Length 95th (ft)		21	2		15	12	#599	5	420
Internal Link Dist (ft)		71			182		282		601
Turn Bay Length (ft)									
Base Capacity (vph)		679	607		624	406	1652	331	1636
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		0.03	0.03		0.06	0.05	0.60	0.02	0.55

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 48.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	0	14	18	0	13	20	890	8	6	863	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	11	12	12
Total Lost time (s)		5.0	5.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.94		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1615		1631		1745	1897		1745	1879	
Flt Permitted		1.00	1.00		0.99		0.25	1.00		0.21	1.00	
Satd. Flow (perm)		1900	1615		1661		466	1897		379	1879	
Peak-hour factor, PHF	0.78	0.78	0.78	0.86	0.86	0.86	0.90	0.90	0.90	0.96	0.96	0.96
Adj. Flow (vph)	22	0	18	21	0	15	22	989	9	6	899	8
RTOR Reduction (vph)	0	0	17	0	34	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	22	1	0	2	0	22	998	0	6	907	0
Heavy Vehicles (%)	0%	0%	0%	6%	0%	8%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		3.2	3.2		3.2		37.0	37.0		37.0	37.0	
Effective Green, g (s)		3.2	3.2		3.2		37.0	37.0		37.0	37.0	
Actuated g/C Ratio		0.06	0.06		0.06		0.72	0.72		0.72	0.72	
Clearance Time (s)		5.0	5.0		5.0		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)		118	100		103		336	1370		273	1357	
v/s Ratio Prot								c0.53			0.48	
v/s Ratio Perm		c0.01	0.00		0.00		0.05			0.02		
v/c Ratio		0.19	0.01		0.02		0.07	0.73		0.02	0.67	
Uniform Delay, d1		22.8	22.5		22.5		2.1	4.2		2.0	3.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.0		0.0		0.0	1.7		0.0	1.0	
Delay (s)		23.0	22.5		22.6		2.1	5.8		2.0	4.8	
Level of Service		C	C		C		A	A		A	A	
Approach Delay (s)		22.8			22.6			5.7			4.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	11.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

H.2 2024 NO BUILD OPERATIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	4	2	0	1	42	1002	3	3	1139	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	4	2	0	1	42	1002	3	3	1139	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.27	0.27	0.27	0.27	0.27		0.27					
vC, conflicting volume	2242	2244	1149	2236	2252	1004	1159			1005		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4213	4220	217	4193	4251	1004	253			1005		
tC, single (s)	7.1	6.5	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	0	100	100	88			100		
cM capacity (veh/h)	0	0	210	0	0	296	354			697		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	3	42	1005	3	1159
Volume Left	0	2	42	0	3	0
Volume Right	4	1	0	3	0	20
cSH	210	0	354	1700	697	1700
Volume to Capacity	0.02	7.53	0.12	0.59	0.00	0.68
Queue Length 95th (ft)	1	Err	10	0	0	0
Control Delay (s)	22.5	Err	16.5	0.0	10.2	0.0
Lane LOS	C	F	C		B	
Approach Delay (s)	22.5	Err	0.7		0.0	
Approach LOS	C	F				

Intersection Summary				
Average Delay	13.9			
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	1	9	955	1213	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	9	955	1213	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.22	0.22	0.22			
vC, conflicting volume	2194	1220	1228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4651	230	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	99	97			
cM capacity (veh/h)	0	179	289			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	3	9	955	1228
Volume Left	2	9	0	0
Volume Right	1	0	0	15
cSH	0	289	1700	1700
Volume to Capacity	7.79	0.03	0.56	0.72
Queue Length 95th (ft)	Err	2	0	0
Control Delay (s)	Err	17.9	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	0.2		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	13.7		
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	9	5	0	6	45	954	4	1	1155	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	9	5	0	6	45	954	4	1	1155	49
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.24	0.24	0.24	0.24	0.24		0.24					
vC, conflicting volume	2232	2230	1180	2212	2252	956	1204			958		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4494	4486	188	4415	4578	956	288			958		
tC, single (s)	7.1	6.5	6.4	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	95	0	100	98	86			100		
cM capacity (veh/h)	0	0	197	0	0	316	314			726		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	11	45	958	1	1204
Volume Left	5	5	45	0	1	0
Volume Right	9	6	0	4	0	49
cSH	0	0	314	1700	726	1700
Volume to Capacity	36.51	41.76	0.14	0.56	0.00	0.71
Queue Length 95th (ft)	Err	Err	12	0	0	0
Control Delay (s)	Err	Err	18.4	0.0	10.0	0.0
Lane LOS	F	F	C		A	
Approach Delay (s)	Err	Err	0.8		0.0	
Approach LOS	F	F				

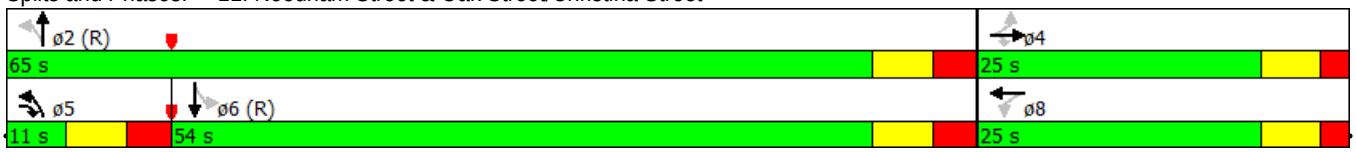
Intersection Summary				
Average Delay	112.3			
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	144	121	149	105	154	162	1062	48	986
Lane Group Flow (vph)	0	294	166	114	243	171	1282	51	1155
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	25.0	25.0	11.0	25.0	25.0	11.0	65.0	54.0	54.0
Total Split (%)	27.8%	27.8%	12.2%	27.8%	27.8%	12.2%	72.2%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.49	0.29	0.86	0.59	1.12	1.11	0.68	1.24
Control Delay		276.0	13.9	85.0	35.4	127.4	79.9	48.5	134.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		276.0	13.9	85.0	35.4	127.4	79.9	48.5	134.3
Queue Length 50th (ft)		~234	36	63	113	~45	~840	24	~855
Queue Length 95th (ft)		#390	85	#163	191	#142	#1095	m32	m#1090
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		197	572	133	415	153	1157	75	935
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.49	0.29	0.86	0.59	1.12	1.11	0.68	1.24

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	121	149	105	154	70	162	1062	156	48	986	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	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	0.98		1.00	0.98	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1766	1615	1770	1880		1678	1785		1626	1784	
Flt Permitted		0.52	1.00	0.34	1.00		0.07	1.00		0.09	1.00	
Satd. Flow (perm)		935	1615	634	1880		131	1785		146	1784	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	160	134	166	114	167	76	171	1118	164	51	1038	117
RTOR Reduction (vph)	0	0	57	0	18	0	0	6	0	0	4	0
Lane Group Flow (vph)	0	294	109	114	225	0	171	1276	0	51	1151	0
Heavy Vehicles (%)	7%	2%	0%	2%	4%	0%	4%	4%	7%	11%	5%	4%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Effective Green, g (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Actuated g/C Ratio		0.21	0.26	0.21	0.21		0.64	0.64		0.52	0.52	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		197	412	133	396		153	1150		76	931	
v/s Ratio Prot			0.01		0.12		0.05	c0.71			c0.65	
v/s Ratio Perm		c0.31	0.06	0.18			0.67			0.35		
v/c Ratio		1.49	0.26	0.86	0.57		1.12	1.11		0.67	1.24	
Uniform Delay, d1		35.5	26.7	34.2	31.8		24.5	16.0		15.8	21.5	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.89	0.95	
Incremental Delay, d2		246.5	0.1	37.5	1.1		107.8	61.9		25.0	112.0	
Delay (s)		282.0	26.9	71.6	32.9		132.4	77.9		39.1	132.3	
Level of Service		F	C	E	C		F	E		D	F	
Approach Delay (s)		189.9			45.3			84.3			128.4	
Approach LOS		F			D			F			F	

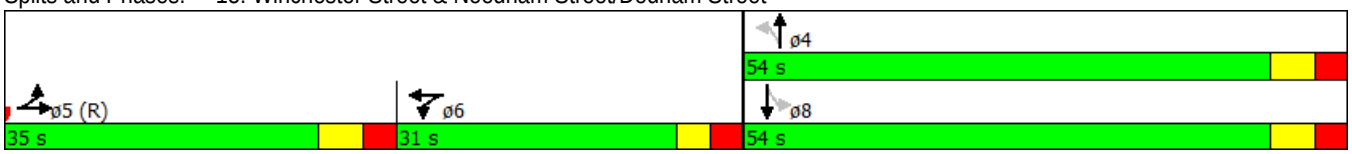
Intersection Summary			
HCM 2000 Control Delay	109.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	122.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	860	108	193	79	303	67	355	994
Lane Group Flow (vph)	1012	182	414	90	359	0	445	1046
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	35.0	35.0	31.0	54.0	54.0	54.0	54.0	
Total Split (%)	29.2%	29.2%	25.8%	45.0%	45.0%	45.0%	45.0%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	1.14	0.39	0.97	0.47	0.54		1.01	0.67
Control Delay	118.4	36.8	79.9	38.1	33.5		84.2	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	118.4	36.8	79.9	38.1	33.5		84.2	2.3
Queue Length 50th (ft)	~504	107	298	52	212		332	0
Queue Length 95th (ft)	#604	170	#499	100	288		#528	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	884	463	433	211	734		488	1568
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	1.14	0.39	0.96	0.43	0.49		0.91	0.67

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	860	108	47	17	193	171	79	303	13	67	355	994
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.95			0.94		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	3224	1645			1963		1805	1870			1839	1568
Flt Permitted	0.95	1.00			1.00		0.28	1.00			0.67	1.00
Satd. Flow (perm)	3224	1645			1963		540	1870			1248	1568
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Adj. Flow (vph)	1012	127	55	18	210	186	90	344	15	71	374	1046
RTOR Reduction (vph)	0	12	0	0	25	0	0	1	0	0	0	0
Lane Group Flow (vph)	1012	170	0	0	389	0	90	358	0	0	445	1046
Heavy Vehicles (%)	5%	6%	8%	0%	2%	4%	0%	1%	0%	5%	2%	3%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	33.0	33.0			24.7		42.3	42.3			42.3	120.0
Effective Green, g (s)	33.0	33.0			24.7		42.3	42.3			42.3	120.0
Actuated g/C Ratio	0.28	0.28			0.21		0.35	0.35			0.35	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	886	452			404		190	659			439	1568
v/s Ratio Prot	c0.31	0.10			c0.20			0.19				
v/s Ratio Perm							0.17				c0.36	0.67
v/c Ratio	1.14	0.38			0.96		0.47	0.54			1.01	0.67
Uniform Delay, d1	43.5	35.2			47.2		30.2	31.1			38.9	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	77.5	2.4			35.0		0.7	0.5			46.4	2.3
Delay (s)	121.0	37.5			82.2		30.9	31.6			85.3	2.3
Level of Service	F	D			F		C	C			F	A
Approach Delay (s)		108.3			82.2			31.5			27.0	
Approach LOS		F			F			C			C	

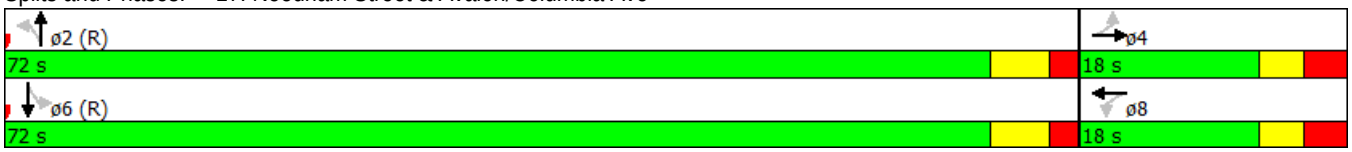
Intersection Summary			
HCM 2000 Control Delay	61.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	32	1	10	2	14	937	1	1195
Lane Group Flow (vph)	38	28	0	30	15	1003	1	1316
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.37	0.17		0.22	0.10	0.67	0.00	0.86
Control Delay	47.9	17.0		28.2	4.9	7.7	3.0	15.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	17.0		28.2	4.9	7.7	3.0	15.6
Queue Length 50th (ft)	21	1		9	2	368	0	456
Queue Length 95th (ft)	47	23		29	m3	m337	1	#1042
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	162	239		213	146	1500	405	1537
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	0.23	0.12		0.14	0.10	0.67	0.00	0.86

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 28 (31%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	1	23	10	2	11	14	937	6	1	1195	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1570	1625			1743		1719	1748		1925	1791	
Flt Permitted	0.74	1.00			0.85		0.09	1.00		0.23	1.00	
Satd. Flow (perm)	1219	1625			1508		170	1748		473	1791	
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	38	1	27	13	3	14	15	997	6	1	1299	17
RTOR Reduction (vph)	0	25	0	0	13	0	0	0	0	0	0	0
Lane Group Flow (vph)	38	3	0	0	17	0	15	1003	0	1	1316	0
Heavy Vehicles (%)	15%	0%	0%	0%	0%	0%	12%	5%	0%	0%	2%	29%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.6	5.6			5.6		72.4	72.4		72.4	72.4	
Effective Green, g (s)	5.6	5.6			5.6		72.4	72.4		72.4	72.4	
Actuated g/C Ratio	0.06	0.06			0.06		0.80	0.80		0.80	0.80	
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)	75	101			93		136	1406		380	1440	
v/s Ratio Prot		0.00						0.57			c0.73	
v/s Ratio Perm	c0.03				0.01		0.09			0.00		
v/c Ratio	0.51	0.03			0.18		0.11	0.71		0.00	0.91	
Uniform Delay, d1	40.9	39.6			40.0		1.9	4.0		1.7	6.5	
Progression Factor	1.00	1.00			1.00		1.39	1.43		1.00	1.00	
Incremental Delay, d2	2.0	0.0			0.3		0.1	0.3		0.0	10.4	
Delay (s)	42.8	39.7			40.4		2.8	6.1		1.7	16.9	
Level of Service	D	D			D		A	A		A	B	
Approach Delay (s)		41.5			40.4			6.0			16.9	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	65	0	0	7	3	1169	2	2	1040	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	0	65	0	0	7	3	1169	2	2	1040	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.61	0.61	0.61	0.61	0.61		0.61					
vC, conflicting volume	2226	2222	1040	2285	2221	1170	1041			1171		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2683	2675	752	2778	2674	1170	753			1171		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.8			2.2		
p0 queue free %	0	100	74	100	100	97	99			100		
cM capacity (veh/h)	8	14	254	6	14	237	385			604		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	83	7	3	1171	2	1041
Volume Left	18	0	3	0	2	0
Volume Right	65	7	0	2	0	1
cSH	34	237	385	1700	604	1700
Volume to Capacity	2.45	0.03	0.01	0.69	0.00	0.61
Queue Length 95th (ft)	236	2	1	0	0	0
Control Delay (s)	908.4	20.6	14.4	0.0	11.0	0.0
Lane LOS	F	C	B		B	
Approach Delay (s)	908.4	20.6	0.0		0.0	
Approach LOS	F	C				

Intersection Summary				
Average Delay	32.8			
Intersection Capacity Utilization	80.0%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	7	2	1218	987	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	7	2	1218	987	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.65	0.65	0.65			
vC, conflicting volume	2210	988	989			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2589	715	716			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	2	98	100			
cM capacity (veh/h)	18	283	583			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	2	1218	989
Volume Left	18	2	0	0
Volume Right	7	0	0	2
cSH	25	583	1700	1700
Volume to Capacity	1.01	0.00	0.72	0.58
Queue Length 95th (ft)	77	0	0	0
Control Delay (s)	407.6	11.2	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	407.6	0.0		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	28	11	0	3	7	1190	4	3	978	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	27	0	28	11	0	3	7	1190	4	3	978	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.63	0.63	0.63	0.63	0.63		0.63					
vC, conflicting volume	2194	2194	980	2218	2195	1192	983			1194		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2605	2606	672	2644	2607	1192	676			1194		
tC, single (s)	7.2	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	0	100	90	0	100	99	99			99		
cM capacity (veh/h)	9	15	281	9	15	230	541			592		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	55	14	7	1194	3	983
Volume Left	27	11	7	0	3	0
Volume Right	28	3	0	4	0	5
cSH	18	11	541	1700	592	1700
Volume to Capacity	3.00	1.28	0.01	0.70	0.01	0.58
Queue Length 95th (ft)	184	62	1	0	0	0
Control Delay (s)	1333.1	837.9	11.7	0.0	11.1	0.0
Lane LOS	F	F	B		B	
Approach Delay (s)	1333.1	837.9	0.1		0.0	
Approach LOS	F	F				

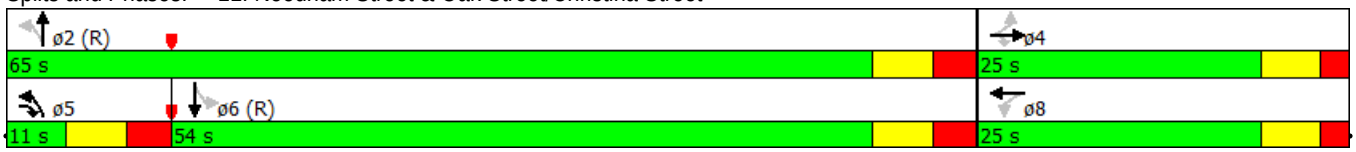
Intersection Summary				
Average Delay	37.8			
Intersection Capacity Utilization	72.9%	ICU Level of Service	C	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	161	144	256	111	131	153	940	35	945
Lane Group Flow (vph)	0	354	298	117	196	158	1083	36	1118
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	25.0	25.0	11.0	25.0	25.0	11.0	65.0	54.0	54.0
Total Split (%)	27.8%	27.8%	12.2%	27.8%	27.8%	12.2%	72.2%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.41	0.52	1.34	0.47	1.01	0.90	0.37	1.16
Control Delay		237.2	20.3	246.5	31.9	92.7	26.2	19.8	105.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		237.2	20.3	246.5	31.9	92.7	26.2	19.8	105.2
Queue Length 50th (ft)		~273	91	~88	87	~41	465	12	~776
Queue Length 95th (ft)		#415	158	#195	153	#118	#817	m15	#1020
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		251	578	87	418	157	1197	98	961
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.41	0.52	1.34	0.47	1.01	0.90	0.37	1.16

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 33 (37%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	144	256	111	131	55	153	940	111	35	945	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1841	1599	1787	1903		1728	1851		1805	1829	
Flt Permitted		0.63	1.00	0.22	1.00		0.07	1.00		0.10	1.00	
Satd. Flow (perm)		1190	1599	414	1903		135	1851		188	1829	
Peak-hour factor, PHF	0.86	0.86	0.86	0.95	0.95	0.95	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	187	167	298	117	138	58	158	969	114	36	964	154
RTOR Reduction (vph)	0	0	70	0	17	0	0	5	0	0	6	0
Lane Group Flow (vph)	0	354	228	117	179	0	158	1078	0	36	1112	0
Heavy Vehicles (%)	1%	0%	1%	1%	0%	6%	1%	1%	1%	0%	2%	0%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Effective Green, g (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Actuated g/C Ratio		0.21	0.26	0.21	0.21		0.64	0.64		0.52	0.52	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		251	408	87	401		157	1192		98	955	
v/s Ratio Prot			0.02		0.09		0.04	c0.58			c0.61	
v/s Ratio Perm		c0.30	0.12	0.28			0.60			0.19		
v/c Ratio		1.41	0.56	1.34	0.45		1.01	0.90		0.37	1.16	
Uniform Delay, d1		35.5	29.1	35.5	30.9		24.5	13.6		12.7	21.5	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.72	0.93	
Incremental Delay, d2		206.7	0.9	213.7	0.3		73.5	11.3		8.4	83.5	
Delay (s)		242.2	30.0	249.2	31.2		98.0	25.0		17.6	103.4	
Level of Service		F	C	F	C		F	C		B	F	
Approach Delay (s)		145.2			112.7			34.3			100.7	
Approach LOS		F			F			C			F	

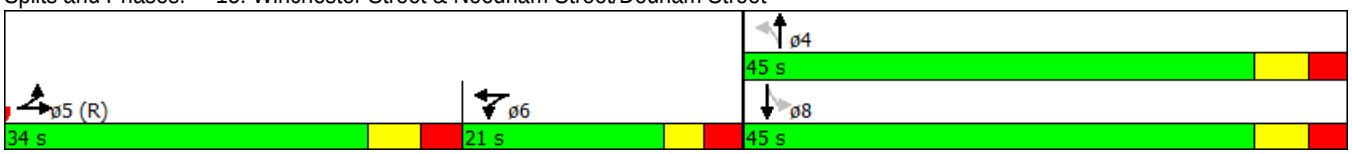
Intersection Summary			
HCM 2000 Control Delay	85.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	115.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	1041	178	125	25	334	148	331	798
Lane Group Flow (vph)	1119	268	255	29	397	0	499	831
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	34.0	34.0	21.0	45.0	45.0	45.0	45.0	
Total Split (%)	34.0%	34.0%	21.0%	45.0%	45.0%	45.0%	45.0%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	1.24	0.55	0.84	0.14	0.54		1.22	0.52
Control Delay	149.7	34.0	60.6	22.6	27.1		149.2	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	149.7	34.0	60.6	22.6	27.1		149.2	1.2
Queue Length 50th (ft)	~458	135	139	12	195		~401	0
Queue Length 95th (ft)	#585	218	#260	32	277		#599	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	904	485	329	209	735		409	1583
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	1.24	0.55	0.78	0.14	0.54		1.22	0.52

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1041	178	72	16	125	104	25	334	11	148	331	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.96			0.94		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.98	1.00
Satd. Flow (prot)	3351	1745			2018		1805	1873			1853	1583
Flt Permitted	0.95	1.00			1.00		0.28	1.00			0.56	1.00
Satd. Flow (perm)	3351	1745			2018		533	1873			1045	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.96	0.96	0.96	0.87	0.87	0.87	0.96	0.96	0.96
Adj. Flow (vph)	1119	191	77	17	130	108	29	384	13	154	345	831
RTOR Reduction (vph)	0	15	0	0	27	0	0	1	0	0	0	0
Lane Group Flow (vph)	1119	253	0	0	228	0	29	396	0	0	499	831
Heavy Vehicles (%)	1%	1%	0%	4%	0%	0%	0%	1%	0%	1%	1%	2%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	27.0	27.0			13.8		39.2	39.2			39.2	100.0
Effective Green, g (s)	27.0	27.0			13.8		39.2	39.2			39.2	100.0
Actuated g/C Ratio	0.27	0.27			0.14		0.39	0.39			0.39	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	904	471			278		208	734			409	1583
v/s Ratio Prot	c0.33	0.15			c0.11			0.21				
v/s Ratio Perm							0.05				c0.48	0.52
v/c Ratio	1.24	0.54			0.82		0.14	0.54			1.22	0.52
Uniform Delay, d1	36.5	31.2			41.9		19.6	23.4			30.4	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	116.5	4.4			16.7		0.1	0.4			119.3	1.2
Delay (s)	153.0	35.5			58.6		19.7	23.8			149.7	1.2
Level of Service	F	D			E		B	C			F	A
Approach Delay (s)		130.3			58.6			23.5			56.9	
Approach LOS		F			E			C			E	

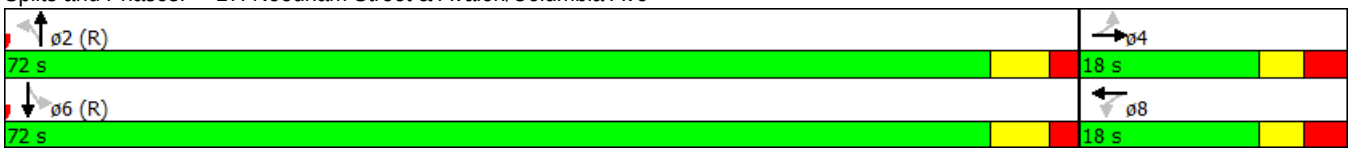
Intersection Summary			
HCM 2000 Control Delay	82.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	109.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	17	0	11	1	23	1207	5	961
Lane Group Flow (vph)	28	28	0	55	24	1277	5	1068
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.26	0.10		0.40	0.07	0.85	0.03	0.73
Control Delay	43.5	0.7		29.4	3.9	14.0	3.2	9.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.5	0.7		29.4	3.9	14.0	3.2	9.4
Queue Length 50th (ft)	15	0		13	3	369	0	228
Queue Length 95th (ft)	27	0		20	m5	m#606	4	550
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	182	358		208	337	1498	180	1467
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	0.15	0.08		0.26	0.07	0.85	0.03	0.73

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	0	17	11	1	17	23	1207	6	5	961	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.92		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1615			1539		1925	1817		1925	1781	
Flt Permitted	0.72	1.00			0.86		0.20	1.00		0.11	1.00	
Satd. Flow (perm)	1370	1615			1353		409	1817		218	1781	
Peak-hour factor, PHF	0.61	0.61	0.61	0.53	0.53	0.53	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	28	0	28	21	2	32	24	1271	6	5	1056	12
RTOR Reduction (vph)	0	26	0	0	30	0	0	0	0	0	0	0
Lane Group Flow (vph)	28	2	0	0	25	0	24	1277	0	5	1068	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	20%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	6.2	6.2			6.2		71.8	71.8		71.8	71.8	
Effective Green, g (s)	6.2	6.2			6.2		71.8	71.8		71.8	71.8	
Actuated g/C Ratio	0.07	0.07			0.07		0.80	0.80		0.80	0.80	
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)	94	111			93		326	1449		173	1420	
v/s Ratio Prot		0.00						c0.70			0.60	
v/s Ratio Perm	c0.02				0.02		0.06			0.02		
v/c Ratio	0.30	0.02			0.27		0.07	0.88		0.03	0.75	
Uniform Delay, d1	39.8	39.1			39.8		2.0	6.2		1.9	4.6	
Progression Factor	1.00	1.00			1.00		1.28	1.30		1.00	1.00	
Incremental Delay, d2	0.6	0.0			0.6		0.2	4.2		0.3	3.7	
Delay (s)	40.5	39.1			40.3		2.7	12.2		2.2	8.3	
Level of Service	D	D			D		A	B		A	A	
Approach Delay (s)		39.8			40.3			12.1			8.3	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	4	1	0	3	0	1183	4	2	1158	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	4	1	0	3	0	1183	4	2	1158	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.26	0.26	0.26	0.26	0.26		0.26					
vC, conflicting volume	2348	2349	1158	2351	2347	1185	1158			1187		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4807	4811	166	4819	4803	1185	166			1187		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	0	100	99	100			100		
cM capacity (veh/h)	0	0	227	0	0	232	365			595		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	4	0	1187	2	1158
Volume Left	0	1	0	0	2	0
Volume Right	4	3	0	4	0	0
cSH	227	0	1700	1700	595	1700
Volume to Capacity	0.02	10.99	0.00	0.70	0.00	0.68
Queue Length 95th (ft)	1	Err	0	0	0	0
Control Delay (s)	21.2	Err	0.0	0.0	11.1	0.0
Lane LOS	C	F			B	
Approach Delay (s)	21.2	Err	0.0		0.0	
Approach LOS	C	F				

Intersection Summary				
Average Delay	17.0			
Intersection Capacity Utilization	72.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	1	2	2	1165	1118	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	2	2	1165	1118	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.21	0.21	0.21			
vC, conflicting volume	2287	1118	1118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	5181	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	99	99			
cM capacity (veh/h)	0	233	350			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	3	2	1165	1118
Volume Left	1	2	0	0
Volume Right	2	0	0	0
cSH	0	350	1700	1700
Volume to Capacity	9.03	0.01	0.69	0.66
Queue Length 95th (ft)	Err	0	0	0
Control Delay (s)	Err	15.3	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	0.0		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	13.1		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	0	6	14	0	15	4	1173	6	7	1103	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	0	6	14	0	15	4	1173	6	7	1103	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.24	0.24	0.24	0.24	0.24		0.24					
vC, conflicting volume	2313	2304	1103	2307	2301	1176	1103			1179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4922	4884	0	4897	4871	1176	0			1179		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	98	0	100	94	99			99		
cM capacity (veh/h)	0	0	259	0	0	235	389			600		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	7	29	4	1179	7	1103
Volume Left	1	14	4	0	7	0
Volume Right	6	15	0	6	0	0
cSH	0	0	389	1700	600	1700
Volume to Capacity	15.16	194.21	0.01	0.69	0.01	0.65
Queue Length 95th (ft)	Err	Err	1	0	1	0
Control Delay (s)	Err	Err	14.4	0.0	11.1	0.0
Lane LOS	F	F	B		B	
Approach Delay (s)	Err	Err	0.0		0.1	
Approach LOS	F	F				

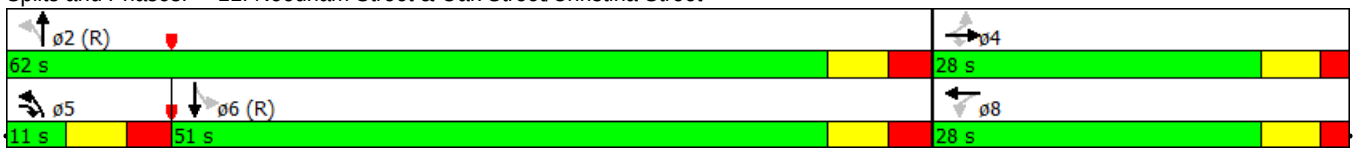
Intersection Summary				
Average Delay	154.6			
Intersection Capacity Utilization	73.1%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	251	90	176	139	124	167	1048	54	875
Lane Group Flow (vph)	0	371	191	151	215	169	1125	57	1135
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	28.0	28.0	11.0	28.0	28.0	11.0	62.0	51.0	51.0
Total Split (%)	31.1%	31.1%	12.2%	31.1%	31.1%	12.2%	68.9%	56.7%	56.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.45	0.31	1.28	0.44	1.07	0.99	0.68	1.26
Control Delay		252.0	12.7	208.5	27.8	110.6	42.0	52.1	145.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		252.0	12.7	208.5	27.8	110.6	42.0	52.1	145.8
Queue Length 50th (ft)		~290	39	~110	88	~44	569	17	~818
Queue Length 95th (ft)		#461	91	#229	155	#136	#907	m40	#1053
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		256	620	118	488	158	1142	84	903
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.45	0.31	1.28	0.44	1.07	0.99	0.68	1.26

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 29 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	251	90	176	139	124	74	167	1048	65	54	875	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583	1805	1902		1745	1866		1805	1828	
Flt Permitted		0.56	1.00	0.25	1.00		0.08	1.00		0.09	1.00	
Satd. Flow (perm)		1050	1583	483	1902		144	1866		173	1828	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.99	0.99	0.99	0.95	0.95	0.95
Adj. Flow (vph)	273	98	191	151	135	80	169	1059	66	57	921	214
RTOR Reduction (vph)	0	0	63	0	23	0	0	2	0	0	9	0
Lane Group Flow (vph)	0	371	128	151	192	0	169	1123	0	57	1126	0
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	26.0	22.0	22.0		55.0	55.0		44.0	44.0	
Effective Green, g (s)		22.0	26.0	22.0	22.0		55.0	55.0		44.0	44.0	
Actuated g/C Ratio		0.24	0.29	0.24	0.24		0.61	0.61		0.49	0.49	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		256	457	118	464		159	1140		84	893	
v/s Ratio Prot			0.01		0.10		0.05	c0.60			c0.62	
v/s Ratio Perm		c0.35	0.07	0.31			0.60			0.33		
v/c Ratio		1.45	0.28	1.28	0.41		1.06	0.98		0.68	1.26	
Uniform Delay, d1		34.0	24.8	34.0	28.6		23.0	17.1		17.6	23.0	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.91	0.93	
Incremental Delay, d2		222.7	0.1	175.8	0.2		89.1	23.3		28.8	124.3	
Delay (s)		256.7	24.9	209.8	28.8		112.1	40.3		44.7	145.7	
Level of Service		F	C	F	C		F	D		D	F	
Approach Delay (s)		177.9			103.5			49.7			140.9	
Approach LOS		F			F			D			F	

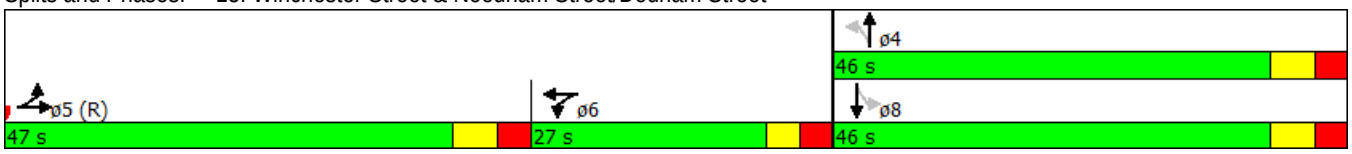
Intersection Summary			
HCM 2000 Control Delay	108.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	119.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Configurations							
Volume (vph)	927	135	170	43	228	136	208	872
Lane Group Flow (vph)	1008	256	373	45	252	0	374	948
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	47.0	47.0	27.0	46.0	46.0	46.0	46.0	
Total Split (%)	39.2%	39.2%	22.5%	38.3%	38.3%	38.3%	38.3%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	0.89	0.43	0.96	0.23	0.42		0.98	0.59
Control Delay	49.2	29.5	82.9	33.2	34.4		82.6	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	49.2	29.5	82.9	33.2	34.4		82.6	1.6
Queue Length 50th (ft)	381	133	269	25	151		282	0
Queue Length 95th (ft)	#504	212	#469	58	228		#479	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	1129	594	387	205	608		391	1615
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	0.89	0.43	0.96	0.22	0.41		0.96	0.59

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	927	135	100	15	170	165	43	228	11	136	208	872
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.94			0.94		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.98	1.00
Satd. Flow (prot)	3351	1700			2012		1805	1869			1863	1615
Flt Permitted	0.95	1.00			1.00		0.33	1.00			0.63	1.00
Satd. Flow (perm)	3351	1700			2012		633	1869			1205	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.92	0.92	0.92
Adj. Flow (vph)	1008	147	109	16	181	176	45	240	12	148	226	948
RTOR Reduction (vph)	0	22	0	0	26	0	0	1	0	0	0	0
Lane Group Flow (vph)	1008	234	0	0	347	0	45	251	0	0	374	948
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	40.5	40.5			21.5		38.0	38.0			38.0	120.0
Effective Green, g (s)	40.5	40.5			21.5		38.0	38.0			38.0	120.0
Actuated g/C Ratio	0.34	0.34			0.18		0.32	0.32			0.32	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	1130	573			360		200	591			381	1615
v/s Ratio Prot	c0.30	0.14			c0.17			0.13				
v/s Ratio Perm							0.07				c0.31	0.59
v/c Ratio	0.89	0.41			0.96		0.23	0.42			0.98	0.59
Uniform Delay, d1	37.7	30.5			48.9		30.2	32.4			40.7	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	10.8	2.2			37.3		0.2	0.2			40.9	1.6
Delay (s)	48.5	32.7			86.2		30.4	32.5			81.6	1.6
Level of Service	D	C			F		C	C			F	A
Approach Delay (s)		45.3			86.2			32.2			24.2	
Approach LOS		D			F			C			C	

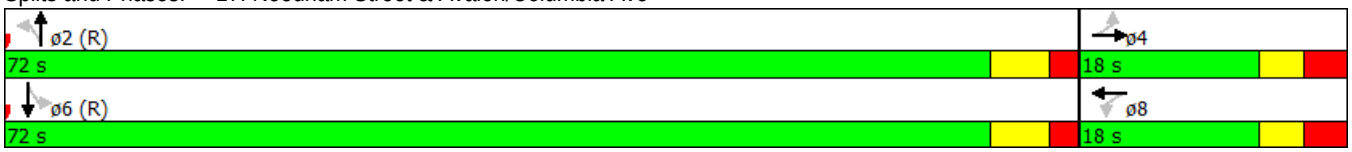
Intersection Summary			
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	23	0	24	0	27	1121	8	1075
Lane Group Flow (vph)	25	21	0	46	29	1230	8	1131
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.22	0.08		0.34	0.09	0.78	0.03	0.72
Control Delay	41.7	0.6		23.3	1.9	5.6	3.1	8.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	0.6		23.3	1.9	5.6	3.1	8.8
Queue Length 50th (ft)	14	0		5	2	194	1	250
Queue Length 95th (ft)	36	0		36	m3	m195	5	#627
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	202	341		212	320	1586	245	1570
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	0.12	0.06		0.22	0.09	0.78	0.03	0.72

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	0	19	24	0	18	27	1121	11	8	1075	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1615			1628		1925	1834		1925	1816	
Flt Permitted	0.80	1.00			0.81		0.18	1.00		0.14	1.00	
Satd. Flow (perm)	1520	1615			1361		371	1834		285	1816	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	25	0	21	26	0	20	29	1218	12	8	1120	11
RTOR Reduction (vph)	0	20	0	0	34	0	0	0	0	0	0	0
Lane Group Flow (vph)	25	1	0	0	12	0	29	1230	0	8	1131	0
Heavy Vehicles (%)	0%	0%	0%	6%	0%	8%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.0	5.0			5.0		73.0	73.0		73.0	73.0	
Effective Green, g (s)	5.0	5.0			5.0		73.0	73.0		73.0	73.0	
Actuated g/C Ratio	0.06	0.06			0.06		0.81	0.81		0.81	0.81	
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)	84	89			75		300	1487		231	1472	
v/s Ratio Prot		0.00						c0.67			0.62	
v/s Ratio Perm	c0.02				0.01		0.08			0.03		
v/c Ratio	0.30	0.01			0.16		0.10	0.83		0.03	0.77	
Uniform Delay, d1	40.8	40.2			40.5		1.7	4.9		1.7	4.3	
Progression Factor	1.00	1.00			1.00		0.61	0.50		1.00	1.00	
Incremental Delay, d2	0.7	0.0			0.4		0.2	1.8		0.3	3.9	
Delay (s)	41.5	40.2			40.9		1.3	4.3		1.9	8.2	
Level of Service	D	D			D		A	A		A	A	
Approach Delay (s)		40.9			40.9			4.2			8.1	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

H.3 2024 LONG-TERM BUILD OPERATIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	0	15	2	0	1	29	976	3	3	1135	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	0	15	2	0	1	29	976	3	3	1135	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.28	0.28	0.28	0.28	0.28		0.28					
vC, conflicting volume	2182	2184	1141	2192	2188	978	1147			979		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3975	3982	197	4009	3998	978	219			979		
tC, single (s)	7.1	6.5	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	93	0	100	100	92			100		
cM capacity (veh/h)	0	1	217	0	1	307	367			713		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	16	3	29	979	3	1147
Volume Left	1	2	29	0	3	0
Volume Right	15	1	0	3	0	12
cSH	6	1	367	1700	713	1700
Volume to Capacity	2.50	5.53	0.08	0.58	0.00	0.67
Queue Length 95th (ft)	78	Err	6	0	0	0
Control Delay (s)	1768.3	Err	15.6	0.0	10.1	0.0
Lane LOS	F	F	C		B	
Approach Delay (s)	1768.3	Err	0.4		0.0	
Approach LOS	F	F				

Intersection Summary				
Average Delay	27.0			
Intersection Capacity Utilization	70.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	14	2	6	950	1183	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	2	6	950	1183	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.22	0.22	0.22			
vC, conflicting volume	2154	1192	1202			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4467	106	149			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	99	98			
cM capacity (veh/h)	0	210	319			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	16	6	950	1202
Volume Left	14	6	0	0
Volume Right	2	0	0	19
cSH	0	319	1700	1700
Volume to Capacity	40.18	0.02	0.56	0.71
Queue Length 95th (ft)	Err	1	0	0
Control Delay (s)	Err	16.5	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	73.6		
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	22	5	0	6	40	933	4	1	1130	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	0	22	5	0	6	40	933	4	1	1130	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.25	0.25	0.25	0.25	0.25		0.25					
vC, conflicting volume	2174	2172	1152	2169	2192	935	1175			937		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4238	4230	87	4219	4313	935	179			937		
tC, single (s)	7.1	6.5	6.4	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.5	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	90	0	100	98	88			100		
cM capacity (veh/h)	0	0	226	0	0	325	347			739		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	40	11	40	937	1	1175
Volume Left	18	5	40	0	1	0
Volume Right	22	6	0	4	0	45
cSH	0	0	347	1700	739	1700
Volume to Capacity	81.10	30.07	0.12	0.55	0.00	0.69
Queue Length 95th (ft)	Err	Err	10	0	0	0
Control Delay (s)	Err	Err	16.7	0.0	9.9	0.0
Lane LOS	F	F	C		A	
Approach Delay (s)	Err	Err	0.7		0.0	
Approach LOS	F	F				

Intersection Summary				
Average Delay	231.7			
Intersection Capacity Utilization	72.2%	ICU Level of Service	C	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	139	121	149	105	154	162	1030	48	992
Lane Group Flow (vph)	0	288	166	114	241	171	1248	51	1162
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	25.0	25.0	11.0	25.0	25.0	11.0	65.0	54.0	54.0
Total Split (%)	27.8%	27.8%	12.2%	27.8%	27.8%	12.2%	72.2%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.44	0.29	0.83	0.58	1.12	1.08	0.68	1.24
Control Delay		254.3	14.0	78.3	35.4	127.4	69.5	50.4	138.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		254.3	14.0	78.3	35.4	127.4	69.5	50.4	138.0
Queue Length 50th (ft)		~225	36	62	112	~45	~800	24	~862
Queue Length 95th (ft)		#381	85	#160	190	#142	#1052	m34	#1108
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		200	571	138	414	153	1155	75	935
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.44	0.29	0.83	0.58	1.12	1.08	0.68	1.24

Intersection Summary

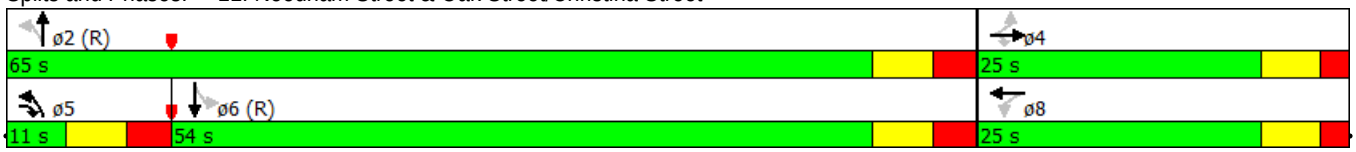
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	139	121	149	105	154	68	162	1030	156	48	992	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	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	0.98		1.00	0.98	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1768	1615	1770	1881		1678	1784		1626	1784	
Flt Permitted		0.52	1.00	0.35	1.00		0.07	1.00		0.09	1.00	
Satd. Flow (perm)		949	1615	656	1881		131	1784		146	1784	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	154	134	166	114	167	74	171	1084	164	51	1044	118
RTOR Reduction (vph)	0	0	57	0	17	0	0	6	0	0	4	0
Lane Group Flow (vph)	0	288	109	114	224	0	171	1242	0	51	1158	0
Heavy Vehicles (%)	7%	2%	0%	2%	4%	0%	4%	4%	7%	11%	5%	4%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Effective Green, g (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Actuated g/C Ratio		0.21	0.26	0.21	0.21		0.64	0.64		0.52	0.52	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		200	412	138	397		153	1149		76	931	
v/s Ratio Prot			0.01		0.12		0.05	c0.70			c0.65	
v/s Ratio Perm		c0.30	0.06	0.17			0.67			0.35		
v/c Ratio		1.44	0.27	0.83	0.56		1.12	1.08		0.67	1.24	
Uniform Delay, d1		35.5	26.8	33.9	31.8		24.5	16.0		15.8	21.5	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.89	0.95	
Incremental Delay, d2		224.0	0.1	30.2	1.1		107.8	51.3		26.7	115.7	
Delay (s)		259.5	26.9	64.1	32.9		132.4	67.3		40.8	136.1	
Level of Service		F	C	E	C		F	E		D	F	
Approach Delay (s)		174.5			42.9			75.1			132.1	
Approach LOS		F			D			E			F	

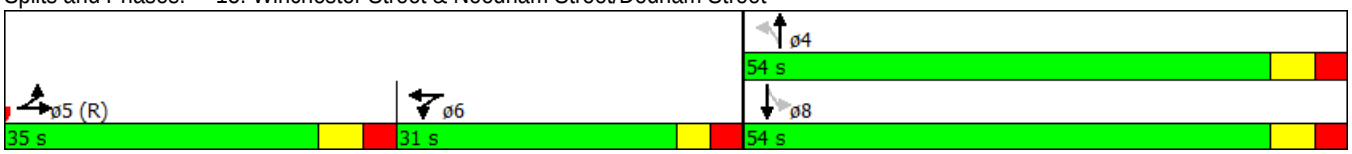
Intersection Summary			
HCM 2000 Control Delay	105.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	120.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	866	108	191	79	303	67	355	970
Lane Group Flow (vph)	1019	183	412	90	359	0	445	1021
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	35.0	35.0	31.0	54.0	54.0	54.0	54.0	
Total Split (%)	29.2%	29.2%	25.8%	45.0%	45.0%	45.0%	45.0%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	1.15	0.39	0.96	0.47	0.54		1.01	0.65
Control Delay	120.5	36.8	79.3	38.1	33.5		84.2	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	120.5	36.8	79.3	38.1	33.5		84.2	2.1
Queue Length 50th (ft)	~510	108	296	52	212		332	0
Queue Length 95th (ft)	#610	171	#497	100	288		#528	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	886	464	433	211	734		488	1568
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	1.15	0.39	0.95	0.43	0.49		0.91	0.65

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	866	108	48	17	191	171	79	303	13	67	355	970
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.95			0.94		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	3224	1644			1962		1805	1870			1839	1568
Flt Permitted	0.95	1.00			1.00		0.28	1.00			0.67	1.00
Satd. Flow (perm)	3224	1644			1962		540	1870			1248	1568
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.88	0.88	0.88	0.95	0.95	0.95
Adj. Flow (vph)	1019	127	56	18	208	186	90	344	15	71	374	1021
RTOR Reduction (vph)	0	12	0	0	25	0	0	1	0	0	0	0
Lane Group Flow (vph)	1019	171	0	0	387	0	90	358	0	0	445	1021
Heavy Vehicles (%)	5%	6%	8%	0%	2%	4%	0%	1%	0%	5%	2%	3%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	33.0	33.0			24.7		42.3	42.3			42.3	120.0
Effective Green, g (s)	33.0	33.0			24.7		42.3	42.3			42.3	120.0
Actuated g/C Ratio	0.28	0.28			0.21		0.35	0.35			0.35	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	886	452			403		190	659			439	1568
v/s Ratio Prot	c0.32	0.10			c0.20			0.19				
v/s Ratio Perm							0.17				c0.36	0.65
v/c Ratio	1.15	0.38			0.96		0.47	0.54			1.01	0.65
Uniform Delay, d1	43.5	35.2			47.2		30.2	31.1			38.9	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	80.6	2.4			34.5		0.7	0.5			46.4	2.1
Delay (s)	124.1	37.6			81.7		30.9	31.6			85.3	2.1
Level of Service	F	D			F		C	C			F	A
Approach Delay (s)		110.9			81.7			31.5			27.4	
Approach LOS		F			F			C			C	

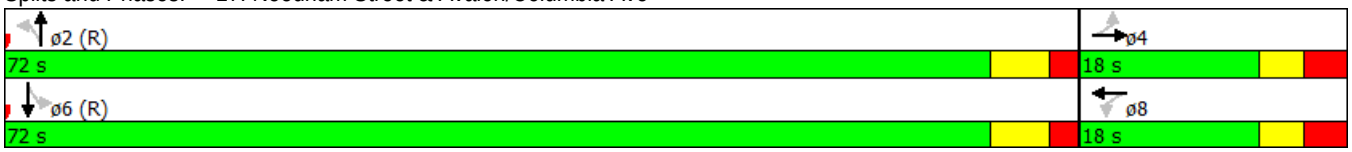
Intersection Summary			
HCM 2000 Control Delay	62.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	107.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	32	1	10	2	14	944	1	1169
Lane Group Flow (vph)	38	28	0	30	15	1010	1	1284
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.37	0.17		0.22	0.09	0.67	0.00	0.83
Control Delay	47.9	17.0		28.2	4.9	8.2	3.0	14.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	17.0		28.2	4.9	8.2	3.0	14.2
Queue Length 50th (ft)	21	1		9	2	370	0	415
Queue Length 95th (ft)	47	23		29	m3	m350	1	#1001
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	162	239		213	170	1500	400	1538
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	0.23	0.12		0.14	0.09	0.67	0.00	0.83

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 28 (31%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	1	23	10	2	11	14	944	6	1	1169	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1570	1625			1743		1719	1748		1925	1793	
Flt Permitted	0.74	1.00			0.85		0.11	1.00		0.23	1.00	
Satd. Flow (perm)	1219	1625			1508		199	1748		467	1793	
Peak-hour factor, PHF	0.85	0.85	0.85	0.79	0.79	0.79	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	38	1	27	13	3	14	15	1004	6	1	1271	13
RTOR Reduction (vph)	0	25	0	0	13	0	0	0	0	0	0	0
Lane Group Flow (vph)	38	3	0	0	17	0	15	1010	0	1	1284	0
Heavy Vehicles (%)	15%	0%	0%	0%	0%	0%	12%	5%	0%	0%	2%	29%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.6	5.6			5.6		72.4	72.4		72.4	72.4	
Effective Green, g (s)	5.6	5.6			5.6		72.4	72.4		72.4	72.4	
Actuated g/C Ratio	0.06	0.06			0.06		0.80	0.80		0.80	0.80	
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)	75	101			93		160	1406		375	1442	
v/s Ratio Prot		0.00						0.58			c0.72	
v/s Ratio Perm	c0.03				0.01		0.08			0.00		
v/c Ratio	0.51	0.03			0.18		0.09	0.72		0.00	0.89	
Uniform Delay, d1	40.9	39.6			40.0		1.9	4.1		1.7	6.1	
Progression Factor	1.00	1.00			1.00		1.38	1.42		1.00	1.00	
Incremental Delay, d2	2.0	0.0			0.3		0.3	0.8		0.0	8.6	
Delay (s)	42.8	39.7			40.4		2.9	6.6		1.7	14.7	
Level of Service	D	D			D		A	A		A	B	
Approach Delay (s)		41.5			40.4			6.5			14.7	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	0	77	0	0	7	45	1178	2	2	1021	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	0	77	0	0	7	45	1178	2	2	1021	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.64	0.64	0.64	0.64	0.64		0.64					
vC, conflicting volume	2304	2298	1024	2371	2301	1179	1028			1180		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2764	2757	752	2871	2761	1179	757			1180		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.8			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.8			2.2		
p0 queue free %	0	100	71	100	100	97	89			100		
cM capacity (veh/h)	7	11	263	4	11	234	396			599		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	91	7	45	1180	2	1028
Volume Left	14	0	45	0	2	0
Volume Right	77	7	0	2	0	7
cSH	39	234	396	1700	599	1700
Volume to Capacity	2.35	0.03	0.11	0.69	0.00	0.60
Queue Length 95th (ft)	249	2	10	0	0	0
Control Delay (s)	839.5	20.8	15.3	0.0	11.0	0.0
Lane LOS	F	C	C		B	
Approach Delay (s)	839.5	20.8	0.6		0.0	
Approach LOS	F	C				

Intersection Summary				
Average Delay	32.8			
Intersection Capacity Utilization	81.0%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	51	10	9	1193	994	44
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	51	10	9	1193	994	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.54	0.54	0.54			
vC, conflicting volume	2227	1016	1038			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2834	612	652			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	96	98			
cM capacity (veh/h)	11	271	514			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	61	9	1193	1038
Volume Left	51	9	0	0
Volume Right	10	0	0	44
cSH	12	514	1700	1700
Volume to Capacity	4.89	0.02	0.70	0.61
Queue Length 95th (ft)	Err	1	0	0
Control Delay (s)	Err	12.1	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	265.1		
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	0	54	11	0	3	56	1145	4	3	939	54
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	0	54	11	0	3	56	1145	4	3	939	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.59	0.59	0.59	0.59	0.59		0.59					
vC, conflicting volume	2232	2233	966	2258	2258	1147	993			1149		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2738	2740	597	2782	2782	1147	642			1149		
tC, single (s)	7.2	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	0	100	82	0	100	99	89			100		
cM capacity (veh/h)	6	11	292	5	10	245	525			615		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	108	14	56	1149	3	993
Volume Left	54	11	56	0	3	0
Volume Right	54	3	0	4	0	54
cSH	13	7	525	1700	615	1700
Volume to Capacity	8.50	2.03	0.11	0.68	0.00	0.58
Queue Length 95th (ft)	Err	69	9	0	0	0
Control Delay (s)	Err	1490.9	12.7	0.0	10.9	0.0
Lane LOS	F	F	B		B	
Approach Delay (s)	Err	1490.9	0.6		0.0	
Approach LOS	F	F				

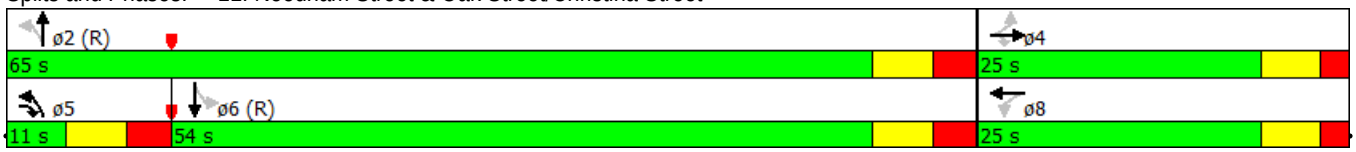
Intersection Summary				
Average Delay	474.2			
Intersection Capacity Utilization	73.4%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	168	144	256	111	131	153	982	35	939
Lane Group Flow (vph)	0	362	298	117	198	158	1126	36	1111
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	25.0	25.0	11.0	25.0	25.0	11.0	65.0	54.0	54.0
Total Split (%)	27.8%	27.8%	12.2%	27.8%	27.8%	12.2%	72.2%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.47	0.51	1.41	0.47	1.01	0.94	0.43	1.16
Control Delay		260.1	20.1	273.0	31.9	92.7	31.0	25.7	102.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		260.1	20.1	273.0	31.9	92.7	31.0	25.7	102.3
Queue Length 50th (ft)		~285	90	~90	88	~41	511	13	~768
Queue Length 95th (ft)		#428	156	#197	154	#118	#871	m17	#1009
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		247	580	83	418	157	1198	84	961
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.47	0.51	1.41	0.47	1.01	0.94	0.43	1.16

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 33 (37%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	144	256	111	131	57	153	982	111	35	939	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	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	0.98		1.00	0.98	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1840	1599	1787	1900		1728	1853		1805	1829	
Flt Permitted		0.62	1.00	0.21	1.00		0.07	1.00		0.09	1.00	
Satd. Flow (perm)		1174	1599	396	1900		135	1853		162	1829	
Peak-hour factor, PHF	0.86	0.86	0.86	0.95	0.95	0.95	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	195	167	298	117	138	60	158	1012	114	36	958	153
RTOR Reduction (vph)	0	0	71	0	17	0	0	5	0	0	6	0
Lane Group Flow (vph)	0	362	227	117	181	0	158	1121	0	36	1105	0
Heavy Vehicles (%)	1%	0%	1%	1%	0%	6%	1%	1%	1%	0%	2%	0%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Effective Green, g (s)		19.0	23.0	19.0	19.0		58.0	58.0		47.0	47.0	
Actuated g/C Ratio		0.21	0.26	0.21	0.21		0.64	0.64		0.52	0.52	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		247	408	83	401		157	1194		84	955	
v/s Ratio Prot			0.02		0.10		0.04	c0.61			c0.60	
v/s Ratio Perm		c0.31	0.12	0.30			0.60			0.22		
v/c Ratio		1.47	0.56	1.41	0.45		1.01	0.94		0.43	1.16	
Uniform Delay, d1		35.5	29.1	35.5	30.9		24.5	14.4		13.2	21.5	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.75	0.93	
Incremental Delay, d2		230.4	0.9	241.3	0.3		73.5	15.0		12.4	80.4	
Delay (s)		265.9	30.0	276.8	31.2		98.0	29.4		22.4	100.5	
Level of Service		F	C	F	C		F	C		C	F	
Approach Delay (s)		159.4			122.5			37.9			98.1	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	89.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	1043	177	127	32	334	148	331	838
Lane Group Flow (vph)	1122	268	257	37	397	0	499	873
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	34.0	34.0	21.0	45.0	45.0	45.0	45.0	
Total Split (%)	34.0%	34.0%	21.0%	45.0%	45.0%	45.0%	45.0%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	1.24	0.55	0.84	0.18	0.54		1.22	0.55
Control Delay	151.1	34.0	61.1	23.5	27.1		149.7	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	151.1	34.0	61.1	23.5	27.1		149.7	1.4
Queue Length 50th (ft)	~460	135	141	16	195		~401	0
Queue Length 95th (ft)	#588	218	#262	39	277		#599	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	904	485	329	209	735		409	1583
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	1.24	0.55	0.78	0.18	0.54		1.22	0.55

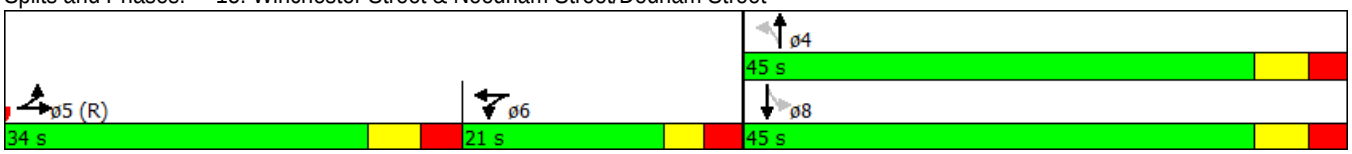
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated

~ 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.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1043	177	73	16	127	104	32	334	11	148	331	838
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.96			0.94		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.98	1.00
Satd. Flow (prot)	3351	1744			2019		1805	1873			1853	1583
Flt Permitted	0.95	1.00			1.00		0.28	1.00			0.56	1.00
Satd. Flow (perm)	3351	1744			2019		533	1873			1045	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.96	0.96	0.96	0.87	0.87	0.87	0.96	0.96	0.96
Adj. Flow (vph)	1122	190	78	17	132	108	37	384	13	154	345	873
RTOR Reduction (vph)	0	15	0	0	27	0	0	1	0	0	0	0
Lane Group Flow (vph)	1122	253	0	0	230	0	37	396	0	0	499	873
Heavy Vehicles (%)	1%	1%	0%	4%	0%	0%	0%	1%	0%	1%	1%	2%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	27.0	27.0			13.8		39.2	39.2			39.2	100.0
Effective Green, g (s)	27.0	27.0			13.8		39.2	39.2			39.2	100.0
Actuated g/C Ratio	0.27	0.27			0.14		0.39	0.39			0.39	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	904	470			278		208	734			409	1583
v/s Ratio Prot	c0.33	0.15			c0.11			0.21				
v/s Ratio Perm							0.07				c0.48	0.55
v/c Ratio	1.24	0.54			0.83		0.18	0.54			1.22	0.55
Uniform Delay, d1	36.5	31.2			41.9		19.9	23.4			30.4	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	117.9	4.4			17.3		0.1	0.4			119.3	1.4
Delay (s)	154.4	35.6			59.2		20.0	23.8			149.7	1.4
Level of Service	F	D			E		C	C			F	A
Approach Delay (s)		131.5			59.2			23.5			55.3	
Approach LOS		F			E			C			E	

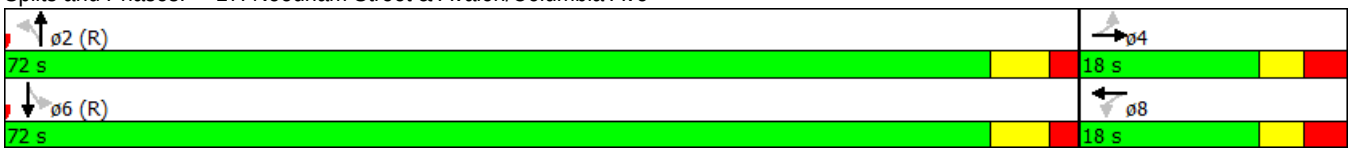
Intersection Summary			
HCM 2000 Control Delay	82.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	12	0	11	1	23	1214	5	1010
Lane Group Flow (vph)	20	28	0	55	24	1284	5	1122
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.19	0.11		0.41	0.08	0.86	0.03	0.76
Control Delay	41.2	0.8		29.7	4.0	14.3	3.2	10.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	0.8		29.7	4.0	14.3	3.2	10.7
Queue Length 50th (ft)	11	0		13	3	381	0	253
Queue Length 95th (ft)	21	0		20	m5	m579	4	#687
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	182	344		208	299	1500	176	1470
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	0.11	0.08		0.26	0.08	0.86	0.03	0.76

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	0	17	11	1	17	23	1214	6	5	1010	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.92		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1615			1539		1925	1817		1925	1781	
Flt Permitted	0.72	1.00			0.86		0.18	1.00		0.11	1.00	
Satd. Flow (perm)	1370	1615			1353		363	1817		213	1781	
Peak-hour factor, PHF	0.61	0.61	0.61	0.53	0.53	0.53	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	20	0	28	21	2	32	24	1278	6	5	1110	12
RTOR Reduction (vph)	0	26	0	0	30	0	0	0	0	0	0	0
Lane Group Flow (vph)	20	2	0	0	25	0	24	1284	0	5	1122	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	20%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	6.1	6.1			6.1		71.9	71.9		71.9	71.9	
Effective Green, g (s)	6.1	6.1			6.1		71.9	71.9		71.9	71.9	
Actuated g/C Ratio	0.07	0.07			0.07		0.80	0.80		0.80	0.80	
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)	92	109			91		289	1451		170	1422	
v/s Ratio Prot		0.00						c0.71			0.63	
v/s Ratio Perm	0.01				c0.02		0.07			0.02		
v/c Ratio	0.22	0.02			0.28		0.08	0.88		0.03	0.79	
Uniform Delay, d1	39.7	39.2			39.9		1.9	6.2		1.9	4.9	
Progression Factor	1.00	1.00			1.00		1.28	1.32		1.00	1.00	
Incremental Delay, d2	0.4	0.0			0.6		0.3	4.4		0.3	4.5	
Delay (s)	40.1	39.2			40.5		2.8	12.6		2.2	9.4	
Level of Service	D	D			D		A	B		A	A	
Approach Delay (s)		39.6			40.5			12.4			9.4	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	0	59	1	0	4	58	1197	5	3	1167	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	0	59	1	0	4	58	1197	5	3	1167	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1041	
pX, platoon unblocked	0.28	0.28	0.28	0.28	0.28		0.28					
vC, conflicting volume	2494	2496	1172	2548	2498	1200	1176			1202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5083	5086	317	5274	5093	1200	333			1202		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	71	0	100	98	83			99		
cM capacity (veh/h)	0	0	202	0	0	228	344			588		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	67	5	58	1202	3	1176
Volume Left	8	1	58	0	3	0
Volume Right	59	4	0	5	0	9
cSH	0	0	344	1700	588	1700
Volume to Capacity	149.42	36.38	0.17	0.71	0.01	0.69
Queue Length 95th (ft)	Err	Err	15	0	0	0
Control Delay (s)	Err	Err	17.6	0.0	11.2	0.0
Lane LOS	F	F	C		B	
Approach Delay (s)	Err	Err	0.8		0.0	
Approach LOS	F	F				

Intersection Summary				
Average Delay	287.1			
Intersection Capacity Utilization	74.8%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	54	12	13	1172	1131	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	12	13	1172	1131	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					362	
pX, platoon unblocked	0.21	0.21	0.21			
vC, conflicting volume	2356	1158	1185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	5492	0	31			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	95	96			
cM capacity (veh/h)	0	234	342			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	66	13	1172	1185
Volume Left	54	13	0	0
Volume Right	12	0	0	54
cSH	0	342	1700	1700
Volume to Capacity	825.08	0.04	0.69	0.70
Queue Length 95th (ft)	Err	3	0	0
Control Delay (s)	Err	15.9	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	0.2		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	271.0		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	0	70	19	0	20	71	1128	8	9	1060	66
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	63	0	70	19	0	20	71	1128	8	9	1060	66
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											735	
pX, platoon unblocked	0.24	0.24	0.24	0.24	0.24		0.24					
vC, conflicting volume	2401	2389	1093	2422	2418	1132	1126			1136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5198	5149	0	5284	5268	1132	0			1136		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	74	0	100	92	82			99		
cM capacity (veh/h)	0	0	266	0	0	250	399			622		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	133	39	71	1136	9	1126
Volume Left	63	19	71	0	9	0
Volume Right	70	20	0	8	0	66
cSH	0	0	399	1700	622	1700
Volume to Capacity	1782.65	783.11	0.18	0.67	0.01	0.66
Queue Length 95th (ft)	Err	Err	16	0	1	0
Control Delay (s)	Err	Err	16.0	0.0	10.9	0.0
Lane LOS	F	F	C		B	
Approach Delay (s)	Err	Err	0.9		0.1	
Approach LOS	F	F				

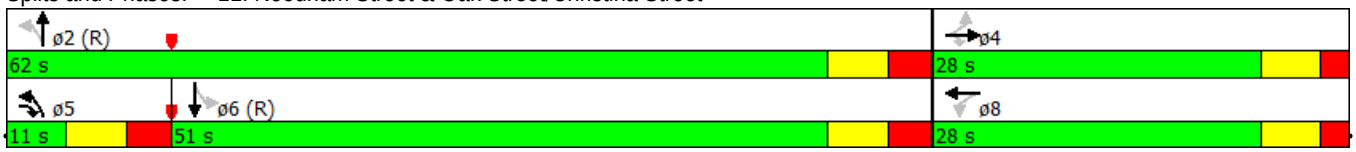
Intersection Summary				
Average Delay	684.6			
Intersection Capacity Utilization	76.2%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	261	90	176	139	124	167	1107	56	927
Lane Group Flow (vph)	0	408	205	160	232	169	1184	59	1199
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	6.0	6.0	4.0	6.0	6.0	4.0	10.0	10.0	10.0
Minimum Split (s)	12.0	12.0	11.0	25.0	25.0	11.0	29.0	28.0	28.0
Total Split (s)	28.0	28.0	11.0	28.0	28.0	11.0	62.0	51.0	51.0
Total Split (%)	31.1%	31.1%	12.2%	31.1%	31.1%	12.2%	68.9%	56.7%	56.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio		1.70	0.34	1.80	0.48	1.07	1.04	0.70	1.33
Control Delay		358.6	14.8	425.7	28.5	110.6	55.8	57.0	177.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		358.6	14.8	425.7	28.5	110.6	55.8	57.0	177.0
Queue Length 50th (ft)		~344	51	~138	96	~44	~732	16	~892
Queue Length 95th (ft)		#491	98	#250	159	#136	#981	m#48	#1133
Internal Link Dist (ft)		252			423		353		704
Turn Bay Length (ft)			100	200		80		200	
Base Capacity (vph)		240	611	89	488	158	1143	84	903
Starvation Cap Reductn		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.70	0.34	1.80	0.48	1.07	1.04	0.70	1.33

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 29 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 11: Needham Street & Oak Street/Christina Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	261	90	176	139	124	77	167	1107	65	56	927	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	11	12	12	12	12	12
Total Lost time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1818	1583	1805	1898		1745	1866		1805	1829	
Flt Permitted		0.52	1.00	0.19	1.00		0.08	1.00		0.09	1.00	
Satd. Flow (perm)		985	1583	364	1898		144	1866		173	1829	
Peak-hour factor, PHF	0.86	0.86	0.86	0.87	0.87	0.87	0.99	0.99	0.99	0.95	0.95	0.95
Adj. Flow (vph)	303	105	205	160	143	89	169	1118	66	59	976	223
RTOR Reduction (vph)	0	0	54	0	25	0	0	2	0	0	9	0
Lane Group Flow (vph)	0	408	151	160	207	0	169	1182	0	59	1190	0
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		22.0	26.0	22.0	22.0		55.0	55.0		44.0	44.0	
Effective Green, g (s)		22.0	26.0	22.0	22.0		55.0	55.0		44.0	44.0	
Actuated g/C Ratio		0.24	0.29	0.24	0.24		0.61	0.61		0.49	0.49	
Clearance Time (s)		6.0	7.0	6.0	6.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		240	457	88	463		159	1140		84	894	
v/s Ratio Prot			0.01		0.11		0.05	c0.63			c0.65	
v/s Ratio Perm		0.41	0.08	c0.44			0.60			0.34		
v/c Ratio		1.70	0.33	1.82	0.45		1.06	1.04		0.70	1.33	
Uniform Delay, d1		34.0	25.2	34.0	28.8		23.0	17.5		17.9	23.0	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		0.95	0.95	
Incremental Delay, d2		332.3	0.2	409.1	0.3		89.1	36.6		32.3	155.1	
Delay (s)		366.3	25.3	443.1	29.1		112.1	54.1		49.3	176.9	
Level of Service		F	C	F	C		F	D		D	F	
Approach Delay (s)		252.2			198.1			61.3			170.9	
Approach LOS		F			F			E			F	

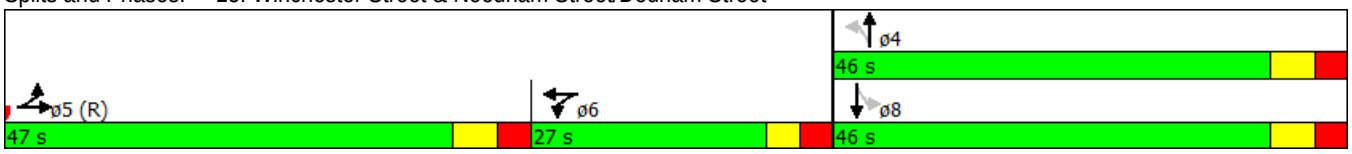
Intersection Summary			
HCM 2000 Control Delay	146.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	123.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	976	137	173	52	228	136	208	926
Lane Group Flow (vph)	1097	276	376	55	252	0	378	1018
Turn Type	Split	NA	NA	Perm	NA	Perm	NA	Free
Protected Phases	5	5	6		4		8	
Permitted Phases				4		8		Free
Detector Phase	5	5	6	4	4	8	8	
Switch Phase								
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	17.0	17.0	12.0	13.0	13.0	13.0	13.0	
Total Split (s)	47.0	47.0	27.0	46.0	46.0	46.0	46.0	
Total Split (%)	39.2%	39.2%	22.5%	38.3%	38.3%	38.3%	38.3%	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	7.0	7.0	6.0	7.0	7.0		7.0	
Lead/Lag	Lead	Lead	Lag					
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	None	Min	Min	Min	Min	
v/c Ratio	0.96	0.46	0.99	0.28	0.42		0.98	0.63
Control Delay	58.7	30.0	90.6	34.7	34.3		83.2	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	58.7	30.0	90.6	34.7	34.3		83.2	1.9
Queue Length 50th (ft)	431	146	271	31	151		287	0
Queue Length 95th (ft)	#568	225	#475	70	228		#486	0
Internal Link Dist (ft)		402	391		303		202	
Turn Bay Length (ft)	250			100				
Base Capacity (vph)	1139	600	378	203	608		392	1615
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	0.96	0.46	0.99	0.27	0.41		0.96	0.63

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 5:EBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Winchester Street & Needham Street/Dedham Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	976	137	109	15	173	165	52	228	11	136	208	926
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	16	12	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0			6.0		7.0	7.0			7.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	1.00			1.00	1.00
Frt	1.00	0.93			0.94		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.98	1.00
Satd. Flow (prot)	3351	1696			2013		1805	1869			1863	1615
Flt Permitted	0.95	1.00			1.00		0.33	1.00			0.64	1.00
Satd. Flow (perm)	3351	1696			2013		627	1869			1209	1615
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	1097	154	122	16	184	176	55	240	12	149	229	1018
RTOR Reduction (vph)	0	24	0	0	26	0	0	1	0	0	0	0
Lane Group Flow (vph)	1097	252	0	0	350	0	55	251	0	0	378	1018
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	Free
Protected Phases	5	5		6	6			4			8	
Permitted Phases							4			8		Free
Actuated Green, G (s)	40.8	40.8			21.0		38.2	38.2			38.2	120.0
Effective Green, g (s)	40.8	40.8			21.0		38.2	38.2			38.2	120.0
Actuated g/C Ratio	0.34	0.34			0.18		0.32	0.32			0.32	1.00
Clearance Time (s)	7.0	7.0			6.0		7.0	7.0			7.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	1139	576			352		199	594			384	1615
v/s Ratio Prot	c0.33	0.15			c0.17			0.13				
v/s Ratio Perm							0.09				c0.31	0.63
v/c Ratio	0.96	0.44			0.99		0.28	0.42			0.98	0.63
Uniform Delay, d1	38.9	30.7			49.4		30.6	32.2			40.6	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	19.2	2.4			45.9		0.3	0.2			41.4	1.9
Delay (s)	58.0	33.1			95.3		30.8	32.4			82.0	1.9
Level of Service	E	C			F		C	C			F	A
Approach Delay (s)		53.0			95.3			32.1			23.6	
Approach LOS		D			F			C			C	

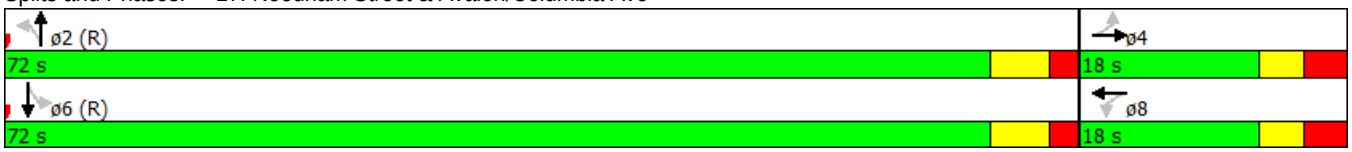
Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	23	0	24	0	27	1181	8	1142
Lane Group Flow (vph)	29	24	0	49	30	1324	8	1201
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	10.0	24.0	24.0	20.0	20.0	23.0	23.0
Total Split (s)	18.0	18.0	18.0	18.0	72.0	72.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
v/c Ratio	0.25	0.10		0.36	0.11	0.84	0.05	0.77
Control Delay	42.9	0.8		24.4	2.3	8.1	3.6	10.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	42.9	0.8		24.4	2.3	8.1	3.6	10.6
Queue Length 50th (ft)	16	0		7	2	225	1	303
Queue Length 95th (ft)	35	0		36	m4	m263	5	#886
Internal Link Dist (ft)		71		182		282		601
Turn Bay Length (ft)					50		50	
Base Capacity (vph)	194	326		212	265	1583	165	1567
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	0.15	0.07		0.23	0.11	0.84	0.05	0.77

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
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.

Splits and Phases: 17: Needham Street & Avalon/Columbia Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	0	19	24	0	18	27	1181	11	8	1142	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	14	11	12	14	11	12
Total Lost time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1615			1629		1925	1834		1925	1816	
Flt Permitted	0.77	1.00			0.81		0.15	1.00		0.09	1.00	
Satd. Flow (perm)	1462	1615			1357		307	1834		191	1816	
Peak-hour factor, PHF	0.78	0.78	0.78	0.86	0.86	0.86	0.90	0.90	0.90	0.96	0.96	0.96
Adj. Flow (vph)	29	0	24	28	0	21	30	1312	12	8	1190	11
RTOR Reduction (vph)	0	23	0	0	34	0	0	0	0	0	0	0
Lane Group Flow (vph)	29	1	0	0	15	0	30	1324	0	8	1201	0
Heavy Vehicles (%)	0%	0%	0%	6%	0%	8%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.2	5.2			5.2		72.8	72.8		72.8	72.8	
Effective Green, g (s)	5.2	5.2			5.2		72.8	72.8		72.8	72.8	
Actuated g/C Ratio	0.06	0.06			0.06		0.81	0.81		0.81	0.81	
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)	84	93			78		248	1483		154	1468	
v/s Ratio Prot		0.00						c0.72			0.66	
v/s Ratio Perm	c0.02				0.01		0.10			0.04		
v/c Ratio	0.35	0.01			0.19		0.12	0.89		0.05	0.82	
Uniform Delay, d1	40.8	40.0			40.4		1.8	5.9		1.7	4.9	
Progression Factor	1.00	1.00			1.00		0.66	0.55		1.00	1.00	
Incremental Delay, d2	0.9	0.0			0.4		0.4	3.8		0.6	5.2	
Delay (s)	41.7	40.0			40.8		1.6	7.1		2.4	10.0	
Level of Service	D	D			D		A	A		A	B	
Approach Delay (s)		40.9			40.8			6.9			10.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			