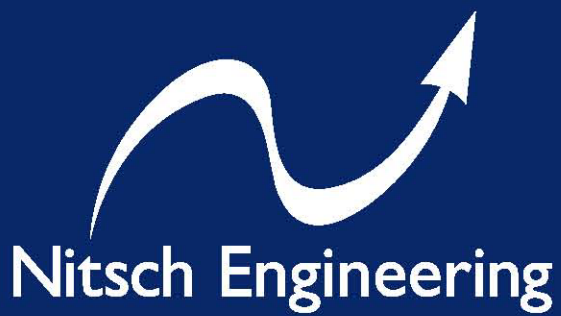




Hillside Elementary School Needham, MA

Transportation Feasibility Study Appendix

October 2015

Prepared for:

Dore & Whittier Architects, Inc.
260 Merrimac Street, Building 7
Newburyport, MA 01950

Submitted by:

Nitsch Engineering
2 Center Plaza, Suite 430
Boston, MA 02108

Nitsch Project #10828.2

CONTENTS

Section Number	DESCRIPTION
A-1	Traffic Count Data
A-2	Weekday Seasonal Adjustment Factors
A-3	Crash Data
A-4	Hillside Elementary School Options
A-5	Traffic Signal Warrant Analysis
A-6	Capacity Analysis

Section A-1

Traffic Count Data

Central Avenue
north of Cefalo Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 A Class
Site Code: 10828
Date Start: 09-Sep-15

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/09/1														
5	0	14	1	2	0	0	0	0	0	0	0	0	0	17
01:00	1	9	0	0	0	0	0	0	0	0	0	0	0	10
02:00	0	3	0	0	1	0	0	0	0	0	0	0	0	4
03:00	0	5	0	0	1	0	0	0	0	0	0	0	0	6
04:00	0	8	1	0	1	0	0	0	0	0	0	0	0	10
05:00	0	10	3	0	1	0	0	0	0	0	0	0	0	14
06:00	2	98	16	1	2	2	0	0	1	0	0	0	0	122
07:00	2	188	23	2	2	2	0	0	0	0	0	0	0	219
08:00	9	268	38	4	11	4	0	2	2	0	0	0	0	338
09:00	3	204	46	0	10	4	0	3	0	0	0	0	0	270
10:00	3	259	34	0	11	2	0	1	1	0	0	0	0	311
11:00	2	309	59	3	10	3	0	1	3	0	0	0	0	390
12 PM	0	355	54	0	6	4	0	1	1	0	0	0	0	421
13:00	1	373	47	2	8	5	0	2	3	0	0	0	0	441
14:00	2	463	73	3	17	2	0	2	0	0	0	0	0	562
15:00	6	601	80	7	8	4	0	4	0	0	0	0	0	710
16:00	4	702	79	0	8	1	0	2	0	1	0	0	0	797
17:00	6	778	46	0	5	1	0	1	0	0	0	0	0	837
18:00	3	724	39	0	1	2	0	0	0	0	0	0	0	769
19:00	0	357	30	0	2	0	0	1	0	0	0	0	0	390
20:00	2	242	21	1	2	0	0	0	0	0	0	0	0	268
21:00	0	215	17	0	1	0	0	0	0	0	0	0	0	233
22:00	2	122	8	0	0	0	0	0	0	0	0	0	0	132
23:00	1	67	2	0	0	0	0	0	0	0	0	0	0	70
Total	49	6374	717	25	108	36	0	20	11	1	0	0	0	7341
Percent	0.7%	86.8%	9.8%	0.3%	1.5%	0.5%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	11:00	11:00	08:00	08:00	08:00		09:00	11:00					11:00
Vol.	9	309	59	4	11	4		3	3					390
PM Peak	15:00	17:00	15:00	15:00	14:00	13:00		15:00	13:00	16:00				17:00
Vol.	6	778	80	7	17	5		4	3	1				837
Total		6374	717	25	108	36	0	20	11	1	0	0	0	7341

Central Avenue
north of Cefalo Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 A Class
Site Code: 10828
Date Start: 09-Sep-15

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/09/1														
5	0	8	2	0	0	0	0	0	0	0	0	0	0	10
01:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
02:00	0	2	2	0	0	0	0	0	0	0	0	0	0	4
03:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
04:00	1	27	9	1	0	0	0	0	0	0	0	0	0	38
05:00	2	150	23	1	1	0	0	0	0	0	0	0	0	177
06:00	2	568	92	2	13	1	0	0	1	1	0	0	0	680
07:00	1	861	61	3	9	3	0	2	2	0	0	0	0	942
08:00	1	782	63	3	12	1	0	1	1	0	0	0	0	864
09:00	5	641	75	0	14	0	0	1	4	0	0	0	0	740
10:00	1	436	66	0	10	3	0	3	2	0	0	0	0	521
11:00	1	380	47	3	11	1	0	0	0	0	0	0	0	443
12 PM	0	366	62	2	10	3	0	1	3	0	0	0	0	447
13:00	2	322	40	2	12	3	0	0	1	0	0	0	0	382
14:00	1	317	49	6	8	1	2	1	0	0	0	0	0	385
15:00	2	363	50	1	8	1	0	2	0	0	0	0	0	427
16:00	3	362	47	0	3	3	0	1	0	0	0	0	0	419
17:00	5	352	19	0	4	0	0	1	0	0	0	0	0	381
18:00	3	270	19	0	1	0	0	0	0	0	0	0	0	293
19:00	1	193	13	0	0	0	0	0	0	0	0	0	0	207
20:00	0	149	5	0	1	1	0	1	1	0	0	0	0	158
21:00	1	76	8	0	0	0	0	0	0	0	0	0	0	85
22:00	0	48	5	0	0	0	0	0	0	0	0	0	0	53
23:00	0	24	1	0	0	0	0	0	0	0	0	0	0	25
Total	32	6708	759	24	117	21	2	14	15	1	0	0	0	7693
Percent	0.4%	87.2%	9.9%	0.3%	1.5%	0.3%	0.0%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	07:00	06:00	07:00	09:00	07:00		10:00	09:00	06:00				07:00
Vol.	5	861	92	3	14	3		3	4	1				942
PM Peak	17:00	12:00	12:00	14:00	13:00	12:00	14:00	15:00	12:00					12:00
Vol.	5	366	62	6	12	3	2	2	3					447
Total		6708	759	24	117	21	2	14	15	1	0	0	0	7693

Central Avenue
north of Cefalo Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 A Speed
Site Code: 10828
Date Start: 09-Sep-15

SB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
09/09/																
15	0	0	0	0	6	7	3	1	0	0	0	0	0	17	41	37
01:00	0	0	0	2	4	4	0	0	0	0	0	0	0	10	37	33
02:00	0	0	0	1	3	0	0	0	0	0	0	0	0	4	33	31
03:00	0	0	0	0	3	2	1	0	0	0	0	0	0	6	39	35
04:00	0	0	0	2	5	2	0	1	0	0	0	0	0	10	37	34
05:00	2	0	0	1	4	5	2	0	0	0	0	0	0	14	38	31
06:00	0	0	0	13	67	37	5	0	0	0	0	0	0	122	37	33
07:00	2	3	17	26	101	63	6	0	0	0	0	0	1	219	36	32
08:00	1	0	12	76	162	80	7	0	0	0	0	0	0	338	36	32
09:00	1	2	9	52	159	43	4	0	0	0	0	0	0	270	34	31
10:00	1	0	9	60	174	59	7	0	0	1	0	0	0	311	35	32
11:00	0	1	14	83	193	95	4	0	0	0	0	0	0	390	36	32
12 PM	0	1	12	88	213	97	9	1	0	0	0	0	0	421	36	32
13:00	0	0	11	90	242	95	3	0	0	0	0	0	0	441	35	32
14:00	0	1	31	128	278	118	5	1	0	0	0	0	0	562	35	31
15:00	30	27	37	138	338	135	5	0	0	0	0	0	0	710	35	30
16:00	2	5	36	142	442	165	4	0	0	0	0	1	0	797	35	32
17:00	33	9	34	167	448	138	7	1	0	0	0	0	0	837	34	30
18:00	108	26	22	131	362	117	3	0	0	0	0	0	0	769	34	28
19:00	1	2	1	61	242	79	4	0	0	0	0	0	0	390	35	32
20:00	1	0	7	44	115	92	8	1	0	0	0	0	0	268	37	33
21:00	0	0	2	23	141	60	5	2	0	0	0	0	0	233	36	33
22:00	1	1	0	10	62	51	5	2	0	0	0	0	0	132	37	34
23:00	0	0	0	6	31	31	1	0	1	0	0	0	0	70	37	34
Total	183	78	254	1344	3795	1575	98	10	1	1	0	1	1	7341		
%	2.5%	1.1%	3.5%	18.3%	51.7%	21.5%	1.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	05:00	07:00	07:00	08:00	08:00	08:00	08:00	00:00					07:00	08:00		
Vol.	2	3	17	76	162	80	7	1					1	338		
Midda y Peak		11:00	14:00	14:00	14:00	14:00	12:00	12:00						14:00		
Vol.		1	31	128	278	118	9	1						562		
PM Peak	18:00	15:00	15:00	17:00	17:00	16:00	20:00	21:00	23:00			16:00		17:00		
Vol.	108	27	37	167	448	165	8	2	1			1		837		
% ile				15th Percentile :		26 MPH										
				50th Percentile :		31 MPH										
				85th Percentile :		35 MPH										
				95th Percentile :		38 MPH										

Stats 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 5370
 Percent in Pace : 73.2%
 Number of Vehicles > 35 MPH : 1372
 Percent of Vehicles > 35 MPH : 18.7%
 Mean Speed(Average) : 31 MPH

Central Avenue
north of Cefalo Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 A Speed
Site Code: 10828
Date Start: 09-Sep-15

NB	Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
09/09/																	
15	0	0	0	5	3	1	1	0	0	0	0	0	0	0	10	36	31
01:00	0	0	0	3	2	1	1	0	0	0	0	0	0	0	7	38	32
02:00	0	0	0	0	1	2	1	0	0	0	0	0	0	0	4	41	37
03:00	0	0	0	0	1	1	3	0	0	0	0	0	0	0	5	42	39
04:00	0	0	0	3	15	16	4	0	0	0	0	0	0	0	38	38	35
05:00	0	1	1	5	76	88	6	0	0	0	0	0	0	0	177	37	35
06:00	0	0	1	64	440	164	11	0	0	0	0	0	0	0	680	36	33
07:00	1	2	14	158	604	157	6	0	0	0	0	0	0	0	942	34	32
08:00	1	0	3	144	565	146	5	0	0	0	0	0	0	0	864	34	32
09:00	1	5	14	180	446	92	2	0	0	0	0	0	0	0	740	33	31
10:00	3	3	13	122	292	85	3	0	0	0	0	0	0	0	521	34	31
11:00	0	1	7	71	268	84	12	0	0	0	0	0	0	0	443	35	32
12 PM	0	0	5	96	270	73	3	0	0	0	0	0	0	0	447	34	32
13:00	0	1	7	60	223	85	6	0	0	0	0	0	0	0	382	35	32
14:00	1	0	3	76	220	75	9	1	0	0	0	0	0	0	385	35	32
15:00	1	1	31	111	227	51	5	0	0	0	0	0	0	0	427	33	31
16:00	0	1	12	78	253	72	3	0	0	0	0	0	0	0	419	34	32
17:00	3	1	9	65	219	76	8	0	0	0	0	0	0	0	381	35	32
18:00	2	7	15	55	154	57	3	0	0	0	0	0	0	0	293	35	31
19:00	0	0	9	55	117	24	1	1	0	0	0	0	0	0	207	33	31
20:00	2	0	7	28	89	31	1	0	0	0	0	0	0	0	158	35	31
21:00	0	0	1	12	50	20	2	0	0	0	0	0	0	0	85	36	33
22:00	0	0	1	8	30	12	2	0	0	0	0	0	0	0	53	36	33
23:00	0	0	0	6	13	5	1	0	0	0	0	0	0	0	25	36	32
Total	15	23	153	1405	4578	1418	99	2	0	0	0	0	0	0	7693		
%	0.2%	0.3%	2.0%	18.3%	59.5%	18.4%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	09:00	07:00	09:00	07:00	06:00	06:00								07:00		
Vol.	1	5	14	180	604	164	11								942		
Midda y Peak	14:00	11:00	11:00	12:00	12:00	13:00	11:00	14:00							12:00		
Vol.	1	1	7	96	270	85	12	1							447		
PM Peak	17:00	18:00	15:00	15:00	16:00	17:00	17:00	19:00							15:00		
Vol.	3	7	31	111	253	76	8	1							427		
% ile				15th Percentile :		27 MPH											
				50th Percentile :		31 MPH											
				85th Percentile :		35 MPH											
				95th Percentile :		37 MPH											

Stats 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 5996
 Percent in Pace : 77.9%
 Number of Vehicles > 35 MPH : 1235
 Percent of Vehicles > 35 MPH : 16.1%
 Mean Speed(Average) : 32 MPH

Central Avenue
north of Cefalo Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 A Volume
Site Code: 10828
Date Start: 09-Sep-15

Start		SB		NB		Combin		ed		09-Sep-15	
Time	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.			Wed	
12:00	7	106		3	113	10	219				
12:15	1	118		4	111	5	229				
12:30	5	84		3	124	8	208				
12:45	4	113	421	0	99	4	212	27	868		
01:00	5	114		4	112	9	226				
01:15	3	90		0	94	3	184				
01:30	2	110		2	102	4	212				
01:45	0	127	441	1	74	1	201	17	823		
02:00	1	117		0	90	1	207				
02:15	2	144		1	80	3	224				
02:30	1	153		3	101	4	254				
02:45	0	148	562	0	114	0	262	8	947		
03:00	1	167		0	99	1	266				
03:15	2	143		2	103	4	246				
03:30	1	191		1	133	2	324				
03:45	2	209	710	2	92	4	301	11	1137		
04:00	1	181		3	122	4	303				
04:15	2	200		4	99	6	299				
04:30	5	225		8	96	13	321				
04:45	2	191	797	23	102	25	293	48	1216		
05:00	2	233		14	100	16	333				
05:15	4	203		38	99	42	302				
05:30	2	200		56	90	58	290				
05:45	6	201	837	69	92	75	293	191	1218		
06:00	13	215		104	61	117	276				
06:15	24	208		155	76	179	284				
06:30	36	204		204	80	240	284				
06:45	49	142	769	217	76	266	218	802	1062		
07:00	50	111		242	65	292	176				
07:15	52	106		258	54	310	160				
07:30	57	91		236	47	293	138				
07:45	60	82	390	206	41	266	123	1161	597		
08:00	82	79		247	52	329	131				
08:15	103	74		213	33	316	107				
08:30	68	71		193	39	261	110				
08:45	85	44	268	211	34	296	78	1202	426		
09:00	63	70		218	24	281	94				
09:15	60	61		212	17	272	78				
09:30	75	58		150	24	225	82				
09:45	72	44	233	160	20	232	64	1010	318		
10:00	66	35		144	24	210	59				
10:15	76	38		126	10	202	48				
10:30	89	30		128	13	217	43				
10:45	80	29	132	123	6	203	35	832	185		
11:00	68	21		109	12	177	33				
11:15	111	22		112	8	223	30				
11:30	102	15		109	5	211	20				
11:45	109	12	70	113	0	222	12	833	95		
Total	1711	5630		4431	3262	6142	8892				
Percent	27.9%	63.3%		72.1%	36.7%						
Day Total		7341			7693		15034				
Peak	11:00	-	04:30	-	06:45	-	03:15	-	07:30	-	-
Vol.	390	-	852	-	953	-	450	-	1204	-	-
P.H.F.	0.878	-	0.914	-	0.923	-	0.846	-	0.915	-	-

West Street
between Birch St and Glen Gary Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 B Class
Site Code: 10828
Date Start: 09-Sep-15

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/09/1														
5	0	8	1	0	0	0	0	0	0	0	0	0	0	9
01:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
04:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
05:00	4	13	2	0	0	2	0	0	0	0	0	0	0	21
06:00	0	55	6	3	4	0	0	0	1	0	0	0	0	69
07:00	0	128	18	0	6	1	0	0	1	0	0	0	0	154
08:00	7	166	40	1	8	1	0	0	0	0	0	0	0	223
09:00	1	120	40	1	7	1	1	0	0	0	0	0	0	171
10:00	1	140	28	0	11	2	0	2	0	0	0	0	0	184
11:00	0	156	41	0	6	1	0	0	0	0	0	0	0	204
12 PM	0	182	35	4	4	0	0	0	0	0	0	0	0	225
13:00	1	155	34	3	4	1	0	1	0	0	0	0	0	199
14:00	5	184	37	1	7	0	0	0	0	0	0	0	0	234
15:00	1	171	47	2	6	1	0	0	0	0	0	0	0	228
16:00	1	176	33	2	5	5	0	0	0	0	0	0	0	222
17:00	2	201	24	0	4	0	0	0	0	0	0	0	0	231
18:00	2	199	29	0	2	2	0	0	0	0	0	0	0	234
19:00	4	185	24	0	0	1	0	0	0	0	0	0	0	214
20:00	3	141	22	0	3	0	0	0	0	0	0	0	0	169
21:00	0	95	9	1	0	0	0	0	0	0	0	0	0	105
22:00	0	51	5	0	0	0	0	0	0	0	0	0	0	56
23:00	0	25	5	0	0	0	0	0	0	0	0	0	0	30
Total	32	2565	481	18	78	18	1	3	2	0	0	0	0	3198
Percent	1.0%	80.2%	15.0%	0.6%	2.4%	0.6%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	11:00	06:00	10:00	05:00	09:00	10:00	06:00					08:00
Vol.	7	166	41	3	11	2	1	2	1					223
PM Peak	14:00	17:00	15:00	12:00	14:00	16:00		13:00						14:00
Vol.	5	201	47	4	7	5		1						234
Total		2565	481	18	78	18	1	3	2	0	0	0	0	3198

West Street
between Birch St and Glen Gary Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 B Class
Site Code: 10828
Date Start: 09-Sep-15

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/09/1														
5	0	9	0	0	0	0	0	0	0	0	0	0	0	9
01:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
04:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
05:00	1	28	7	0	3	0	0	0	0	0	0	0	0	39
06:00	1	118	22	3	9	0	0	0	0	0	0	0	0	153
07:00	1	221	49	2	6	2	0	1	1	0	0	0	0	283
08:00	6	226	58	1	9	2	0	1	0	0	0	0	0	303
09:00	3	176	50	1	8	0	0	0	1	0	0	0	0	239
10:00	2	164	40	0	8	2	0	0	0	0	0	0	0	216
11:00	1	160	39	2	6	1	0	1	1	0	0	0	0	211
12 PM	0	177	37	0	10	0	0	0	0	0	0	0	0	224
13:00	1	145	34	1	7	1	0	0	0	0	0	0	0	189
14:00	4	170	53	0	10	2	0	0	0	0	0	0	0	239
15:00	1	227	40	3	7	0	0	1	0	0	0	0	0	279
16:00	2	220	46	1	7	0	0	1	0	0	0	0	0	277
17:00	0	205	45	0	5	1	0	0	0	0	0	0	0	256
18:00	2	232	44	0	5	0	0	1	0	0	0	0	0	284
19:00	1	132	32	0	5	0	0	0	0	0	0	0	0	170
20:00	0	83	13	0	2	0	0	0	0	0	0	0	0	98
21:00	0	45	9	0	0	1	0	0	0	0	0	0	0	55
22:00	1	27	2	0	1	0	0	0	0	0	0	0	0	31
23:00	0	19	0	0	0	0	0	0	0	0	0	0	0	19
Total	27	2796	621	14	108	12	0	6	3	0	0	0	0	3587
Percent	0.8%	77.9%	17.3%	0.4%	3.0%	0.3%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	08:00	06:00	06:00	07:00		07:00	07:00					08:00
Vol.	6	226	58	3	9	2		1	1					303
PM Peak	14:00	18:00	14:00	15:00	12:00	14:00		15:00						18:00
Vol.	4	232	53	3	10	2		1						284
Total		2796	621	14	108	12	0	6	3	0	0	0	0	3587

West Street
between Birch St and Glen Gary Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 B Speed
Site Code: 10828
Date Start: 09-Sep-15

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
09/09/																
15	0	0	0	0	3	2	2	2	0	0	0	0	0	9	45	39
01:00	0	1	0	0	3	4	1	0	0	0	0	0	0	9	38	34
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	1	0	0	0	0	0	1	48	47
04:00	0	0	0	0	1	3	1	1	0	0	0	0	0	6	44	39
05:00	1	0	5	2	2	3	6	0	2	0	0	0	0	21	43	33
06:00	2	1	1	5	12	25	17	5	1	0	0	0	0	69	42	36
07:00	2	10	7	18	33	52	26	6	0	0	0	0	0	154	40	34
08:00	14	39	39	56	53	17	4	1	0	0	0	0	0	223	32	25
09:00	6	2	1	11	42	68	34	7	0	0	0	0	0	171	41	35
10:00	5	8	2	16	42	67	37	7	0	0	0	0	0	184	41	35
11:00	2	16	1	6	62	77	33	7	0	0	0	0	0	204	40	34
12 PM	3	6	5	13	44	88	56	9	1	0	0	0	0	225	41	36
13:00	3	12	2	8	41	61	58	12	1	1	0	0	0	199	42	36
14:00	21	14	22	20	51	64	39	3	0	0	0	0	0	234	39	31
15:00	5	24	4	13	47	81	45	8	1	0	0	0	0	228	41	34
16:00	9	9	12	22	48	71	40	9	2	0	0	0	0	222	41	34
17:00	3	6	1	15	57	87	47	15	0	0	0	0	0	231	41	36
18:00	8	9	14	36	72	63	27	5	0	0	0	0	0	234	38	32
19:00	30	29	31	51	47	19	7	0	0	0	0	0	0	214	33	25
20:00	11	13	8	15	41	50	24	5	0	1	0	1	0	169	40	32
21:00	3	5	3	15	43	28	7	1	0	0	0	0	0	105	37	32
22:00	0	0	2	1	14	24	11	1	3	0	0	0	0	56	41	37
23:00	2	1	0	0	9	10	7	1	0	0	0	0	0	30	41	34
Total	130	205	160	323	767	964	529	106	11	2	0	1	0	3198		
%	4.1%	6.4%	5.0%	10.1%	24.0%	30.1%	16.5%	3.3%	0.3%	0.1%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	08:00	09:00	09:00	09:00	05:00					08:00		
Vol.	14	39	39	56	53	68	34	7	2					223		
Midda y Peak	14:00	11:00	14:00	14:00	11:00	12:00	13:00	13:00	12:00	13:00				14:00		
Vol.	21	16	22	20	62	88	58	12	1	1				234		
PM Peak	19:00	19:00	19:00	19:00	18:00	17:00	17:00	17:00	22:00	20:00		20:00		18:00		
Vol.	30	29	31	51	72	87	47	15	3	1		1		234		
% ile				15th Percentile :		23 MPH										
				50th Percentile :		34 MPH										
				85th Percentile :		40 MPH										
				95th Percentile :		43 MPH										

Stats 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 1731
 Percent in Pace : 54.1%
 Number of Vehicles > 35 MPH : 1420
 Percent of Vehicles > 35 MPH : 44.4%
 Mean Speed(Average) : 33 MPH

West Street
between Birch St and Glen Gary Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 B Speed
Site Code: 10828
Date Start: 09-Sep-15

EB	Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
		14	19	24	29	34	39	44	49	54	59	64	69	9999			
09/09/																	
15	0	0	0	0	2	6	1	0	0	0	0	0	0	0	9	38	36
01:00	0	0	0	1	1	3	1	0	0	0	0	0	0	0	6	39	35
02:00	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	37	35
03:00	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	47	45
04:00	0	0	0	0	1	1	1	0	0	0	0	0	0	0	3	41	37
05:00	4	1	0	0	12	13	6	3	0	0	0	0	0	0	39	41	33
06:00	2	0	0	3	29	74	39	5	1	0	0	0	0	0	153	41	37
07:00	11	13	16	28	72	102	39	2	0	0	0	0	0	0	283	38	33
08:00	28	40	63	62	91	16	3	0	0	0	0	0	0	0	303	32	25
09:00	5	1	6	17	74	108	24	3	1	0	0	0	0	0	239	38	34
10:00	7	9	3	10	57	95	29	5	1	0	0	0	0	0	216	39	34
11:00	3	7	6	10	65	90	30	0	0	0	0	0	0	0	211	38	34
12 PM	5	4	5	15	59	96	36	4	0	0	0	0	0	0	224	39	35
13:00	1	5	4	7	70	75	26	0	1	0	0	0	0	0	189	38	35
14:00	10	22	23	28	68	64	21	3	0	0	0	0	0	0	239	38	30
15:00	5	6	9	24	100	101	33	0	1	0	0	0	0	0	279	38	34
16:00	7	6	9	38	101	93	22	1	0	0	0	0	0	0	277	38	33
17:00	12	1	1	19	114	83	22	4	0	0	0	0	0	0	256	38	33
18:00	27	40	21	44	91	50	9	1	1	0	0	0	0	0	284	35	27
19:00	11	8	13	44	68	24	2	0	0	0	0	0	0	0	170	34	28
20:00	3	2	6	10	39	31	7	0	0	0	0	0	0	0	98	37	32
21:00	1	5	0	7	20	20	2	0	0	0	0	0	0	0	55	37	32
22:00	0	1	2	3	14	8	3	0	0	0	0	0	0	0	31	37	33
23:00	0	0	1	4	6	7	0	1	0	0	0	0	0	0	19	37	33
Total	142	171	188	374	1155	1161	357	33	6	0	0	0	0	0	3587		
%	4.0%	4.8%	5.2%	10.4%	32.2%	32.4%	10.0%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	08:00	09:00	06:00	06:00	06:00						08:00		
Vol.	28	40	63	62	91	108	39	5	1						303		
Midda y Peak	14:00	14:00	14:00	14:00	13:00	12:00	12:00	12:00	13:00						14:00		
Vol.	10	22	23	28	70	96	36	4	1						239		
PM Peak	18:00	18:00	18:00	18:00	17:00	15:00	15:00	17:00	15:00						18:00		
Vol.	27	40	21	44	114	101	33	4	1						284		
% ile				15th Percentile :		24 MPH											
				50th Percentile :		32 MPH											
				85th Percentile :		38 MPH											
				95th Percentile :		42 MPH											

Stats
10 MPH Pace Speed : 30-39 MPH
Number in Pace : 2316
Percent in Pace : 64.6%
Number of Vehicles > 35 MPH : 1325
Percent of Vehicles > 35 MPH : 36.9%
Mean Speed(Average) : 32 MPH

West Street
between Birch St and Glen Gary Road
City, State: Needham, MA
Client: Nitsch/ N. Havan



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

154641 B Volume
Site Code: 10828
Date Start: 09-Sep-15

Start		WB		EB		Combin		09-Sep-15	
Time	A.M.		P.M.	A.M.	P.M.	A.M.	P.M.	Wed	
12:00	2		63	4	70	6	133		
12:15	5		56	0	41	5	97		
12:30	0		48	2	66	2	114		
12:45	2	9	58	3	47	5	105	449	
01:00	4		61	4	57	8	118		
01:15	3		55	0	42	3	97		
01:30	1		38	1	46	2	84		
01:45	1	9	45	1	44	2	89	388	
02:00	0		53	2	54	2	107		
02:15	0		60	0	57	0	117		
02:30	0		55	0	58	0	113		
02:45	0	0	66	0	70	0	136	473	
03:00	0		77	0	72	0	149		
03:15	0		48	0	69	0	117		
03:30	1		47	1	64	2	111		
03:45	0	1	56	1	74	1	130	507	
04:00	1		50	0	70	1	120		
04:15	1		55	0	56	1	111		
04:30	3		58	1	69	4	127		
04:45	1	6	59	2	82	3	141	499	
05:00	2		60	4	68	6	128		
05:15	3		57	6	66	9	123		
05:30	6		61	14	51	20	112		
05:45	10	21	53	15	39	25	124	487	
06:00	8		53	26	67	34	120		
06:15	14		51	34	69	48	120		
06:30	12		58	38	74	50	132		
06:45	35	69	72	55	153	74	146	518	
07:00	27		58	50	66	77	124		
07:15	32		45	71	46	103	91		
07:30	37		42	74	28	111	70		
07:45	58	154	69	88	283	30	99	384	
08:00	47		68	90	31	137	99		
08:15	78		38	79	28	157	66		
08:30	55		34	65	21	120	55		
08:45	43	223	29	69	303	18	47	267	
09:00	50		37	70	8	120	45		
09:15	54		32	47	20	101	52		
09:30	34		20	59	14	93	34		
09:45	33	171	16	63	239	13	29	160	
10:00	45		16	54	9	99	25		
10:15	57		18	55	13	112	31		
10:30	35		7	58	7	93	14		
10:45	47	184	15	49	216	2	17	87	
11:00	54		11	36	7	90	18		
11:15	62		10	53	4	115	14		
11:30	35		4	57	6	92	10		
11:45	53	204	5	65	211	2	7	49	
Total	1051		2147	1466	2121	2517	4268		
Percent	41.8%		50.3%	58.2%	49.7%				
Day Total		3198		3587		6785			
Peak	07:45	-	02:15	-	07:30	-	04:30	-	07:45
Vol.	238	-	258	-	331	-	285	-	560
P.H.F.	0.763	-	0.838	-	0.919	-	0.869	-	0.892



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: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 A
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	4	1	0	3	9	1	0	1	56	48	0	7	4	1	0	135
06:15 AM	0	8	1	0	3	3	0	0	2	80	72	0	12	3	0	0	184
06:30 AM	0	24	0	0	4	4	2	0	1	106	101	0	4	6	1	0	253
06:45 AM	1	30	2	0	11	19	5	0	0	119	104	0	10	6	4	0	311
Total	1	66	4	0	21	35	8	0	4	361	325	0	33	19	6	0	883
07:00 AM	2	33	3	0	9	18	6	0	2	147	87	0	9	13	9	0	338
07:15 AM	2	28	5	0	7	24	3	0	5	170	94	0	8	22	4	0	372
07:30 AM	0	41	5	0	11	29	6	0	3	150	89	0	9	24	6	0	373
07:45 AM	0	34	6	0	14	46	10	0	6	140	63	0	12	31	13	0	375
Total	4	136	19	0	41	117	25	0	16	607	333	0	38	90	32	0	1458
Grand Total	5	202	23	0	62	152	33	0	20	968	658	0	71	109	38	0	2341
Apprch %	2.2	87.8	10	0	25.1	61.5	13.4	0	1.2	58.8	40	0	32.6	50	17.4	0	
Total %	0.2	8.6	1	0	2.6	6.5	1.4	0	0.9	41.3	28.1	0	3	4.7	1.6	0	
Cars	4	190	19	0	62	145	29	0	18	938	651	0	70	108	38	0	2272
% Cars	80	94.1	82.6	0	100	95.4	87.9	0	90	96.9	98.9	0	98.6	99.1	100	0	97.1
Heavy Vehicles	1	12	4	0	0	7	4	0	2	30	7	0	1	1	0	0	69
% Heavy Vehicles	20	5.9	17.4	0	0	4.6	12.1	0	10	3.1	1.1	0	1.4	0.9	0	0	2.9

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	2	33	3	0	38	9	18	6	0	33	2	147	87	0	236	9	13	9	0	31	338
07:15 AM	2	28	5	0	35	7	24	3	0	34	5	170	94	0	269	8	22	4	0	34	372
07:30 AM	0	41	5	0	46	11	29	6	0	46	3	150	89	0	242	9	24	6	0	39	373
07:45 AM	0	34	6	0	40	14	46	10	0	70	6	140	63	0	209	12	31	13	0	56	375
Total Volume	4	136	19	0	159	41	117	25	0	183	16	607	333	0	956	38	90	32	0	160	1458
% App. Total	2.5	85.5	11.9	0		22.4	63.9	13.7	0		1.7	63.5	34.8	0		23.8	56.2	20	0		
PHF	.500	.829	.792	.000	.864	.732	.636	.625	.000	.654	.667	.893	.886	.000	.888	.792	.726	.615	.000	.714	.972
Cars	3	130	15	0	148	41	113	21	0	175	14	589	330	0	933	37	90	32	0	159	1415
% Cars	75.0	95.6	78.9	0	93.1	100	96.6	84.0	0	95.6	87.5	97.0	99.1	0	97.6	97.4	100	100	0	99.4	97.1
Heavy Vehicles	1	6	4	0	11	0	4	4	0	8	2	18	3	0	23	1	0	0	0	1	43
% Heavy Vehicles	25.0	4.4	21.1	0	6.9	0	3.4	16.0	0	4.4	12.5	3.0	0.9	0	2.4	2.6	0	0	0	0.6	2.9



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

Groups Printed- Cars

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 A
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	4	1	0	3	9	1	0	1	55	48	0	7	4	1	0	134
06:15 AM	0	6	1	0	3	2	0	0	2	77	72	0	12	3	0	0	178
06:30 AM	0	22	0	0	4	3	2	0	1	105	99	0	4	6	1	0	247
06:45 AM	1	28	2	0	11	18	5	0	0	112	102	0	10	5	4	0	298
Total	1	60	4	0	21	32	8	0	4	349	321	0	33	18	6	0	857
07:00 AM	2	31	2	0	9	17	5	0	1	140	86	0	9	13	9	0	324
07:15 AM	1	25	4	0	7	23	3	0	4	166	93	0	8	22	4	0	360
07:30 AM	0	40	4	0	11	29	5	0	3	145	88	0	9	24	6	0	364
07:45 AM	0	34	5	0	14	44	8	0	6	138	63	0	11	31	13	0	367
Total	3	130	15	0	41	113	21	0	14	589	330	0	37	90	32	0	1415
Grand Total	4	190	19	0	62	145	29	0	18	938	651	0	70	108	38	0	2272
Apprch %	1.9	89.2	8.9	0	26.3	61.4	12.3	0	1.1	58.4	40.5	0	32.4	50	17.6	0	
Total %	0.2	8.4	0.8	0	2.7	6.4	1.3	0	0.8	41.3	28.7	0	3.1	4.8	1.7	0	

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	2	31	2	0	35	9	17	5	0	31	1	140	86	0	227	9	13	9	0	31	324
07:15 AM	1	25	4	0	30	7	23	3	0	33	4	166	93	0	263	8	22	4	0	34	360
07:30 AM	0	40	4	0	44	11	29	5	0	45	3	145	88	0	236	9	24	6	0	39	364
07:45 AM	0	34	5	0	39	14	44	8	0	66	6	138	63	0	207	11	31	13	0	55	367
Total Volume	3	130	15	0	148	41	113	21	0	175	14	589	330	0	933	37	90	32	0	159	1415
% App. Total	2	87.8	10.1	0		23.4	64.6	12	0		1.5	63.1	35.4	0		23.3	56.6	20.1	0		
PHF	.375	.813	.750	.000	.841	.732	.642	.656	.000	.663	.583	.887	.887	.000	.887	.841	.726	.615	.000	.723	.964



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

Groups Printed- Heavy Vehicles

File Name : 154641 A

Site Code : 10828

Start Date : 9/9/2015

Page No : 1

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
06:15 AM	0	2	0	0	0	1	0	0	0	3	0	0	0	0	0	0	6
06:30 AM	0	2	0	0	0	1	0	0	0	1	2	0	0	0	0	0	6
06:45 AM	0	2	0	0	0	1	0	0	0	7	2	0	0	1	0	0	13
Total	0	6	0	0	0	3	0	0	0	12	4	0	0	1	0	0	26
07:00 AM	0	2	1	0	0	1	1	0	1	7	1	0	0	0	0	0	14
07:15 AM	1	3	1	0	0	1	0	0	1	4	1	0	0	0	0	0	12
07:30 AM	0	1	1	0	0	0	1	0	0	5	1	0	0	0	0	0	9
07:45 AM	0	0	1	0	0	2	2	0	0	2	0	0	1	0	0	0	8
Total	1	6	4	0	0	4	4	0	2	18	3	0	1	0	0	0	43
Grand Total	1	12	4	0	0	7	4	0	2	30	7	0	1	1	0	0	69
Apprch %	5.9	70.6	23.5	0	0	63.6	36.4	0	5.1	76.9	17.9	0	50	50	0	0	
Total %	1.4	17.4	5.8	0	0	10.1	5.8	0	2.9	43.5	10.1	0	1.4	1.4	0	0	

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45 AM																					
06:45 AM	0	2	0	0	2	0	1	0	0	1	0	7	2	0	9	0	1	0	0	1	13
07:00 AM	0	2	1	0	3	0	1	1	0	2	1	7	1	0	9	0	0	0	0	0	14
07:15 AM	1	3	1	0	5	0	1	0	0	1	1	4	1	0	6	0	0	0	0	0	12
07:30 AM	0	1	1	0	2	0	0	1	0	1	0	5	1	0	6	0	0	0	0	0	9
Total Volume	1	8	3	0	12	0	3	2	0	5	2	23	5	0	30	0	1	0	0	1	48
% App. Total	8.3	66.7	25	0		0	60	40	0		6.7	76.7	16.7	0		0	100	0	0		
PHF	.250	.667	.750	.000	.600	.000	.750	.500	.000	.625	.500	.821	.625	.000	.833	.000	.250	.000	.000	.250	.857



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

Groups Printed- Peds and Bikes

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 A
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Start Time	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
	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	
06:00 AM	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
06:15 AM	0	0	0	1	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	5
06:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	2	1	0	0	6
06:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Total	0	0	0	1	0	0	1	1	3	1	0	3	1	0	0	1	2	1	0	0	15
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0	1	0	2	2	10
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2	0	2	0	2	2	12
Grand Total	0	0	0	1	0	0	1	1	3	2	0	4	1	2	2	1	4	1	2	2	27
Apprch %	0	0	0	100	0	0	14.3	14.3	42.9	28.6	0	44.4	11.1	22.2	22.2	10	40	10	20	20	
Total %	0	0	0	3.7	0	0	3.7	3.7	11.1	7.4	0	14.8	3.7	7.4	7.4	3.7	14.8	3.7	7.4	7.4	

	Central Avenue From North						Hunnewell Street From East						Central Avenue From South						Hunnewell 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 06:00 AM to 07:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 06:00 AM																									
06:00 AM	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
06:15 AM	0	0	0	1	0	1	0	0	0	1	1	2	0	2	0	0	0	2	0	0	0	0	0	0	5
06:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	1	2	1	0	0	4	6
06:45 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	2
Total Volume	0	0	0	1	0	1	0	1	1	3	1	6	0	3	1	0	0	4	1	2	1	0	0	4	15
% App. Total	0	0	0	100	0		0	16.7	16.7	50	16.7		0	75	25	0	0		25	50	25	0	0		
PHF	.000	.000	.000	.250	.000	.250	.000	.250	.250	.750	.250	.750	.000	.375	.250	.000	.000	.500	.250	.250	.250	.000	.000	.250	.625



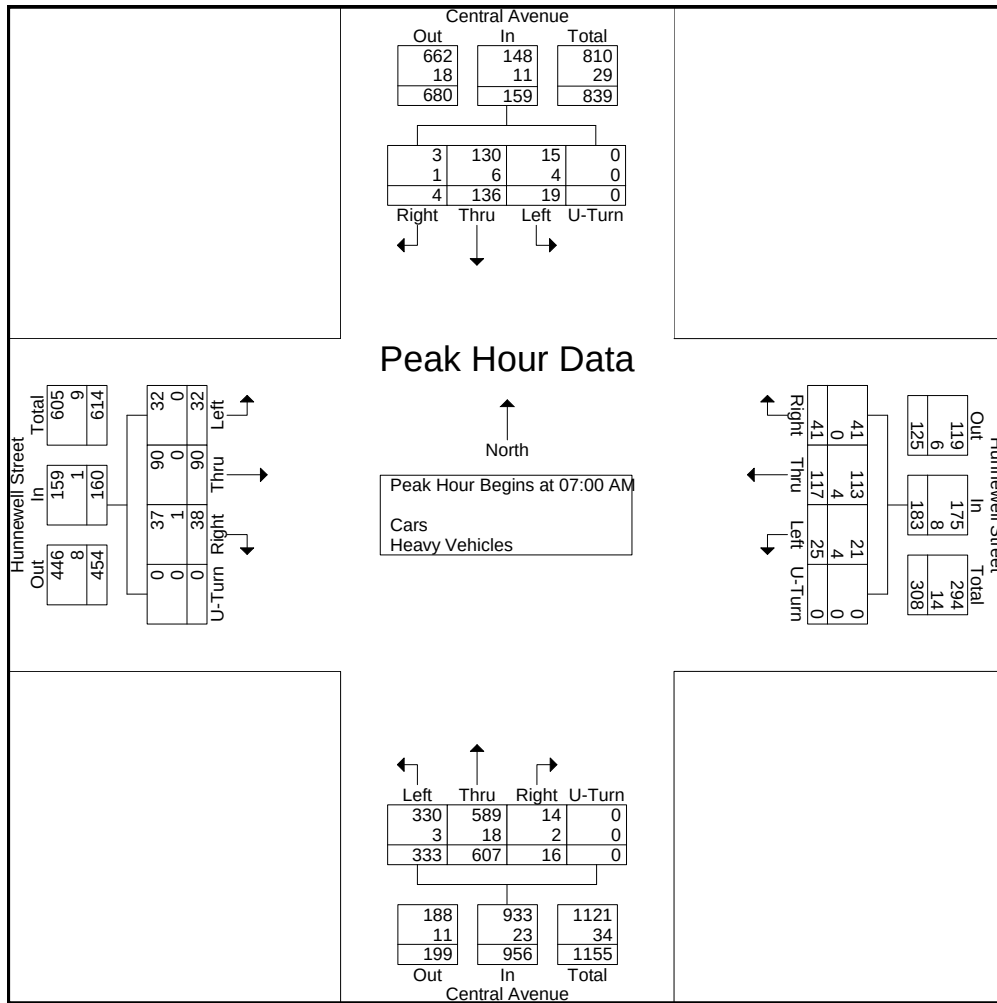
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 A
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell 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 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	2	33	3	0	38	9	18	6	0	33	2	147	87	0	236	9	13	9	0	31	338
07:15 AM	2	28	5	0	35	7	24	3	0	34	5	170	94	0	269	8	22	4	0	34	372
07:30 AM	0	41	5	0	46	11	29	6	0	46	3	150	89	0	242	9	24	6	0	39	373
07:45 AM	0	34	6	0	40	14	46	10	0	70	6	140	63	0	209	12	31	13	0	56	375
Total Volume	4	136	19	0	159	41	117	25	0	183	16	607	333	0	956	38	90	32	0	160	1458
% App. Total	2.5	85.5	11.9	0		22.4	63.9	13.7	0		1.7	63.5	34.8	0		23.8	56.2	20	0		
PHF	.500	.829	.792	.000	.864	.732	.636	.625	.000	.654	.667	.893	.886	.000	.888	.792	.726	.615	.000	.714	.972
Cars	3	130	15	0	148	41	113	21	0	175	14	589	330	0	933	37	90	32	0	159	1415
% Cars	75.0	95.6	78.9	0	93.1	100	96.6	84.0	0	95.6	87.5	97.0	99.1	0	97.6	97.4	100	100	0	99.4	97.1
Heavy Vehicles	1	6	4	0	11	0	4	4	0	8	2	18	3	0	23	1	0	0	0	1	43
% Heavy Vehicles	25.0	4.4	21.1	0	6.9	0	3.4	16.0	0	4.4	12.5	3.0	0.9	0	2.4	2.6	0	0	0	0.6	2.9





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: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 AA
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	2	65	6	0	9	18	11	0	2	65	32	0	28	14	4	0	256
01:45 PM	3	84	5	0	6	9	8	0	3	59	21	0	26	17	2	0	243
Total	5	149	11	0	15	27	19	0	5	124	53	0	54	31	6	0	499
02:00 PM	2	76	3	0	4	11	2	0	6	59	29	0	30	32	2	0	256
02:15 PM	8	86	7	0	7	13	10	0	5	53	19	0	43	24	4	0	279
02:30 PM	13	85	4	0	9	28	5	0	7	71	28	0	49	28	0	0	327
02:45 PM	3	76	15	0	8	20	7	0	9	69	31	0	44	32	12	0	326
Total	26	323	29	0	28	72	24	0	27	252	107	0	166	116	18	0	1188
03:00 PM	3	95	11	0	5	20	12	0	5	79	28	0	40	37	8	0	343
03:15 PM	4	67	8	0	6	24	6	0	6	58	25	0	56	34	5	0	299
Grand Total	38	634	59	0	54	143	61	0	43	513	213	0	316	218	37	0	2329
Apprch %	5.2	86.7	8.1	0	20.9	55.4	23.6	0	5.6	66.7	27.7	0	55.3	38.2	6.5	0	
Total %	1.6	27.2	2.5	0	2.3	6.1	2.6	0	1.8	22	9.1	0	13.6	9.4	1.6	0	
Cars	37	607	54	0	50	138	59	0	41	487	204	0	308	214	37	0	2236
% Cars	97.4	95.7	91.5	0	92.6	96.5	96.7	0	95.3	94.9	95.8	0	97.5	98.2	100	0	96
Heavy Vehicles	1	27	5	0	4	5	2	0	2	26	9	0	8	4	0	0	93
% Heavy Vehicles	2.6	4.3	8.5	0	7.4	3.5	3.3	0	4.7	5.1	4.2	0	2.5	1.8	0	0	4

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	13	85	4	0	102	9	28	5	0	42	7	71	28	0	106	49	28	0	0	77	327
02:45 PM	3	76	15	0	94	8	20	7	0	35	9	69	31	0	109	44	32	12	0	88	326
03:00 PM	3	95	11	0	109	5	20	12	0	37	5	79	28	0	112	40	37	8	0	85	343
03:15 PM	4	67	8	0	79	6	24	6	0	36	6	58	25	0	89	56	34	5	0	95	299
Total Volume	23	323	38	0	384	28	92	30	0	150	27	277	112	0	416	189	131	25	0	345	1295
% App. Total	6	84.1	9.9	0		18.7	61.3	20	0		6.5	66.6	26.9	0		54.8	38	7.2	0		
PHF	.442	.850	.633	.000	.881	.778	.821	.625	.000	.893	.750	.877	.903	.000	.929	.844	.885	.521	.000	.908	.944
Cars	23	311	34	0	368	26	88	29	0	143	25	260	108	0	393	188	127	25	0	340	1244
% Cars	100	96.3	89.5	0	95.8	92.9	95.7	96.7	0	95.3	92.6	93.9	96.4	0	94.5	99.5	96.9	100	0	98.6	96.1
Heavy Vehicles	0	12	4	0	16	2	4	1	0	7	2	17	4	0	23	1	4	0	0	5	51
% Heavy Vehicles	0	3.7	10.5	0	4.2	7.1	4.3	3.3	0	4.7	7.4	6.1	3.6	0	5.5	0.5	3.1	0	0	1.4	3.9



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

Groups Printed- Cars

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 AA
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	2	62	6	0	9	18	10	0	2	60	30	0	26	14	4	0	243
01:45 PM	3	79	4	0	6	8	8	0	3	57	19	0	24	17	2	0	230
Total	5	141	10	0	15	26	18	0	5	117	49	0	50	31	6	0	473
02:00 PM	2	73	3	0	3	11	2	0	6	58	28	0	29	32	2	0	249
02:15 PM	7	82	7	0	6	13	10	0	5	52	19	0	41	24	4	0	270
02:30 PM	13	84	4	0	9	27	5	0	6	67	26	0	49	27	0	0	317
02:45 PM	3	74	13	0	6	20	7	0	9	61	30	0	43	32	12	0	310
Total	25	313	27	0	24	71	24	0	26	238	103	0	162	115	18	0	1146
03:00 PM	3	89	10	0	5	18	11	0	4	75	28	0	40	36	8	0	327
03:15 PM	4	64	7	0	6	23	6	0	6	57	24	0	56	32	5	0	290
Grand Total	37	607	54	0	50	138	59	0	41	487	204	0	308	214	37	0	2236
Apprch %	5.3	87	7.7	0	20.2	55.9	23.9	0	5.6	66.5	27.9	0	55.1	38.3	6.6	0	
Total %	1.7	27.1	2.4	0	2.2	6.2	2.6	0	1.8	21.8	9.1	0	13.8	9.6	1.7	0	

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	13	84	4	0	101	9	27	5	0	41	6	67	26	0	99	49	27	0	0	76	317
02:45 PM	3	74	13	0	90	6	20	7	0	33	9	61	30	0	100	43	32	12	0	87	310
03:00 PM	3	89	10	0	102	5	18	11	0	34	4	75	28	0	107	40	36	8	0	84	327
03:15 PM	4	64	7	0	75	6	23	6	0	35	6	57	24	0	87	56	32	5	0	93	290
Total Volume	23	311	34	0	368	26	88	29	0	143	25	260	108	0	393	188	127	25	0	340	1244
% App. Total	6.2	84.5	9.2	0		18.2	61.5	20.3	0		6.4	66.2	27.5	0		55.3	37.4	7.4	0		
PHF	.442	.874	.654	.000	.902	.722	.815	.659	.000	.872	.694	.867	.900	.000	.918	.839	.882	.521	.000	.914	.951



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: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 AA
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Central Avenue From North				Hunnewell Street From East				Central Avenue From South				Hunnewell Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	0	3	0	0	0	0	1	0	0	5	2	0	2	0	0	0	13
01:45 PM	0	5	1	0	0	1	0	0	0	2	2	0	2	0	0	0	13
Total	0	8	1	0	0	1	1	0	0	7	4	0	4	0	0	0	26
02:00 PM	0	3	0	0	1	0	0	0	0	1	1	0	1	0	0	0	7
02:15 PM	1	4	0	0	1	0	0	0	0	1	0	0	2	0	0	0	9
02:30 PM	0	1	0	0	0	1	0	0	1	4	2	0	0	1	0	0	10
02:45 PM	0	2	2	0	2	0	0	0	0	8	1	0	1	0	0	0	16
Total	1	10	2	0	4	1	0	0	1	14	4	0	4	1	0	0	42
03:00 PM	0	6	1	0	0	2	1	0	1	4	0	0	0	1	0	0	16
03:15 PM	0	3	1	0	0	1	0	0	0	1	1	0	0	2	0	0	9
Grand Total	1	27	5	0	4	5	2	0	2	26	9	0	8	4	0	0	93
Apprch %	3	81.8	15.2	0	36.4	45.5	18.2	0	5.4	70.3	24.3	0	66.7	33.3	0	0	
Total %	1.1	29	5.4	0	4.3	5.4	2.2	0	2.2	28	9.7	0	8.6	4.3	0	0	

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:15 PM																					
02:15 PM	1	4	0	0	5	1	0	0	0	1	0	1	0	0	1	2	0	0	0	2	9
02:30 PM	0	1	0	0	1	0	1	0	0	1	1	4	2	0	7	0	1	0	0	1	10
02:45 PM	0	2	2	0	4	2	0	0	0	2	0	8	1	0	9	1	0	0	0	1	16
03:00 PM	0	6	1	0	7	0	2	1	0	3	1	4	0	0	5	0	1	0	0	1	16
Total Volume	1	13	3	0	17	3	3	1	0	7	2	17	3	0	22	3	2	0	0	5	51
% App. Total	5.9	76.5	17.6	0		42.9	42.9	14.3	0		9.1	77.3	13.6	0		60	40	0	0		
PHF	.250	.542	.375	.000	.607	.375	.375	.250	.000	.583	.500	.531	.375	.000	.611	.375	.500	.000	.000	.625	.797



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

Groups Printed- Peds and Bikes

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 AA
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Start Time	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell Street From West					Int. Total
	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	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
03:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6
Apprch %	20	40	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	
Total %	16.7	33.3	0	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.7	0	

	Central Avenue From North						Hunnewell Street From East						Central Avenue From South						Hunnewell 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 01:30 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:30 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	
02:45 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
03:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2		
Total Volume	0	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4		
% App. Total	0	33.3	0	66.7	0		0	0	0	0	0		0	0	0	0	0		0	0	100	0				
PHF	.000	.250	.000	.250	.000	.375	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.500		



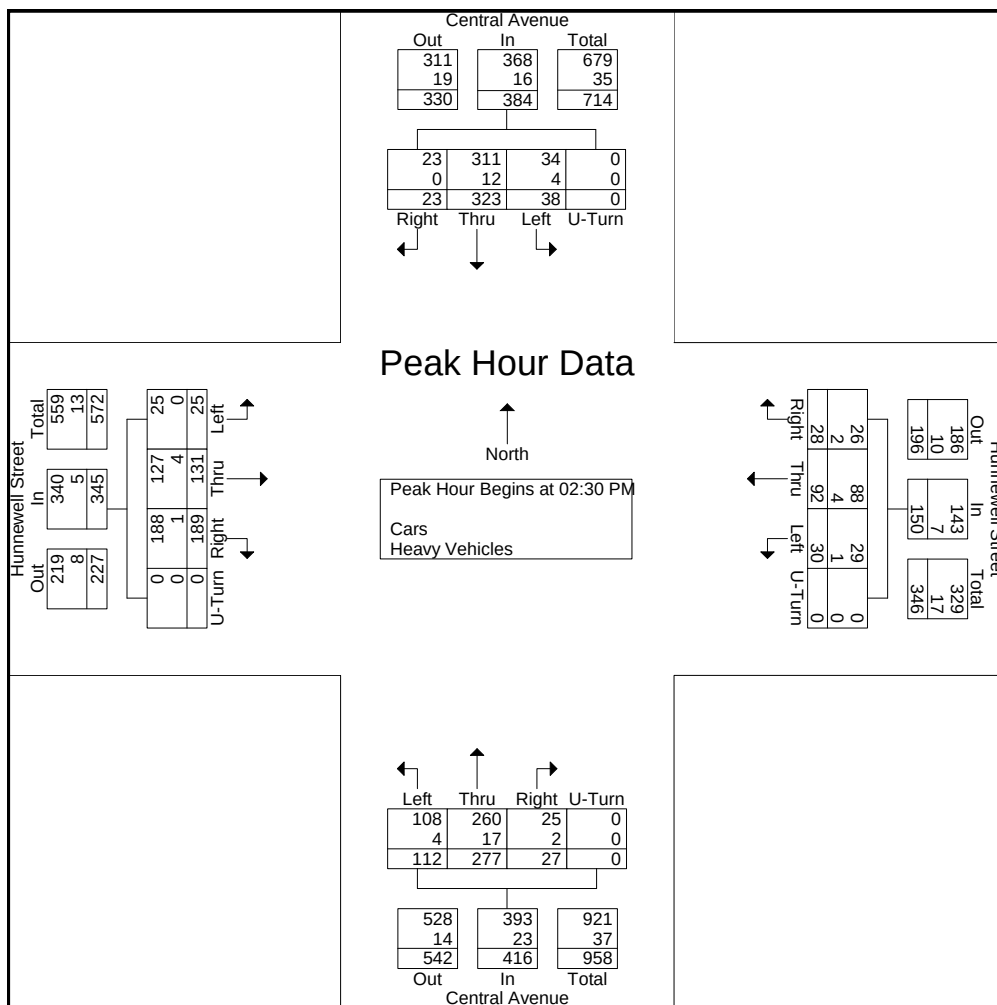
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E/W: Hunnewell Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 AA
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North					Hunnewell Street From East					Central Avenue From South					Hunnewell 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 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	13	85	4	0	102	9	28	5	0	42	7	71	28	0	106	49	28	0	0	77	327
02:45 PM	3	76	15	0	94	8	20	7	0	35	9	69	31	0	109	44	32	12	0	88	326
03:00 PM	3	95	11	0	109	5	20	12	0	37	5	79	28	0	112	40	37	8	0	85	343
03:15 PM	4	67	8	0	79	6	24	6	0	36	6	58	25	0	89	56	34	5	0	95	299
Total Volume	23	323	38	0	384	28	92	30	0	150	27	277	112	0	416	189	131	25	0	345	1295
% App. Total	6	84.1	9.9	0		18.7	61.3	20	0		6.5	66.6	26.9	0		54.8	38	7.2	0		
PHF	.442	.850	.633	.000	.881	.778	.821	.625	.000	.893	.750	.877	.903	.000	.929	.844	.885	.521	.000	.908	.944
Cars	23	311	34	0	368	26	88	29	0	143	25	260	108	0	393	188	127	25	0	340	1244
% Cars	100	96.3	89.5	0	95.8	92.9	95.7	96.7	0	95.3	92.6	93.9	96.4	0	94.5	99.5	96.9	100	0	98.6	96.1
Heavy Vehicles	0	12	4	0	16	2	4	1	0	7	2	17	4	0	23	1	4	0	0	5	51
% Heavy Vehicles	0	3.7	10.5	0	4.2	7.1	4.3	3.3	0	4.7	7.4	6.1	3.6	0	5.5	0.5	3.1	0	0	1.4	3.9





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: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 B
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	12	0	0	0	0	0	0	0	105	0	0	1	0	0	0	118
06:15 AM	0	19	0	0	1	0	1	0	0	162	0	0	2	0	0	0	185
06:30 AM	0	33	0	0	0	0	0	0	0	206	0	0	5	0	1	0	245
06:45 AM	0	44	0	0	1	0	0	0	0	222	0	0	5	0	0	0	272
Total	0	108	0	0	2	0	1	0	0	695	0	0	13	0	1	0	820
07:00 AM	0	50	0	0	1	0	0	0	0	235	0	0	7	0	0	0	293
07:15 AM	0	40	0	0	3	0	0	0	0	265	0	0	12	0	0	0	320
07:30 AM	0	55	0	0	0	0	1	0	1	247	0	0	5	0	0	0	309
07:45 AM	0	56	0	0	2	0	0	0	1	200	0	0	7	0	1	0	267
Total	0	201	0	0	6	0	1	0	2	947	0	0	31	0	1	0	1189
Grand Total	0	309	0	0	8	0	2	0	2	1642	0	0	44	0	2	0	2009
Apprch %	0	100	0	0	80	0	20	0	0.1	99.9	0	0	95.7	0	4.3	0	
Total %	0	15.4	0	0	0.4	0	0.1	0	0.1	81.7	0	0	2.2	0	0.1	0	
Cars	0	289	0	0	7	0	2	0	2	1602	0	0	42	0	2	0	1946
% Cars	0	93.5	0	0	87.5	0	100	0	100	97.6	0	0	95.5	0	100	0	96.9
Heavy Vehicles	0	20	0	0	1	0	0	0	0	40	0	0	2	0	0	0	63
% Heavy Vehicles	0	6.5	0	0	12.5	0	0	0	0	2.4	0	0	4.5	0	0	0	3.1

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45 AM																					
06:45 AM	0	44	0	0	44	1	0	0	0	1	0	222	0	0	222	5	0	0	0	5	272
07:00 AM	0	50	0	0	50	1	0	0	0	1	0	235	0	0	235	7	0	0	0	7	293
07:15 AM	0	40	0	0	40	3	0	0	0	3	0	265	0	0	265	12	0	0	0	12	320
07:30 AM	0	55	0	0	55	0	0	1	0	1	1	247	0	0	248	5	0	0	0	5	309
Total Volume	0	189	0	0	189	5	0	1	0	6	1	969	0	0	970	29	0	0	0	29	1194
% App. Total	0	100	0	0		83.3	0	16.7	0		0.1	99.9	0	0		100	0	0	0		
PHF	.000	.859	.000	.000	.859	.417	.000	.250	.000	.500	.250	.914	.000	.000	.915	.604	.000	.000	.000	.604	.933
Cars	0	179	0	0	179	4	0	1	0	5	1	941	0	0	942	28	0	0	0	28	1154
% Cars	0	94.7	0	0	94.7	80.0	0	100	0	83.3	100	97.1	0	0	97.1	96.6	0	0	0	96.6	96.6
Heavy Vehicles	0	10	0	0	10	1	0	0	0	1	0	28	0	0	28	1	0	0	0	1	40
% Heavy Vehicles	0	5.3	0	0	5.3	20.0	0	0	0	16.7	0	2.9	0	0	2.9	3.4	0	0	0	3.4	3.4



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

Groups Printed- Cars

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 B
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	12	0	0	0	0	0	0	0	104	0	0	1	0	0	0	117
06:15 AM	0	18	0	0	1	0	1	0	0	158	0	0	2	0	0	0	180
06:30 AM	0	29	0	0	0	0	0	0	0	201	0	0	5	0	1	0	236
06:45 AM	0	42	0	0	1	0	0	0	0	212	0	0	5	0	0	0	260
Total	0	101	0	0	2	0	1	0	0	675	0	0	13	0	1	0	793
07:00 AM	0	47	0	0	1	0	0	0	0	227	0	0	6	0	0	0	281
07:15 AM	0	37	0	0	2	0	0	0	0	261	0	0	12	0	0	0	312
07:30 AM	0	53	0	0	0	0	1	0	1	241	0	0	5	0	0	0	301
07:45 AM	0	51	0	0	2	0	0	0	1	198	0	0	6	0	1	0	259
Total	0	188	0	0	5	0	1	0	2	927	0	0	29	0	1	0	1153
Grand Total	0	289	0	0	7	0	2	0	2	1602	0	0	42	0	2	0	1946
Apprch %	0	100	0	0	77.8	0	22.2	0	0.1	99.9	0	0	95.5	0	4.5	0	
Total %	0	14.9	0	0	0.4	0	0.1	0	0.1	82.3	0	0	2.2	0	0.1	0	

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45 AM																					
06:45 AM	0	42	0	0	42	1	0	0	0	1	0	212	0	0	212	5	0	0	0	5	260
07:00 AM	0	47	0	0	47	1	0	0	0	1	0	227	0	0	227	6	0	0	0	6	281
07:15 AM	0	37	0	0	37	2	0	0	0	2	0	261	0	0	261	12	0	0	0	12	312
07:30 AM	0	53	0	0	53	0	0	1	0	1	1	241	0	0	242	5	0	0	0	5	301
Total Volume	0	179	0	0	179	4	0	1	0	5	1	941	0	0	942	28	0	0	0	28	1154
% App. Total	0	100	0	0		80	0	20	0		0.1	99.9	0	0		100	0	0	0		
PHF	.000	.844	.000	.000	.844	.500	.000	.250	.000	.625	.250	.901	.000	.000	.902	.583	.000	.000	.000	.583	.925



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

File Name : 154641 B
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

Groups Printed- Heavy Vehicles

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
06:15 AM	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
06:30 AM	0	4	0	0	0	0	0	0	0	5	0	0	0	0	0	0	9
06:45 AM	0	2	0	0	0	0	0	0	0	10	0	0	0	0	0	0	12
Total	0	7	0	0	0	0	0	0	0	20	0	0	0	0	0	0	27
07:00 AM	0	3	0	0	0	0	0	0	0	8	0	0	1	0	0	0	12
07:15 AM	0	3	0	0	1	0	0	0	0	4	0	0	0	0	0	0	8
07:30 AM	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	8
07:45 AM	0	5	0	0	0	0	0	0	0	2	0	0	1	0	0	0	8
Total	0	13	0	0	1	0	0	0	0	20	0	0	2	0	0	0	36
Grand Total	0	20	0	0	1	0	0	0	0	40	0	0	2	0	0	0	63
Apprch %	0	100	0	0	100	0	0	0	0	100	0	0	100	0	0	0	
Total %	0	31.7	0	0	1.6	0	0	0	0	63.5	0	0	3.2	0	0	0	

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:30 AM																					
06:30 AM	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	9
06:45 AM	0	2	0	0	2	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	12
07:00 AM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	12
07:15 AM	0	3	0	0	3	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	8
Total Volume	0	12	0	0	12	1	0	0	0	1	0	27	0	0	27	1	0	0	0	1	41
% App. Total	0	100	0	0		100	0	0	0		0	100	0	0		100	0	0	0		
PHF	.000	.750	.000	.000	.750	.250	.000	.000	.000	.250	.000	.675	.000	.000	.675	.250	.000	.000	.000	.250	.854



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

Groups Printed- Peds and Bikes

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 B
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Start Time	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
	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	
06:00 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:15 AM	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	1	0	0	0	0	5
06:30 AM	0	1	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	5
06:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1	4
Total	0	1	0	0	0	0	0	0	4	3	0	3	0	0	0	1	0	0	2	1	15
07:00 AM	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	3
07:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	4	2	0	1	0	0	0	0	0	0	0	0	7
07:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	6	5	0	1	0	0	0	0	0	0	0	0	12
Grand Total	0	1	0	0	0	0	0	0	10	8	0	4	0	0	0	1	0	0	2	1	27
Apprch %	0	100	0	0	0	0	0	0	55.6	44.4	0	100	0	0	0	25	0	0	50	25	
Total %	0	3.7	0	0	0	0	0	0	37	29.6	0	14.8	0	0	0	3.7	0	0	7.4	3.7	

	Central Avenue From North						Booth Street From East						Central Avenue From South						Taylor 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 06:00 AM to 07:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 06:15 AM																									
06:15 AM	0	0	0	0	0	0	0	0	0	1	1	2	0	2	0	0	0	2	1	0	0	0	0	1	5
06:30 AM	0	1	0	0	0	1	0	0	0	2	1	3	0	1	0	0	0	1	0	0	0	0	0	0	5
06:45 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	1	3	4
07:00 AM	0	0	0	0	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	0	1	0	0	0	1	0	0	0	5	4	9	0	3	0	0	0	3	1	0	0	2	1	4	17
% App. Total	0	100	0	0	0		0	0	0	55.6	44.4		0	100	0	0	0		25	0	0	50	25		
PHF	.000	.250	.000	.000	.000	.250	.000	.000	.000	.625	1.0 0	.750	.000	.375	.000	.000	.000	.375	.250	.000	.000	.250	.250	.333	.850



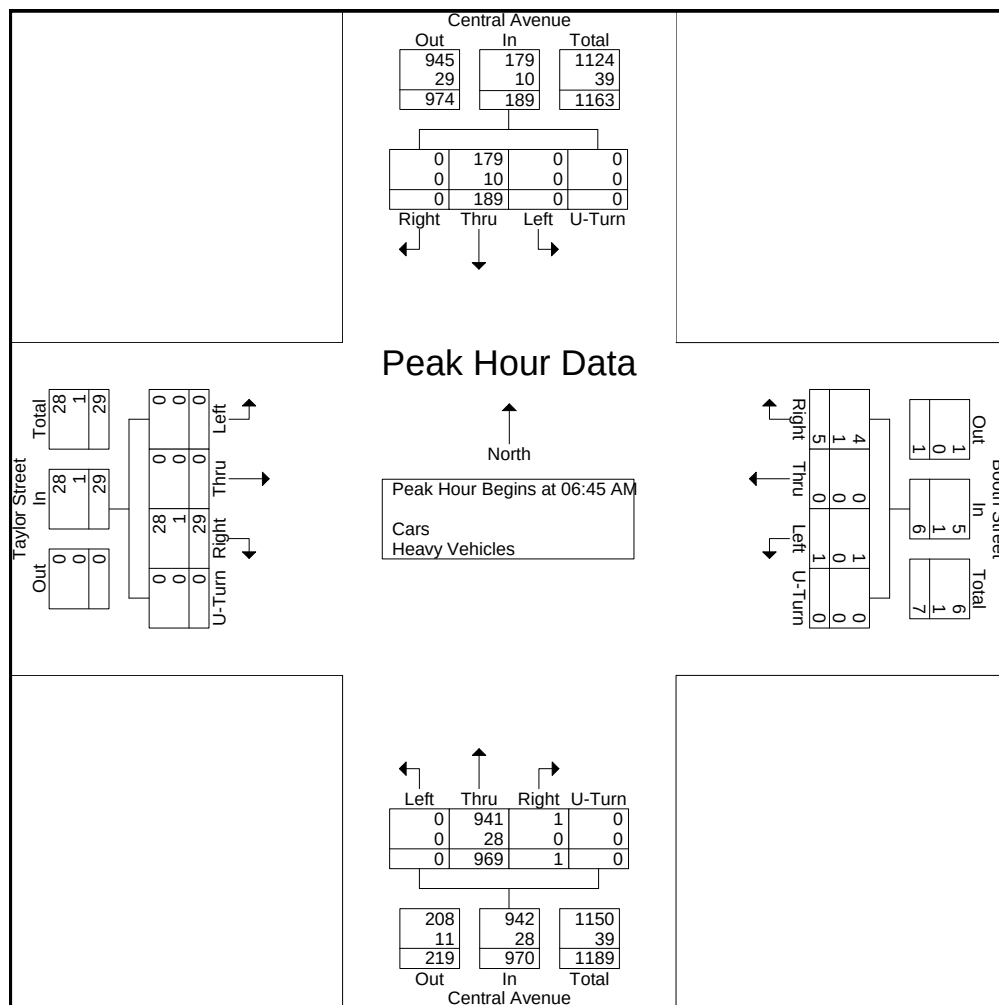
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 B
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor 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 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45 AM																					
06:45 AM	0	44	0	0	44	1	0	0	0	1	0	222	0	0	222	5	0	0	0	5	272
07:00 AM	0	50	0	0	50	1	0	0	0	1	0	235	0	0	235	7	0	0	0	7	293
07:15 AM	0	40	0	0	40	3	0	0	0	3	0	265	0	0	265	12	0	0	0	12	320
07:30 AM	0	55	0	0	55	0	0	1	0	1	1	247	0	0	248	5	0	0	0	5	309
Total Volume	0	189	0	0	189	5	0	1	0	6	1	969	0	0	970	29	0	0	0	29	1194
% App. Total	0	100	0	0		83.3	0	16.7	0		0.1	99.9	0	0		100	0	0	0		
PHF	.000	.859	.000	.000	.859	.417	.000	.250	.000	.500	.250	.914	.000	.000	.915	.604	.000	.000	.000	.604	.933
Cars	0	179	0	0	179	4	0	1	0	5	1	941	0	0	942	28	0	0	0	28	1154
% Cars	0	94.7	0	0	94.7	80.0	0	100	0	83.3	100	97.1	0	0	97.1	96.6	0	0	0	96.6	96.6
Heavy Vehicles	0	10	0	0	10	1	0	0	0	1	0	28	0	0	28	1	0	0	0	1	40
% Heavy Vehicles	0	5.3	0	0	5.3	20.0	0	0	0	16.7	0	2.9	0	0	2.9	3.4	0	0	0	3.4	3.4





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: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 BB
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	0	108	0	0	1	0	0	0	1	100	0	0	9	0	0	0	219
01:45 PM	0	119	0	0	0	0	0	0	0	77	0	0	7	0	0	0	203
Total	0	227	0	0	1	0	0	0	1	177	0	0	16	0	0	0	422
02:00 PM	0	109	1	0	4	0	1	0	0	91	0	0	8	0	0	0	214
02:15 PM	0	138	1	0	2	0	0	0	1	79	0	0	13	0	0	0	234
02:30 PM	0	137	2	0	0	0	1	0	2	102	0	0	14	0	0	0	258
02:45 PM	0	125	2	0	1	0	3	0	2	113	0	0	23	0	0	0	269
Total	0	509	6	0	7	0	5	0	5	385	0	0	58	0	0	0	975
03:00 PM	0	143	1	0	0	0	1	0	2	109	0	0	21	1	0	0	278
03:15 PM	0	130	1	0	1	0	2	0	1	93	0	0	16	0	0	0	244
Grand Total	0	1009	8	0	9	0	8	0	9	764	0	0	111	1	0	0	1919
Apprch %	0	99.2	0.8	0	52.9	0	47.1	0	1.2	98.8	0	0	99.1	0.9	0	0	
Total %	0	52.6	0.4	0	0.5	0	0.4	0	0.5	39.8	0	0	5.8	0.1	0	0	
Cars	0	968	8	0	8	0	8	0	9	725	0	0	107	1	0	0	1834
% Cars	0	95.9	100	0	88.9	0	100	0	100	94.9	0	0	96.4	100	0	0	95.6
Heavy Vehicles	0	41	0	0	1	0	0	0	0	39	0	0	4	0	0	0	85
% Heavy Vehicles	0	4.1	0	0	11.1	0	0	0	0	5.1	0	0	3.6	0	0	0	4.4

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	137	2	0	139	0	0	1	0	1	2	102	0	0	104	14	0	0	0	14	258
02:45 PM	0	125	2	0	127	1	0	3	0	4	2	113	0	0	115	23	0	0	0	23	269
03:00 PM	0	143	1	0	144	0	0	1	0	1	2	109	0	0	111	21	1	0	0	22	278
03:15 PM	0	130	1	0	131	1	0	2	0	3	1	93	0	0	94	16	0	0	0	16	244
Total Volume	0	535	6	0	541	2	0	7	0	9	7	417	0	0	424	74	1	0	0	75	1049
% App. Total	0	98.9	1.1	0		22.2	0	77.8	0		1.7	98.3	0	0		98.7	1.3	0	0		
PHF	.000	.935	.750	.000	.939	.500	.000	.583	.000	.563	.875	.923	.000	.000	.922	.804	.250	.000	.000	.815	.943
Cars	0	520	6	0	526	2	0	7	0	9	7	393	0	0	400	70	1	0	0	71	1006
% Cars	0	97.2	100	0	97.2	100	0	100	0	100	100	94.2	0	0	94.3	94.6	100	0	0	94.7	95.9
Heavy Vehicles	0	15	0	0	15	0	0	0	0	0	0	24	0	0	24	4	0	0	0	4	43
% Heavy Vehicles	0	2.8	0	0	2.8	0	0	0	0	0	0	5.8	0	0	5.7	5.4	0	0	0	5.3	4.1



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

Groups Printed- Cars

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 BB
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	0	101	0	0	1	0	0	0	1	93	0	0	9	0	0	0	205
01:45 PM	0	112	0	0	0	0	0	0	0	71	0	0	7	0	0	0	190
Total	0	213	0	0	1	0	0	0	1	164	0	0	16	0	0	0	395
02:00 PM	0	105	1	0	3	0	1	0	0	89	0	0	8	0	0	0	207
02:15 PM	0	130	1	0	2	0	0	0	1	79	0	0	13	0	0	0	226
02:30 PM	0	134	2	0	0	0	1	0	2	94	0	0	12	0	0	0	245
02:45 PM	0	123	2	0	1	0	3	0	2	104	0	0	23	0	0	0	258
Total	0	492	6	0	6	0	5	0	5	366	0	0	56	0	0	0	936
03:00 PM	0	136	1	0	0	0	1	0	2	104	0	0	19	1	0	0	264
03:15 PM	0	127	1	0	1	0	2	0	1	91	0	0	16	0	0	0	239
Grand Total	0	968	8	0	8	0	8	0	9	725	0	0	107	1	0	0	1834
Apprch %	0	99.2	0.8	0	50	0	50	0	1.2	98.8	0	0	99.1	0.9	0	0	
Total %	0	52.8	0.4	0	0.4	0	0.4	0	0.5	39.5	0	0	5.8	0.1	0	0	

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	134	2	0	136	0	0	1	0	1	2	94	0	0	96	12	0	0	0	12	245
02:45 PM	0	123	2	0	125	1	0	3	0	4	2	104	0	0	106	23	0	0	0	23	258
03:00 PM	0	136	1	0	137	0	0	1	0	1	2	104	0	0	106	19	1	0	0	20	264
03:15 PM	0	127	1	0	128	1	0	2	0	3	1	91	0	0	92	16	0	0	0	16	239
Total Volume	0	520	6	0	526	2	0	7	0	9	7	393	0	0	400	70	1	0	0	71	1006
% App. Total	0	98.9	1.1	0		22.2	0	77.8	0		1.8	98.2	0	0		98.6	1.4	0	0		
PHF	.000	.956	.750	.000	.960	.500	.000	.583	.000	.563	.875	.945	.000	.000	.943	.761	.250	.000	.000	.772	.953



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

File Name : 154641 BB

Site Code : 10828

Start Date : 9/9/2015

Page No : 1

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

Groups Printed- Heavy Vehicles

	Central Avenue From North				Booth Street From East				Central Avenue From South				Taylor Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:30 PM	0	7	0	0	0	0	0	0	0	7	0	0	0	0	0	0	14
01:45 PM	0	7	0	0	0	0	0	0	0	6	0	0	0	0	0	0	13
Total	0	14	0	0	0	0	0	0	0	13	0	0	0	0	0	0	27
02:00 PM	0	4	0	0	1	0	0	0	0	2	0	0	0	0	0	0	7
02:15 PM	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
02:30 PM	0	3	0	0	0	0	0	0	0	8	0	0	2	0	0	0	13
02:45 PM	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	11
Total	0	17	0	0	1	0	0	0	0	19	0	0	2	0	0	0	39
03:00 PM	0	7	0	0	0	0	0	0	0	5	0	0	2	0	0	0	14
03:15 PM	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
Grand Total	0	41	0	0	1	0	0	0	0	39	0	0	4	0	0	0	85
Apprch %	0	100	0	0	100	0	0	0	0	100	0	0	100	0	0	0	
Total %	0	48.2	0	0	1.2	0	0	0	0	45.9	0	0	4.7	0	0	0	

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
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	
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:15 PM																					
02:15 PM	0	8	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
02:30 PM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	2	0	0	0	2	13
02:45 PM	0	2	0	0	2	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	11
03:00 PM	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	2	0	0	0	2	14
Total Volume	0	20	0	0	20	0	0	0	0	0	0	22	0	0	22	4	0	0	0	4	46
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		100	0	0	0		
PHF	.000	.625	.000	.000	.625	.000	.000	.000	.000	.000	.000	.611	.000	.000	.611	.500	.000	.000	.000	.500	.821



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

Groups Printed- Peds and Bikes

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 BB
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Start Time	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor Street From West					Int. Total
	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	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
01:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
03:00 PM	0	1	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	7
Apprch %	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	20	
Total %	0	28.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57.1	14.3	

	Central Avenue From North						Booth Street From East						Central Avenue From South						Taylor 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 01:30 PM to 03:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:30 PM																									
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
01:45 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
02:15 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
Total Volume	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	5	
% App. Total	0	100	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	100	0		
PHF	.000	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.333	.000	.333	.417



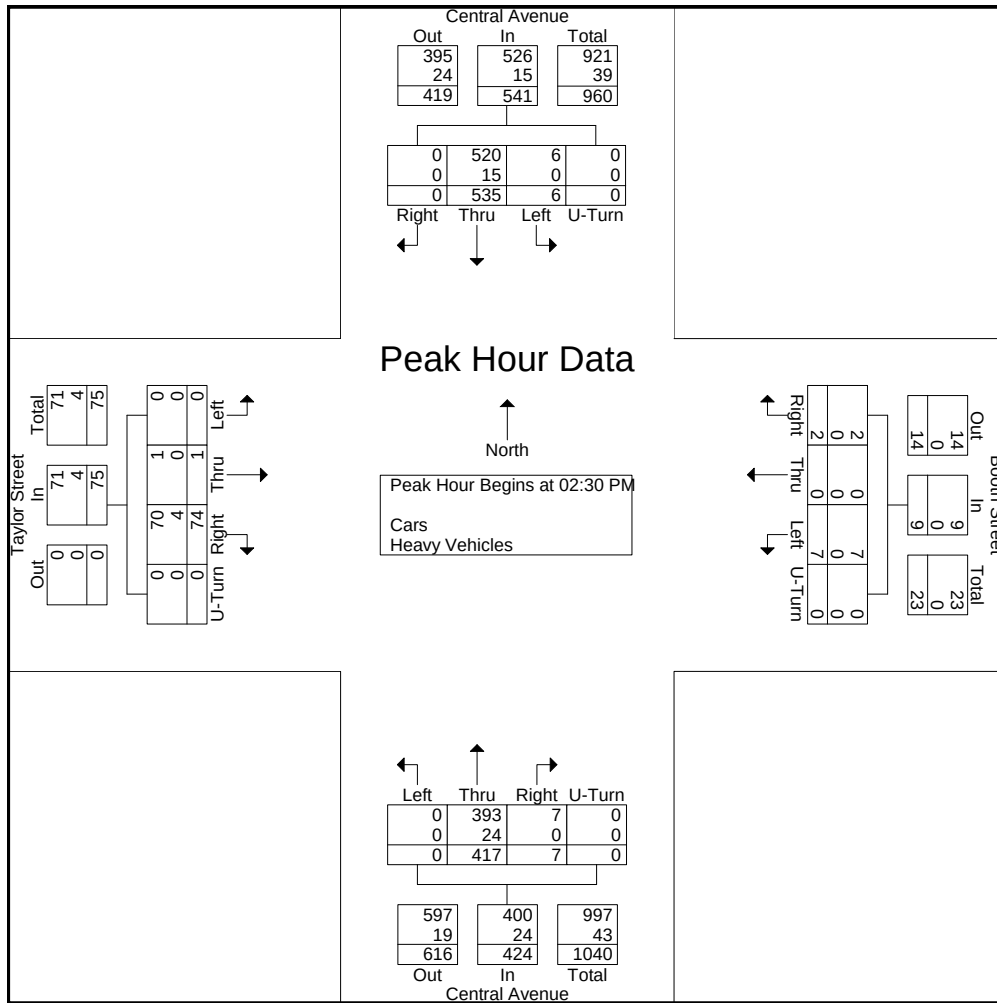
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E/W: Booth Street/ Taylor Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 BB
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North					Booth Street From East					Central Avenue From South					Taylor 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 01:30 PM to 03:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	137	2	0	139	0	0	1	0	1	2	102	0	0	104	14	0	0	0	14	258
02:45 PM	0	125	2	0	127	1	0	3	0	4	2	113	0	0	115	23	0	0	0	23	269
03:00 PM	0	143	1	0	144	0	0	1	0	1	2	109	0	0	111	21	1	0	0	22	278
03:15 PM	0	130	1	0	131	1	0	2	0	3	1	93	0	0	94	16	0	0	0	16	244
Total Volume	0	535	6	0	541	2	0	7	0	9	7	417	0	0	424	74	1	0	0	75	1049
% App. Total	0	98.9	1.1	0		22.2	0	77.8	0		1.7	98.3	0	0		98.7	1.3	0	0		
PHF	.000	.935	.750	.000	.939	.500	.000	.583	.000	.563	.875	.923	.000	.000	.922	.804	.250	.000	.000	.815	.943
Cars	0	520	6	0	526	2	0	7	0	9	7	393	0	0	400	70	1	0	0	71	1006
% Cars	0	97.2	100	0	97.2	100	0	100	0	100	100	94.2	0	0	94.3	94.6	100	0	0	94.7	95.9
Heavy Vehicles	0	15	0	0	15	0	0	0	0	0	0	24	0	0	24	4	0	0	0	4	43
% Heavy Vehicles	0	2.8	0	0	2.8	0	0	0	0	0	0	5.8	0	0	5.7	5.4	0	0	0	5.3	4.1





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: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 C
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North			West Street From East			Central Avenue From South			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
06:00 AM	14	1	0	0	9	0	19	103	0	146
06:15 AM	18	2	0	1	12	0	42	153	0	228
06:30 AM	35	1	0	0	18	0	26	206	0	286
06:45 AM	48	3	0	5	29	0	51	210	0	346
Total	115	7	0	6	68	0	138	672	0	1006
07:00 AM	51	3	0	9	14	0	46	224	0	347
07:15 AM	50	6	0	2	26	0	57	255	0	396
07:30 AM	64	5	0	7	33	0	62	230	0	401
07:45 AM	58	6	0	8	44	0	65	199	0	380
Total	223	20	0	26	117	0	230	908	0	1524
Grand Total	338	27	0	32	185	0	368	1580	0	2530
Apprch %	92.6	7.4	0	14.7	85.3	0	18.9	81.1	0	
Total %	13.4	1.1	0	1.3	7.3	0	14.5	62.5	0	
Cars	316	26	0	31	170	0	355	1546	0	2444
% Cars	93.5	96.3	0	96.9	91.9	0	96.5	97.8	0	96.6
Heavy Vehicles	22	1	0	1	15	0	13	34	0	86
% Heavy Vehicles	6.5	3.7	0	3.1	8.1	0	3.5	2.2	0	3.4

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	51	3	0	54	9	14	0	23	46	224	0	270	347
07:15 AM	50	6	0	56	2	26	0	28	57	255	0	312	396
07:30 AM	64	5	0	69	7	33	0	40	62	230	0	292	401
07:45 AM	58	6	0	64	8	44	0	52	65	199	0	264	380
Total Volume	223	20	0	243	26	117	0	143	230	908	0	1138	1524
% App. Total	91.8	8.2	0		18.2	81.8	0		20.2	79.8	0		
PHF	.871	.833	.000	.880	.722	.665	.000	.688	.885	.890	.000	.912	.950
Cars	206	19	0	225	26	109	0	135	223	892	0	1115	1475
% Cars	92.4	95.0	0	92.6	100	93.2	0	94.4	97.0	98.2	0	98.0	96.8
Heavy Vehicles	17	1	0	18	0	8	0	8	7	16	0	23	49
% Heavy Vehicles	7.6	5.0	0	7.4	0	6.8	0	5.6	3.0	1.8	0	2.0	3.2



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

Groups Printed- Cars

File Name : 154641 C
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

	Central Avenue From North			West Street From East			Central Avenue From South			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
06:00 AM	14	1	0	0	9	0	19	102	0	145
06:15 AM	17	2	0	1	10	0	42	149	0	221
06:30 AM	32	1	0	0	17	0	24	203	0	277
06:45 AM	47	3	0	4	25	0	47	200	0	326
Total	110	7	0	5	61	0	132	654	0	969
07:00 AM	46	3	0	9	13	0	45	218	0	334
07:15 AM	47	6	0	2	23	0	57	253	0	388
07:30 AM	62	4	0	7	32	0	58	224	0	387
07:45 AM	51	6	0	8	41	0	63	197	0	366
Total	206	19	0	26	109	0	223	892	0	1475
Grand Total	316	26	0	31	170	0	355	1546	0	2444
Apprch %	92.4	7.6	0	15.4	84.6	0	18.7	81.3	0	
Total %	12.9	1.1	0	1.3	7	0	14.5	63.3	0	

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	46	3	0	49	9	13	0	22	45	218	0	263	334
07:15 AM	47	6	0	53	2	23	0	25	57	253	0	310	388
07:30 AM	62	4	0	66	7	32	0	39	58	224	0	282	387
07:45 AM	51	6	0	57	8	41	0	49	63	197	0	260	366
Total Volume	206	19	0	225	26	109	0	135	223	892	0	1115	1475
% App. Total	91.6	8.4	0		19.3	80.7	0		20	80	0		
PHF	.831	.792	.000	.852	.722	.665	.000	.689	.885	.881	.000	.899	.950



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: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 C
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Central Avenue From North			West Street From East			Central Avenue From South			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
06:00 AM	0	0	0	0	0	0	0	1	0	1
06:15 AM	1	0	0	0	2	0	0	4	0	7
06:30 AM	3	0	0	0	1	0	2	3	0	9
06:45 AM	1	0	0	1	4	0	4	10	0	20
Total	5	0	0	1	7	0	6	18	0	37
07:00 AM	5	0	0	0	1	0	1	6	0	13
07:15 AM	3	0	0	0	3	0	0	2	0	8
07:30 AM	2	1	0	0	1	0	4	6	0	14
07:45 AM	7	0	0	0	3	0	2	2	0	14
Total	17	1	0	0	8	0	7	16	0	49
Grand Total	22	1	0	1	15	0	13	34	0	86
Apprch %	95.7	4.3	0	6.2	93.8	0	27.7	72.3	0	
Total %	25.6	1.2	0	1.2	17.4	0	15.1	39.5	0	

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 06:45 AM													
06:45 AM	1	0	0	1	1	4	0	5	4	10	0	14	20
07:00 AM	5	0	0	5	0	1	0	1	1	6	0	7	13
07:15 AM	3	0	0	3	0	3	0	3	0	2	0	2	8
07:30 AM	2	1	0	3	0	1	0	1	4	6	0	10	14
Total Volume	11	1	0	12	1	9	0	10	9	24	0	33	55
% App. Total	91.7	8.3	0		10	90	0		27.3	72.7	0		
PHF	.550	.250	.000	.600	.250	.563	.000	.500	.563	.600	.000	.589	.688



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

Groups Printed- Peds and Bikes

File Name : 154641 C

Site Code : 10828

Start Date : 9/9/2015

Page No : 1

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

Start Time	Central Avenue From North				West Street From East				Central Avenue From South				Int. Total
	Thru	Left	Peds EB	Peds WB	Right	Left	Peds SB	Peds NB	Right	Thru	Peds WB	Peds EB	
06:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
06:15 AM	0	0	0	0	0	0	1	1	0	2	0	0	4
06:30 AM	2	0	0	0	0	0	0	1	0	1	0	0	4
06:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	2	0	0	0	0	0	2	3	0	3	0	0	10
07:00 AM	0	0	0	0	0	0	1	2	1	0	0	0	4
07:15 AM	0	0	0	0	0	0	0	1	0	1	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	3	1	1	0	0	6
Grand Total	2	0	0	0	0	0	3	6	1	4	0	0	16
Apprch %	100	0	0	0	0	0	33.3	66.7	20	80	0	0	
Total %	12.5	0	0	0	0	0	18.8	37.5	6.2	25	0	0	

	Central Avenue From North					West Street From East					Central Avenue From South					
Start Time	Thru	Left	Peds EB	Peds WB	App. Total	Right	Left	Peds SB	Peds NB	App. Total	Right	Thru	Peds WB	Peds EB	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 06:15 AM																
06:15 AM	0	0	0	0	0	0	0	1	1	2	0	2	0	0	2	4
06:30 AM	2	0	0	0	2	0	0	0	1	1	0	1	0	0	1	4
06:45 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
07:00 AM	0	0	0	0	0	0	0	1	2	3	1	0	0	0	1	4
Total Volume	2	0	0	0	2	0	0	3	4	7	1	3	0	0	4	13
% App. Total	100	0	0	0		0	0	42.9	57.1		25	75	0	0		
PHF	.250	.000	.000	.000	.250	.000	.000	.750	.500	.583	.250	.375	.000	.000	.500	.813



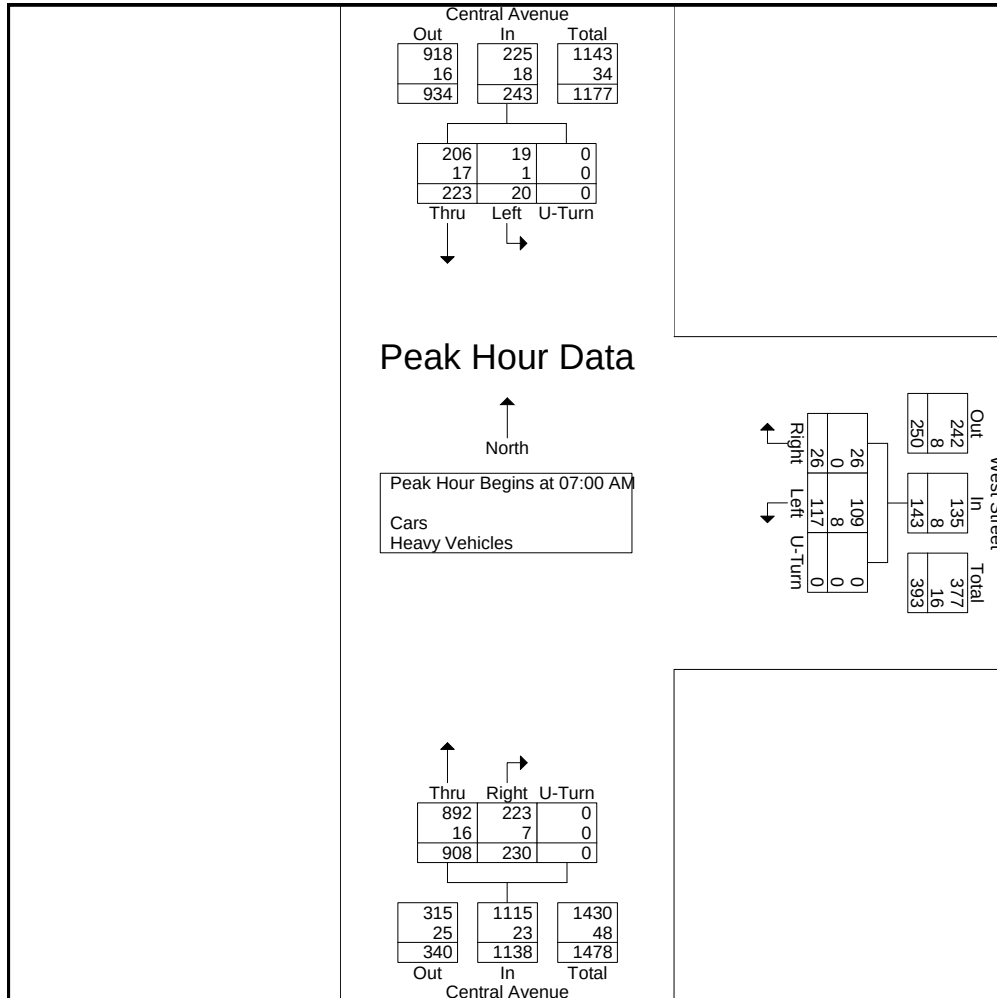
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 C
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	51	3	0	54	9	14	0	23	46	224	0	270	347
07:15 AM	50	6	0	56	2	26	0	28	57	255	0	312	396
07:30 AM	64	5	0	69	7	33	0	40	62	230	0	292	401
07:45 AM	58	6	0	64	8	44	0	52	65	199	0	264	380
Total Volume	223	20	0	243	26	117	0	143	230	908	0	1138	1524
% App. Total	91.8	8.2	0		18.2	81.8	0		20.2	79.8	0		
PHF	.871	.833	.000	.880	.722	.665	.000	.688	.885	.890	.000	.912	.950
Cars	206	19	0	225	26	109	0	135	223	892	0	1115	1475
% Cars	92.4	95.0	0	92.6	100	93.2	0	94.4	97.0	98.2	0	98.0	96.8
Heavy Vehicles	17	1	0	18	0	8	0	8	7	16	0	23	49
% Heavy Vehicles	7.6	5.0	0	7.4	0	6.8	0	5.6	3.0	1.8	0	2.0	3.2





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: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 CC
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Central Avenue From North			West Street From East			Central Avenue From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
01:30 PM	113	9	0	6	29	0	38	92	0	287
01:45 PM	118	5	0	4	32	0	39	69	0	267
Total	231	14	0	10	61	0	77	161	0	554
02:00 PM	109	12	0	5	43	0	37	89	0	295
02:15 PM	125	12	0	5	48	0	37	81	0	308
02:30 PM	149	8	0	4	45	0	46	94	0	346
02:45 PM	136	12	0	15	42	0	52	110	0	367
Total	519	44	0	29	178	0	172	374	0	1316
03:00 PM	153	19	0	9	57	0	47	102	0	387
03:15 PM	140	13	0	5	45	0	54	101	0	358
Grand Total	1043	90	0	53	341	0	350	738	0	2615
Apprch %	92.1	7.9	0	13.5	86.5	0	32.2	67.8	0	
Total %	39.9	3.4	0	2	13	0	13.4	28.2	0	
Cars	1013	84	0	50	328	0	330	705	0	2510
% Cars	97.1	93.3	0	94.3	96.2	0	94.3	95.5	0	96
Heavy Vehicles	30	6	0	3	13	0	20	33	0	105
% Heavy Vehicles	2.9	6.7	0	5.7	3.8	0	5.7	4.5	0	4

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:30 PM													
02:30 PM	149	8	0	157	4	45	0	49	46	94	0	140	346
02:45 PM	136	12	0	148	15	42	0	57	52	110	0	162	367
03:00 PM	153	19	0	172	9	57	0	66	47	102	0	149	387
03:15 PM	140	13	0	153	5	45	0	50	54	101	0	155	358
Total Volume	578	52	0	630	33	189	0	222	199	407	0	606	1458
% App. Total	91.7	8.3	0		14.9	85.1	0		32.8	67.2	0		
PHF	.944	.684	.000	.916	.550	.829	.000	.841	.921	.925	.000	.935	.942
Cars	565	49	0	614	31	180	0	211	186	388	0	574	1399
% Cars	97.8	94.2	0	97.5	93.9	95.2	0	95.0	93.5	95.3	0	94.7	96.0
Heavy Vehicles	13	3	0	16	2	9	0	11	13	19	0	32	59
% Heavy Vehicles	2.2	5.8	0	2.5	6.1	4.8	0	5.0	6.5	4.7	0	5.3	4.0



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

Groups Printed- Cars

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 CC
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North			West Street From East			Central Avenue From South			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
01:30 PM	107	8	0	6	29	0	36	86	0	272
01:45 PM	114	5	0	4	31	0	38	64	0	256
Total	221	13	0	10	60	0	74	150	0	528
02:00 PM	107	11	0	5	40	0	34	87	0	284
02:15 PM	120	11	0	4	48	0	36	80	0	299
02:30 PM	144	8	0	3	44	0	41	86	0	326
02:45 PM	135	10	0	14	39	0	48	104	0	350
Total	506	40	0	26	171	0	159	357	0	1259
03:00 PM	147	18	0	9	54	0	44	98	0	370
03:15 PM	139	13	0	5	43	0	53	100	0	353
Grand Total	1013	84	0	50	328	0	330	705	0	2510
Apprch %	92.3	7.7	0	13.2	86.8	0	31.9	68.1	0	
Total %	40.4	3.3	0	2	13.1	0	13.1	28.1	0	

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:30 PM													
02:30 PM	144	8	0	152	3	44	0	47	41	86	0	127	326
02:45 PM	135	10	0	145	14	39	0	53	48	104	0	152	350
03:00 PM	147	18	0	165	9	54	0	63	44	98	0	142	370
03:15 PM	139	13	0	152	5	43	0	48	53	100	0	153	353
Total Volume	565	49	0	614	31	180	0	211	186	388	0	574	1399
% App. Total	92	8	0		14.7	85.3	0		32.4	67.6	0		
PHF	.961	.681	.000	.930	.554	.833	.000	.837	.877	.933	.000	.938	.945



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: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 CC
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Central Avenue From North			West Street From East			Central Avenue From South			
Start Time	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	Int. Total
01:30 PM	6	1	0	0	0	0	2	6	0	15
01:45 PM	4	0	0	0	1	0	1	5	0	11
Total	10	1	0	0	1	0	3	11	0	26
02:00 PM	2	1	0	0	3	0	3	2	0	11
02:15 PM	5	1	0	1	0	0	1	1	0	9
02:30 PM	5	0	0	1	1	0	5	8	0	20
02:45 PM	1	2	0	1	3	0	4	6	0	17
Total	13	4	0	3	7	0	13	17	0	57
03:00 PM	6	1	0	0	3	0	3	4	0	17
03:15 PM	1	0	0	0	2	0	1	1	0	5
Grand Total	30	6	0	3	13	0	20	33	0	105
Apprch %	83.3	16.7	0	18.8	81.2	0	37.7	62.3	0	
Total %	28.6	5.7	0	2.9	12.4	0	19	31.4	0	

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:15 PM													
02:15 PM	5	1	0	6	1	0	0	1	1	1	0	2	9
02:30 PM	5	0	0	5	1	1	0	2	5	8	0	13	20
02:45 PM	1	2	0	3	1	3	0	4	4	6	0	10	17
03:00 PM	6	1	0	7	0	3	0	3	3	4	0	7	17
Total Volume	17	4	0	21	3	7	0	10	13	19	0	32	63
% App. Total	81	19	0		30	70	0		40.6	59.4	0		
PHF	.708	.500	.000	.750	.750	.583	.000	.625	.650	.594	.000	.615	.788



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

Groups Printed- Peds and Bikes

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 CC
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	Peds EB	Peds WB	Right	Left	Peds SB	Peds NB	Right	Thru	Peds WB	Peds EB	Int. Total
01:30 PM	1	0	0	0	0	0	1	0	0	0	0	0	2
01:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	2	0	0	0	0	0	1	0	0	0	0	0	3
02:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	1	0	1
03:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	3	0	0	0	1	0	1	0	0	0	1	0	6
Apprch %	100	0	0	0	50	0	50	0	0	0	100	0	
Total %	50	0	0	0	16.7	0	16.7	0	0	0	16.7	0	

	Central Avenue From North					West Street From East					Central Avenue From South					
Start Time	Thru	Left	Peds EB	Peds WB	App. Total	Right	Left	Peds SB	Peds NB	App. Total	Right	Thru	Peds WB	Peds EB	App. Total	Int. Total
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 01:30 PM																
01:30 PM	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	2
01:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	2	0	0	0	2	0	0	1	0	1	0	0	1	0	1	4
% App. Total	100	0	0	0		0	0	100	0		0	0	100	0		
PHF	.500	.000	.000	.000	.500	.000	.000	.250	.000	.250	.000	.000	.250	.000	.250	.500



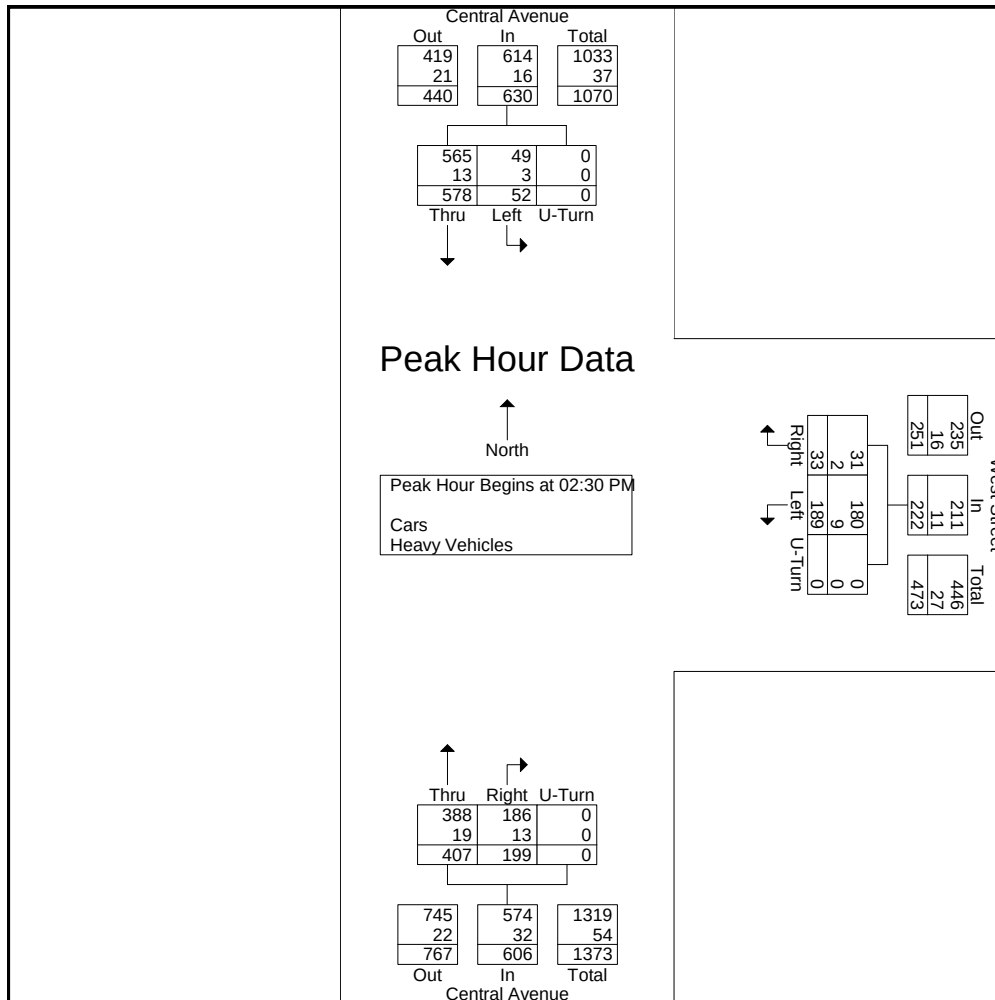
PRECISION
D A T A
INDUSTRIES, LLC

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

N/S: Central Avenue
E: West Street
City, State: Needham, MA
Client: Nitsch/ N. Havan

File Name : 154641 CC
Site Code : 10828
Start Date : 9/9/2015
Page No : 1

	Central Avenue From North				West Street From East				Central Avenue From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 01:30 PM to 03:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 02:30 PM													
02:30 PM	149	8	0	157	4	45	0	49	46	94	0	140	346
02:45 PM	136	12	0	148	15	42	0	57	52	110	0	162	367
03:00 PM	153	19	0	172	9	57	0	66	47	102	0	149	387
03:15 PM	140	13	0	153	5	45	0	50	54	101	0	155	358
Total Volume	578	52	0	630	33	189	0	222	199	407	0	606	1458
% App. Total	91.7	8.3	0		14.9	85.1	0		32.8	67.2	0		
PHF	.944	.684	.000	.916	.550	.829	.000	.841	.921	.925	.000	.935	.942
Cars	565	49	0	614	31	180	0	211	186	388	0	574	1399
% Cars	97.8	94.2	0	97.5	93.9	95.2	0	95.0	93.5	95.3	0	94.7	96.0
Heavy Vehicles	13	3	0	16	2	9	0	11	13	19	0	32	59
% Heavy Vehicles	2.2	5.8	0	2.5	6.1	4.8	0	5.0	6.5	4.7	0	5.3	4.0



Section A-2

Weekday Seasonal Adjustment Factors

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

RAW COUNT * (FACTOR) = ADJUSTED

2007 WEEKDAY SEASONAL FACTORS *

* Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.95	0.91	0.85	0.85	0.87	0.86	0.91	0.96	0.90	0.88	0.90	0.91
GROUP 2 - RURAL MAJOR COLLECTOR (R-5)	1.11	1.07	1.07	0.98	0.92	0.88	0.88	0.86	0.89	0.93	1.01	1.04
GROUP 3A - RECREATIONAL ** (1-4) See below	1.26	1.20	1.18	1.04	0.96	0.86	0.78	0.79	0.93	0.99	1.07	1.12
GROUP 3B - RECREATIONAL *** (5) See below	1.22	1.18	1.20	1.04	0.96	0.88	0.73	0.74	0.99	1.02	1.12	1.17
GROUP 4 - I-495 INTERSTATE	1.05	1.03	1.03	0.95	0.93	0.87	0.86	0.83	0.89	0.93	0.93	0.96
GROUP 5 - EAST INTERSTATE	1.02	0.99	0.97	0.94	0.95	0.91	0.92	0.92	0.94	0.94	0.98	0.99
GROUP 6 - URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3)	1.03	0.99	0.97	0.92	0.91	0.90	0.92	0.91	0.92	0.93	0.97	0.97
GROUP 7 - I-84 PROXIMITY (STA. 17)	0.84	1.15	1.17	1.08	1.10	1.02	1.01	0.96	1.06	1.06	1.11	1.15
GROUP 8 - I-295 PROXIMITY (STA. 6590)	0.95	1.01	0.96	0.92	0.89	0.88	0.91	0.86	0.91	0.93	0.95	0.92
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.10	1.03	1.00	0.94	0.91	0.87	0.84	0.82	0.88	0.93	1.03	0.99

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

- CAPE COD (ALL TOWNS)
- PLYMOUTH(SOUTH OF RTE.3A)

- 7014, 7079, 7080, 7090, 7091, 7092, 7093, 7094, 7095, 7096, 7097, 7108, 7178
- MARTHA'S VINEYARD
- NANTUCKET

***GROUP 3B:

- PERMANENTS 2 & 189
- 1086, 1087, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1113, 1114, 1115, 2196, 2197, 2198

2007 AXLE CORRECTION FACTORS

ROAD INVENTORY FUNCTIONAL CLASSIFICATION	AXLE CORRECTION FACTOR
RURAL	

1 0.90

2 0.93

3 0.98

0.5.6 0.98

URBAN

1 0.96

2.3 0.97

5 0.99

0.6 0.99

I-84 0.83

Apply I-84 factor to stations: 3290, 3921, 3929

ROUND OFF

0 - 99910
> 1,000100

Section A-3

Crash Data

Central Avenue at West Street, Needham, MA													
Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles Involved	Number of Fatal Injuries	Number of Non-Fatal Injuries	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light
273387	NEEDHAM	26-May-2011	6:18 PM	Property damage only (one injured)	2	0	0	V1: Turning right / V2: Slowing or stopped in traffic	V1 Eastbound / V2 Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires / V2: Passenger	Dry	Daylight
287295	NEEDHAM	27-Oct-2011	8:00 AM	Property damage only (one injured)	2	0	0	V1: Turning left / V2: Travelling straight ahead	V1 Westbound / V2 Northbound	V1: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Wet	Daylight
287291	NEEDHAM	29-Oct-2011	11:25 AM	Property damage only (one injured)	2	0	0	V1: Turning left / V2: Travelling straight ahead	V1 Southbound / V2 Southbound	V1: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Dry	Daylight
283338	NEEDHAM	03-Nov-2011	5:23 PM	Property damage only (one injured)	2	0	0	V1: Entering traffic lane / V2: Travelling straight ahead	V1 Westbound / V2 Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Dry	Dark, sighted roadway
308337	NEEDHAM	16-Jan-2012	10:26 PM	Property damage only (one injured)	2	0	0	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1 Northbound / V2 Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Passenger car	Snow	Cloudy/Snow
3774413	NEEDHAM	12-Dec-2013	1:56 PM	Non-fatal injury	2	1	0	V1: Slowing or stopped in traffic / V2: Turning right	V1 Westbound / V2 Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Passenger car	Dry	Daylight
Central Avenue at Hunnewell Street, Needham, MA													
Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles Involved	Number of Fatal Injuries	Number of Non-Fatal Injuries	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light
275595	NEEDHAM	21-Jun-2011	3:40 PM	Property damage only (one injured)	2	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1 Northbound / V2 Westbound	V1: Collision with motor vehicle in traffic	V1: Light truck (van, minivan, pickup, sport utility) with only four tires / V2: Not reported	Dry	Daylight
2804728	NEEDHAM	20-Dec-2011	8:36 AM	Property damage only (one injured)	2	0	0	V1: Turning right / V2: Travelling straight ahead	V1 Northbound / V2 Northbound	V1: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Dry	Daylight
3365996	NEEDHAM	07-Nov-2012	8:26 PM	Property damage only (one injured)	2	0	0	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1 Southbound / V2 Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Snow	Dark, sighted roadway
Central Avenue at Taylor Street, Needham, MA													
Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles Involved	Number of Fatal Injuries	Number of Non-Fatal Injuries	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light
287328	NEEDHAM	26-Oct-2011	7:22 AM	Property damage only (one injured)	2	0	0	V1: Entering traffic lane / V2: Travelling straight ahead	V1 Eastbound / V2 Southbound	V1: Collision with motor vehicle in traffic	V1: Light truck (van, minivan, pickup, sport utility) with only four tires / V2: Light truck (van, minivan, pickup, sport utility) with only four tires	Dry	Daylight

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : NEEDHAM COUNT DATE : Sep-15

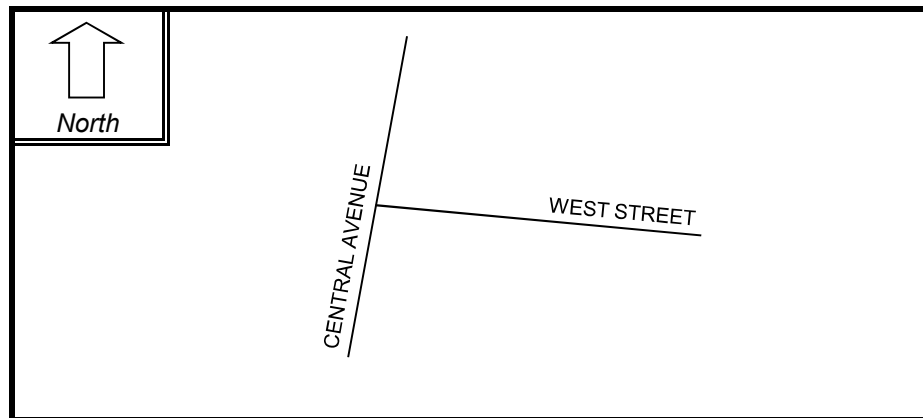
DISTRICT : 6 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : CENTRAL AVENUE

MINOR STREET(S) : WEST STREET

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	WB			
PEAK HOURLY VOLUMES* (AM/PM) :	1,138	243	143			1,524

" K " FACTOR :

0.08

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME* :

19,050

TOTAL # OF CRASHES :

6

OF
YEARS :

3

AVERAGE # OF
CRASHES PER YEAR
(A) :

2.00

CRASH RATE CALCULATION :

0.29

RATE =

$$\frac{(A * 1,000,000)}{(V * 365)}$$

Comments : AM PEAK HOUR USED

Project Title & Date: HILLSIDE ELEMENTARY SCHOOL, NEEDHAM

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : NEEDHAM COUNT DATE : Sep-15

DISTRICT : 6 UNSIGNALIZED : ☒ SIGNALIZED : ☐

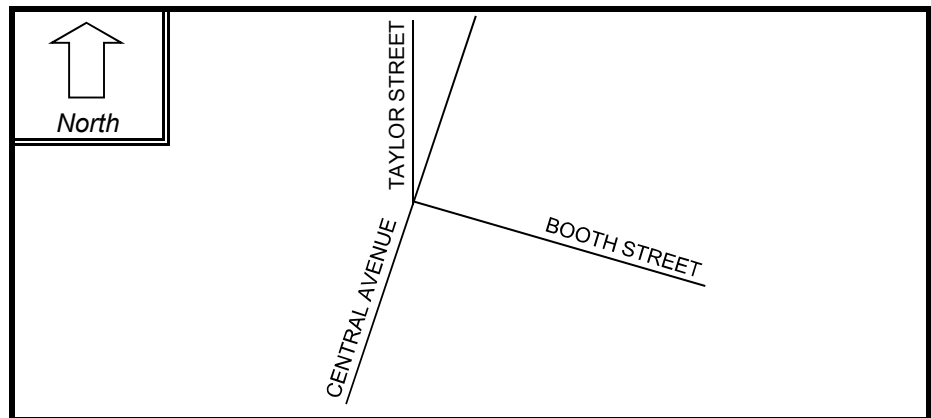
~ INTERSECTION DATA ~

MAJOR STREET : CENTRAL AVENUE

MINOR STREET(S) : BOOTH STREET

TAYLOR STREET

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	WB	Taylor St (SB)		
PEAK HOURLY VOLUMES* (AM/PM) :	970	189	6	29		1,194

" K " FACTOR : INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME* :

TOTAL # OF CRASHES : # OF YEARS : AVERAGE # OF CRASHES PER YEAR (A) :

CRASH RATE CALCULATION :

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : AM PEAK HOUR USED

Project Title & Date: HILLSIDE ELEMENTARY SCHOOL, NEEDHAM

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : NEEDHAM COUNT DATE : Sep-15

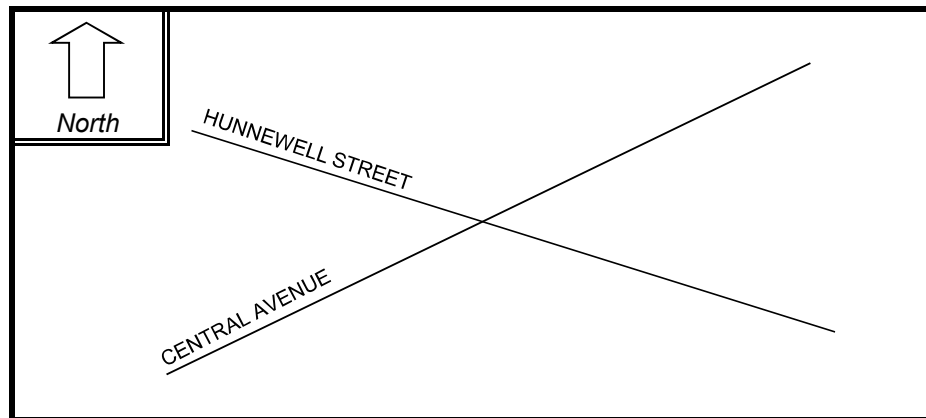
DISTRICT : 6 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : CENTRAL AVENUE

MINOR STREET(S) : HUNNEWELL STREET

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NE	SW	SE	NW		
PEAK HOURLY VOLUMES* (AM/PM) :	956	154	160	183		1,453

" K " FACTOR : INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME* :

TOTAL # OF CRASHES : # OF YEARS : AVERAGE # OF CRASHES PER YEAR (A) :

CRASH RATE CALCULATION :

0.15

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

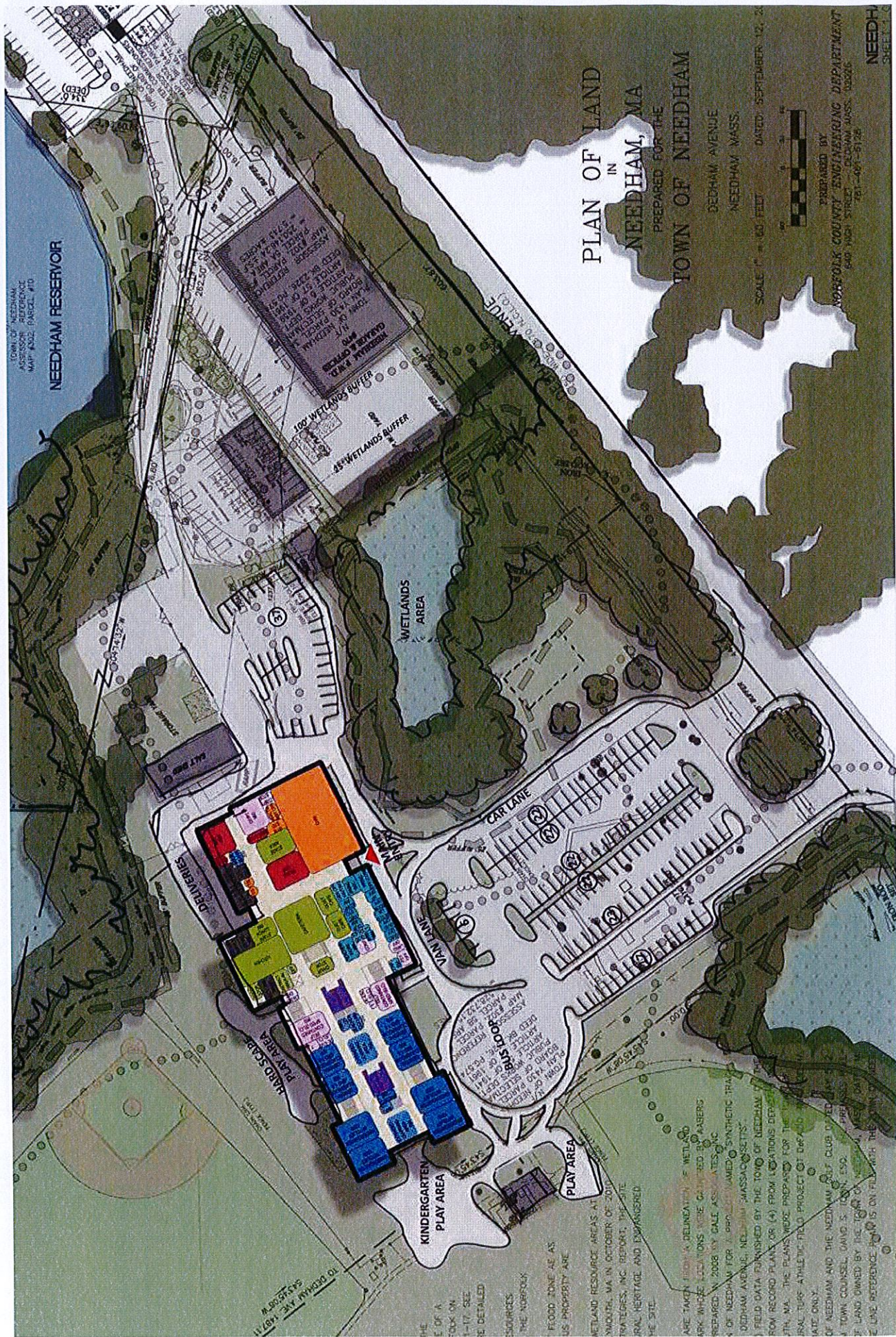
Comments : AM PEAK HOUR USED

Project Title & Date: HILLSIDE ELEMENTARY SCHOOL, NEEDHAM

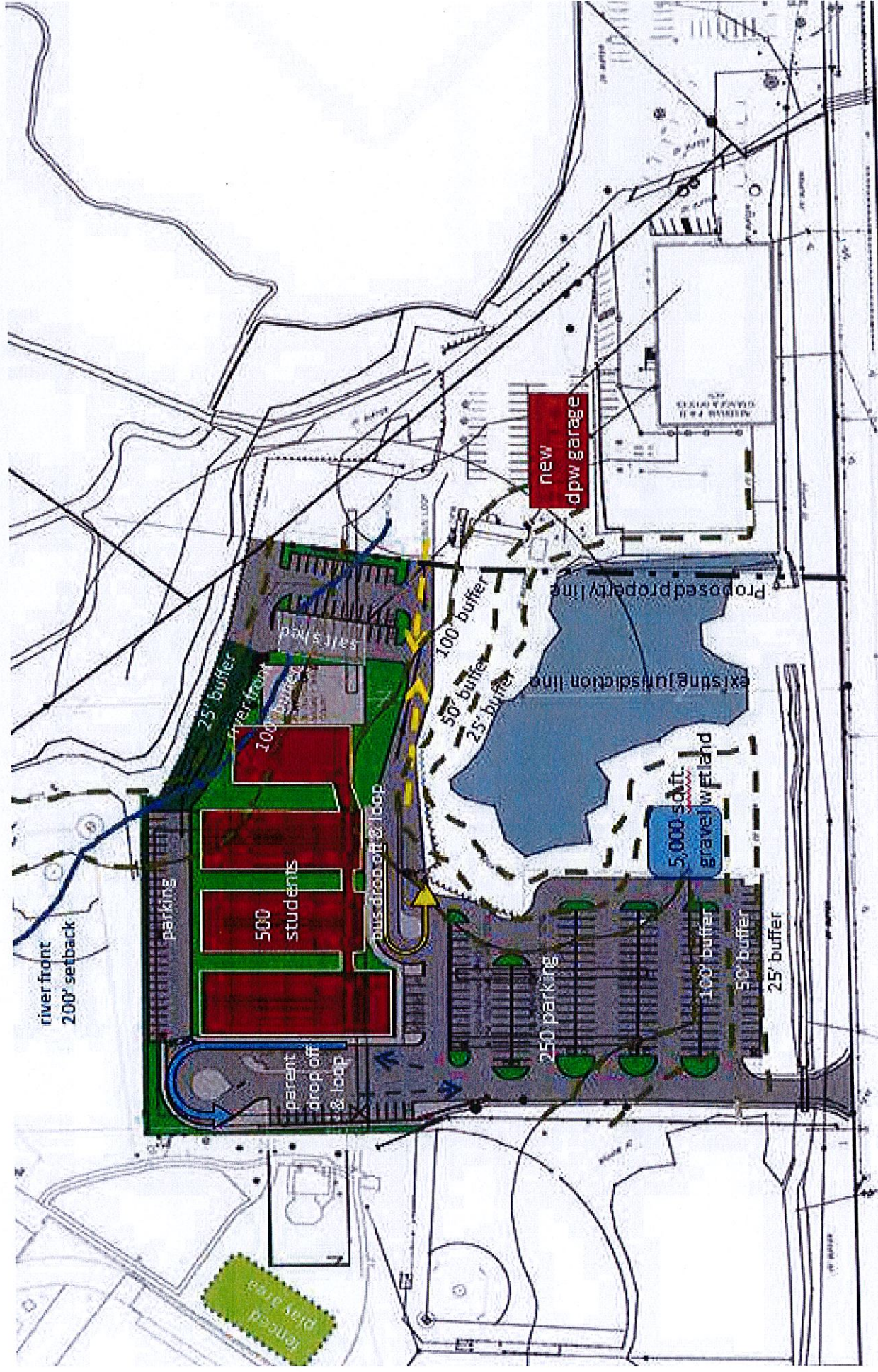
Hillside Elementary School Options



Option A - C3: New School on Expanded Site
113 Parking Spaces



Option B - E1A / E2A + H3: DeFazio East
171 Parking Spaces



Option C - Swing Space at DeFazio Park
 250 Parking Spaces



Option D - J3: Central Avenue Site
81 Parking Spaces

Traffic Signal Warrant Analysis

Traffic Control Signal Warrant Analyses

(Based on MUTCD-2009 Edition)

Print Date: 10/13/15

Print Time: 4:09 PM

Intersection:

Central Avenue at West Street

Population <10,000?

No

Count Date:

9/9/2015

Analysis Date:

10/13/15

Speed:

30 mph

Analysis Year:

2020

Analyst:

NHH

Adjustment Factor:

1

Is Major? #Lanes (1w)

EB	N	0
WB	N	1
NB	Y	1
SB	Y	1

Major Lanes: 1

Minor Lanes: 1

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	0	0	88	0	951	0	82	250	0
8:00	0	0	0	75	0	302	0	587	237	216	194	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	84	0	219	0	249	79	268	292	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0

Time	Σ EB	Σ WB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	0	88	951	332	1284	88	88	N	Y	N	Y	N
8:00	0	377	824	410	1234	377	377	Y	Y	Y	Y	Y
9:00	0	0	0	0	0	0	0	N	N	N	N	N
10:00	0	0	0	0	0	0	0	N	N	N	N	N
11:00	0	0	0	0	0	0	0	N	N	N	N	N
12:00	0	0	0	0	0	0	0	N	N	N	N	N
13:00	0	0	0	0	0	0	0	N	N	N	N	N
14:00	0	303	328	560	888	0	303	Y	Y	Y	Y	Y
15:00	0	0	0	0	0	0	0	N	N	N	N	N
16:00	0	0	0	0	0	0	0	N	N	N	N	N
17:00	0	0	0	0	0	0	0	N	N	N	N	N

2 of 8 3 of 8 2 of 8 3 of 4 2 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Not Met

Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Not Met

Warrant 1: Combination of Warrants 1A and 1B is Not Met

Warrant 2: Four-Hour Warrant is Not Met

Warrant 3: One-Hour Warrant is Met

Traffic Control Signal Warrant Analyses

(Based on MUTCD-2009 Edition)

Print Date: 10/13/15

Print Time: 3:58 PM

Intersection:

Central Avenue at Proposed Site Driveway

Population <10,000?

No

Count Date: 9/9/2015

Analysis Date: 10/13/15

Speed:

30 mph

Analysis Year: 2020

Analyst: NHH

Adjustment Factor: 1

	Is Major?	#Lanes (1w)
EB	N	1
WB	N	0
NB	Y	1
SB	Y	1

Major Lanes: 1

Minor Lanes: 1

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	22	0	0	0	0	0	0	1,042	0	0	230	22
8:00	83	0	63	0	0	0	100	840	0	0	308	137
9:00	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
14:00	34	74	0	0	0	0	35	427	0	0	503	59
15:00	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0

Time	Σ EB	Σ WB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	22	0	1042	252	1294	22	22	N	N	N	N	N
8:00	146	0	940	445	1385	146	146	N	Y	Y	Y	Y
9:00	0	0	0	0	0	0	0	N	N	N	N	N
10:00	0	0	0	0	0	0	0	N	N	N	N	N
11:00	0	0	0	0	0	0	0	N	N	N	N	N
12:00	0	0	0	0	0	0	0	N	N	N	N	N
13:00	0	0	0	0	0	0	0	N	N	N	N	N
14:00	108	0	462	562	1024	0	108	N	Y	N	Y	N
15:00	0	0	0	0	0	0	0	N	N	N	N	N
16:00	0	0	0	0	0	0	0	N	N	N	N	N
17:00	0	0	0	0	0	0	0	N	N	N	N	N
								0 of 8	2 of 8	1 of 8	2 of 4	1 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Not Met

Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Not Met

Warrant 1: Combination of Warrants 1A and 1B is Not Met

Warrant 2: Four-Hour Warrant is Not Met

Warrant 3: One-Hour Warrant is Met

Traffic Control Signal Warrant Analyses

(Based on MUTCD-2009 Edition)

Print Date: 10/13/15

Print Time: 3:54 PM

Intersection:

Central Avenue at Hunnewell Street

Population <10,000?

No

Count Date:

9/9/2015

Analysis Date:

10/13/15

Speed:

30 mph

Analysis Year:

2020

Analyst:

NHH

Adjustment Factor:

1

Is Major? #Lanes (1w)

EB	N	1
WB	N	1
NB	Y	1
SB	Y	1

Major Lanes:

1

Minor Lanes:

1

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	34	0	0	0	0	43	0	649	0	19	154	4
8:00	0	0	0	75	0	302	0	587	237	216	194	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	84	0	219	0	249	79	268	292	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0

Time	Σ EB	Σ WB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	34	43	649	177	826	77	43	N	N	N	N	N
8:00	0	377	824	410	1234	377	377	Y	Y	Y	Y	Y
9:00	0	0	0	0	0	0	0	N	N	N	N	N
10:00	0	0	0	0	0	0	0	N	N	N	N	N
11:00	0	0	0	0	0	0	0	N	N	N	N	N
12:00	0	0	0	0	0	0	0	N	N	N	N	N
13:00	0	0	0	0	0	0	0	N	N	N	N	N
14:00	0	303	328	560	888	0	303	Y	Y	Y	Y	Y
15:00	0	0	0	0	0	0	0	N	N	N	N	N
16:00	0	0	0	0	0	0	0	N	N	N	N	N
17:00	0	0	0	0	0	0	0	N	N	N	N	N
								2 of 8	2 of 8	2 of 8	2 of 4	2 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Not Met

Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Not Met

Warrant 1: Combination of Warrants 1A and 1B is Not Met

Warrant 2: Four-Hour Warrant is Not Met

Warrant 3: One-Hour Warrant is Met

Section A-6

Capacity Analysis

Lanes, Volumes, Timings

1: Central Ave & West St

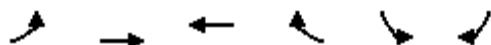
10/2/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	117	26	908	230	20	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.976		0.973			
Flt Protected	0.961					0.996
Satd. Flow (prot)	1747	0	1812	0	0	1855
Flt Permitted	0.961					0.996
Satd. Flow (perm)	1747	0	1812	0	0	1855
Link Speed (mph)	30		30			30
Link Distance (ft)	2024		232			2583
Travel Time (s)	46.0		5.3			58.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	28	987	250	22	242
Shared Lane Traffic (%)						
Lane Group Flow (vph)	155	0	1237	0	0	264
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	76.5%			ICU Level of Service D		
Analysis Period (min)	15					

Lanes, Volumes, Timings

6: West St & Glen Gary

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	327	220	4	49	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.998		0.944	
Flt Protected		0.999			0.972	
Satd. Flow (prot)	0	1861	1859	0	1709	0
Flt Permitted		0.999			0.972	
Satd. Flow (perm)	0	1861	1859	0	1709	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2024	262		334	
Travel Time (s)		46.0	6.0		7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	355	239	4	53	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	359	243	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

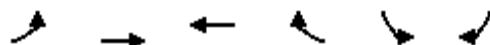
Intersection Capacity Utilization 31.9% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

7: West St & McCulloch

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	32	295	224	63	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.970			
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	1853	1807	0	1770	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	1853	1807	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		262	435		536	
Travel Time (s)		6.0	9.9		12.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	321	243	68	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	356	311	0	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.2% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
8: Central Ave & Hunnewell St

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	32	90	38	25	117	41	333	607	16	19	136	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.968			0.969			0.996			0.997	
Flt Protected		0.990			0.993		0.950				0.994	
Satd. Flow (prot)	0	1785	0	0	1792	0	1770	1855	0	0	1846	0
Flt Permitted		0.763			0.890		0.609				0.731	
Satd. Flow (perm)	0	1376	0	0	1606	0	1134	1855	0	0	1358	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			11			2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		551			930			566			380	
Travel Time (s)		12.5			21.1			12.9			8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	98	41	27	127	45	362	660	17	21	148	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	0	0	199	0	362	677	0	0	173	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		10			14		5	2			6	
Permitted Phases	10			14			2			6		
Detector Phase	10	10		14	14		5	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	7.0		7.0	7.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	

Baseline

Synchro 8 Report
Page 4

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0

Lanes, Volumes, Timings
8: Central Ave & Hunnewell St

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Total Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	
Total Split (%)	21.7%	21.7%		21.7%	21.7%		21.7%	60.9%		39.1%	39.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
Yellow Time (s)	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	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		17.4			17.4		65.1	65.1			40.0	
Actuated g/C Ratio		0.15			0.15		0.58	0.58			0.36	
v/c Ratio		0.78			0.77		0.47	0.63			0.36	
Control Delay		66.5			63.4		18.0	19.5			29.8	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		66.5			63.4		18.0	19.5			29.8	
LOS		E			E		B	B			C	
Approach Delay		66.5			63.4			19.0			29.8	
Approach LOS		E			E			B			C	
90th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
90th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
70th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
70th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
50th %ile Green (s)	19.2	19.2		19.2	19.2		20.0	65.0		40.0	40.0	
50th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
30th %ile Green (s)	16.1	16.1		16.1	16.1		20.0	65.0		40.0	40.0	
30th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
10th %ile Green (s)	12.0	12.0		12.0	12.0		20.0	65.0		40.0	40.0	
10th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
Stops (vph)		139			162		171	404			114	
Fuel Used(gal)		4			5		4	7			2	
CO Emissions (g/hr)		253			320		254	521			145	
NOx Emissions (g/hr)		49			62		49	101			28	
VOC Emissions (g/hr)		59			74		59	121			33	
Dilemma Vehicles (#)		0			0		0	0			0	
Queue Length 50th (ft)		114			132		137	319			93	
Queue Length 95th (ft)		#211			#227		203	452			157	
Internal Link Dist (ft)		471			850			486			300	
Turn Bay Length (ft)												
Base Capacity (vph)		254			295		768	1073			484	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.69			0.67		0.47	0.63			0.36	

Lanes, Volumes, Timings

8: Central Ave & Hunnewell St

10/2/2015

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 112.5

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 30.9

Intersection LOS: C

Intersection Capacity Utilization 67.4%

ICU Level of Service C

Analysis Period (min) 15

90th %ile Actuated Cycle: 115

70th %ile Actuated Cycle: 115

50th %ile Actuated Cycle: 114.2

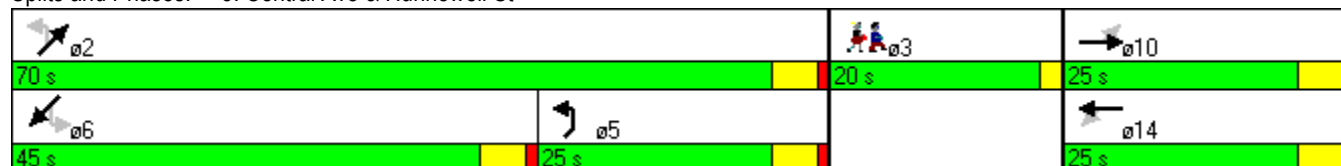
30th %ile Actuated Cycle: 111.1

10th %ile Actuated Cycle: 107

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

Queue shown is maximum after two cycles.

Splits and Phases: 8: Central Ave & Hunnewell St



Lane Group	ø3
Total Split (s)	20.0
Total Split (%)	17%
Maximum Green (s)	18.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	0.2
Recall Mode	Ped
Walk Time (s)	5.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	6
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	18.0
90th %ile Term Code	Ped
70th %ile Green (s)	18.0
70th %ile Term Code	Ped
50th %ile Green (s)	18.0
50th %ile Term Code	Ped
30th %ile Green (s)	18.0
30th %ile Term Code	Ped
10th %ile Green (s)	18.0
10th %ile Term Code	Ped
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Lanes, Volumes, Timings

11: Booth St & Taylor St & Central Ave

10/2/2015



Lane Group	WBL	WBR	SBL	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Volume (vph)	1	5	0	29	0	969	1	0	189	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887			0.865						
Flt Protected	0.992									
Satd. Flow (prot)	1639	0	0	1611	0	1863	0	0	1863	0
Flt Permitted	0.992									
Satd. Flow (perm)	1639	0	0	1611	0	1863	0	0	1863	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	458		450			2583			566	
Travel Time (s)	10.4		10.2			58.7			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	5	0	32	0	1053	1	0	205	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	6	0	0	32	0	1054	0	0	205	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		0			0			0	
Link Offset(ft)	0		0			0			0	
Crosswalk Width(ft)	16		16			16			16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15		9	15		9
Sign Control	Stop		Yield			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 61.1% ICU Level of Service B

Analysis Period (min) 15

Lanes, Volumes, Timings
1: Central Ave/Cenytal Ave & West St

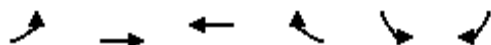
10/2/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	33	407	199	52	578
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980		0.956			
Flt Protected	0.959					0.996
Satd. Flow (prot)	1751	0	1781	0	0	1855
Flt Permitted	0.959					0.996
Satd. Flow (perm)	1751	0	1781	0	0	1855
Link Speed (mph)	30		30			30
Link Distance (ft)	2024		232			2583
Travel Time (s)	46.0		5.3			58.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	36	442	216	57	628
Shared Lane Traffic (%)						
Lane Group Flow (vph)	241	0	658	0	0	685
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	89.3%			ICU Level of Service E		
Analysis Period (min)	15					

Lanes, Volumes, Timings

6: West St & Glen Gary

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	257	228	4	55	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.998		0.955	
Flt Protected		0.999			0.968	
Satd. Flow (prot)	0	1861	1859	0	1722	0
Flt Permitted		0.999			0.968	
Satd. Flow (perm)	0	1861	1859	0	1722	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2024	262		334	
Travel Time (s)		46.0	6.0		7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	279	248	4	60	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	283	252	0	90	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

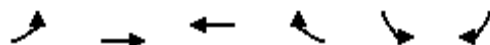
Intersection Capacity Utilization 28.2% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

7: West St & McCulloch

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	30	288	233	60	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.972			
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	1853	1811	0	1770	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	1853	1811	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		262	435		536	
Travel Time (s)		6.0	9.9		12.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	313	253	65	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	346	318	0	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.1% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
8: Hunnewell St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	25	131	189	30	92	28	112	277	27	38	323	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.926			0.975			0.987			0.992	
Flt Protected		0.996			0.990		0.950				0.995	
Satd. Flow (prot)	0	1718	0	0	1798	0	1770	1839	0	0	1839	0
Flt Permitted		0.957			0.559		0.380				0.935	
Satd. Flow (perm)	0	1651	0	0	1015	0	708	1839	0	0	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			9			7			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		551			930			566			380	
Travel Time (s)		12.5			21.1			12.9			8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	142	205	33	100	30	122	301	29	41	351	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	374	0	0	163	0	122	330	0	0	417	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		10			14		5	2			6	
Permitted Phases	10			14			2			6		
Detector Phase	10	10		14	14		5	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	7.0		7.0	7.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0

Lanes, Volumes, Timings
8: Hunnewell St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Total Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	
Total Split (%)	21.7%	21.7%		21.7%	21.7%		21.7%	60.9%		39.1%	39.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
Yellow Time (s)	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	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		20.0			20.0		65.0	65.0			40.0	
Actuated g/C Ratio		0.17			0.17		0.57	0.57			0.35	
v/c Ratio		1.15			0.89		0.21	0.32			0.69	
Control Delay		135.2			88.0		14.6	14.0			39.1	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		135.2			88.0		14.6	14.0			39.1	
LOS		F			F		B	B			D	
Approach Delay		135.2			88.0			14.1			39.1	
Approach LOS		F			F			B			D	
90th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
90th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
70th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
70th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
50th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
50th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
30th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
30th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
10th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
10th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
Stops (vph)		247			121		51	151			323	
Fuel Used(gal)		12			4		1	3			6	
CO Emissions (g/hr)		860			311		78	213			418	
NOx Emissions (g/hr)		167			60		15	41			81	
VOC Emissions (g/hr)		199			72		18	49			97	
Dilemma Vehicles (#)		0			0		0	0			0	
Queue Length 50th (ft)		~297			113		40	120			261	
Queue Length 95th (ft)		#490			#244		70	178			379	
Internal Link Dist (ft)		471			850			486			300	
Turn Bay Length (ft)												
Base Capacity (vph)		325			183		584	1042			603	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		1.15			0.89		0.21	0.32			0.69	

Lanes, Volumes, Timings

8: Hunnewell St & Central Ave

10/2/2015

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 62.3

Intersection LOS: E

Intersection Capacity Utilization 71.0%

ICU Level of Service C

Analysis Period (min) 15

90th %ile Actuated Cycle: 115

70th %ile Actuated Cycle: 115

50th %ile Actuated Cycle: 115

30th %ile Actuated Cycle: 115

10th %ile Actuated Cycle: 115

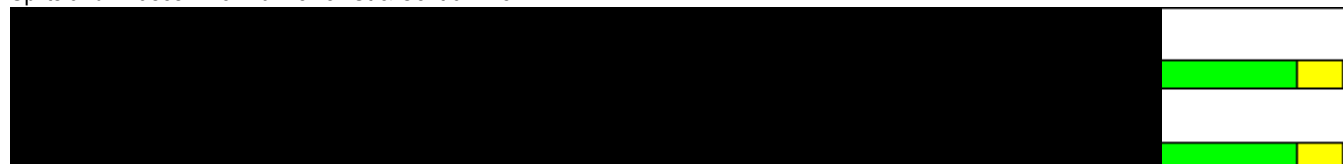
~ Volume exceeds capacity, queue is theoretically infinite.

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: 8: Hunnewell St & Central Ave



Lane Group	ø3
Total Split (s)	20.0
Total Split (%)	17%
Maximum Green (s)	18.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	0.2
Recall Mode	Ped
Walk Time (s)	5.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	6
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	18.0
90th %ile Term Code	Ped
70th %ile Green (s)	18.0
70th %ile Term Code	Ped
50th %ile Green (s)	18.0
50th %ile Term Code	Ped
30th %ile Green (s)	18.0
30th %ile Term Code	Ped
10th %ile Green (s)	18.0
10th %ile Term Code	Ped
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Lanes, Volumes, Timings
11: Cenyrtral Ave & Booth St & Taylor St

10/2/2015



Lane Group	WBL	WBR	SBL	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Volume (vph)	7	2	0	74	0	417	7	6	535	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973			0.865		0.998				
Flt Protected	0.962								0.999	
Satd. Flow (prot)	1744	0	0	1611	0	1859	0	0	1861	0
Flt Permitted	0.962								0.999	
Satd. Flow (perm)	1744	0	0	1611	0	1859	0	0	1861	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	458		450			2583			566	
Travel Time (s)	10.4		10.2			58.7			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	0	80	0	453	8	7	582	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	10	0	0	80	0	461	0	0	589	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		0			0			0	
Link Offset(ft)	0		0			0			0	
Crosswalk Width(ft)	16		16			16			16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15		9	15		9
Sign Control	Stop		Yield			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 42.9% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
1: West St & Central Ave

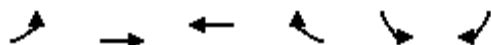
10/2/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	120	27	931	236	21	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.975		0.973			
Flt Protected	0.961					0.996
Satd. Flow (prot)	1745	0	1812	0	0	1855
Flt Permitted	0.961					0.996
Satd. Flow (perm)	1745	0	1812	0	0	1855
Link Speed (mph)	30		30			30
Link Distance (ft)	2024		232			2583
Travel Time (s)	46.0		5.3			58.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	29	1012	257	23	249
Shared Lane Traffic (%)						
Lane Group Flow (vph)	159	0	1269	0	0	272
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	78.3%			ICU Level of Service D		
Analysis Period (min)	15					

Lanes, Volumes, Timings

6: West St & Glen Gary

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	335	226	4	49	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.998		0.944	
Flt Protected		0.999			0.972	
Satd. Flow (prot)	0	1861	1859	0	1709	0
Flt Permitted		0.999			0.972	
Satd. Flow (perm)	0	1861	1859	0	1709	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2024	262		334	
Travel Time (s)		46.0	6.0		7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	364	246	4	53	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	368	250	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

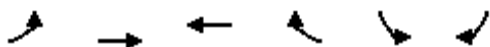
Control Type: Unsignalized

Intersection Capacity Utilization 32.3% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
7: West St & McCulloch St

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	32	302	230	63	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.971			
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	1853	1809	0	1770	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	1853	1809	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		262	435		536	
Travel Time (s)		6.0	9.9		12.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	328	250	68	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	363	318	0	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.9% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
8: Hunnewell St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	33	92	39	26	120	42	341	622	16	19	139	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.968			0.970			0.996			0.997	
Flt Protected		0.990			0.993		0.950				0.994	
Satd. Flow (prot)	0	1785	0	0	1794	0	1770	1855	0	0	1846	0
Flt Permitted		0.757			0.885		0.605				0.704	
Satd. Flow (perm)	0	1365	0	0	1599	0	1127	1855	0	0	1307	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			11			2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		551			930			566			380	
Travel Time (s)		12.5			21.1			12.9			8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	100	42	28	130	46	371	676	17	21	151	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	178	0	0	204	0	371	693	0	0	176	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		10			14		5	2			6	
Permitted Phases	10			14			2			6		
Detector Phase	10	10		14	14		5	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	7.0		7.0	7.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0

Lanes, Volumes, Timings
8: Hunnewell St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Total Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	
Total Split (%)	21.7%	21.7%		21.7%	21.7%		21.7%	60.9%		39.1%	39.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
Yellow Time (s)	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	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		17.7			17.7		65.0	65.0			40.0	
Actuated g/C Ratio		0.16			0.16		0.58	0.58			0.35	
v/c Ratio		0.79			0.78		0.49	0.65			0.38	
Control Delay		67.5			64.3		18.5	20.1			30.5	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		67.5			64.3		18.5	20.1			30.5	
LOS		E			E		B	C			C	
Approach Delay		67.5			64.3			19.5			30.5	
Approach LOS		E			E			B			C	
90th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
90th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
70th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
70th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
50th %ile Green (s)	19.8	19.8		19.8	19.8		20.0	65.0		40.0	40.0	
50th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
30th %ile Green (s)	16.7	16.7		16.7	16.7		20.0	65.0		40.0	40.0	
30th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
10th %ile Green (s)	12.5	12.5		12.5	12.5		20.0	65.0		40.0	40.0	
10th %ile Term Code	Hold	Hold		Gap	Gap		Hold	MaxR		MaxR	MaxR	
Stops (vph)		141			164		176	421			119	
Fuel Used(gal)		4			5		4	8			2	
CO Emissions (g/hr)		261			331		263	542			150	
NOx Emissions (g/hr)		51			64		51	105			29	
VOC Emissions (g/hr)		61			77		61	126			35	
Dilemma Vehicles (#)		0			0		0	0			0	
Queue Length 50th (ft)		117			136		143	336			97	
Queue Length 95th (ft)		#220			#238		209	470			161	
Internal Link Dist (ft)		471			850			486			300	
Turn Bay Length (ft)												
Base Capacity (vph)		252			292		763	1070			464	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.71			0.70		0.49	0.65			0.38	

Lanes, Volumes, Timings

8: Hunnewell St & Central Ave

10/2/2015

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 112.8

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 31.6

Intersection LOS: C

Intersection Capacity Utilization 68.7%

ICU Level of Service C

Analysis Period (min) 15

90th %ile Actuated Cycle: 115

70th %ile Actuated Cycle: 115

50th %ile Actuated Cycle: 114.8

30th %ile Actuated Cycle: 111.7

10th %ile Actuated Cycle: 107.5

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

Queue shown is maximum after two cycles.

Splits and Phases: 8: Hunnewell St & Central Ave

 ø2	 ø3	 ø10
70 s	20 s	25 s
 ø6	 ø5	 ø14
45 s	25 s	25 s

Lane Group	ø3
Total Split (s)	20.0
Total Split (%)	17%
Maximum Green (s)	18.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	0.2
Recall Mode	Ped
Walk Time (s)	5.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	6
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	18.0
90th %ile Term Code	Ped
70th %ile Green (s)	18.0
70th %ile Term Code	Ped
50th %ile Green (s)	18.0
50th %ile Term Code	Ped
30th %ile Green (s)	18.0
30th %ile Term Code	Ped
10th %ile Green (s)	18.0
10th %ile Term Code	Ped
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Lanes, Volumes, Timings
11: Central Ave & Booth St & Taylor St

10/2/2015



Lane Group	WBL	WBR	SBL	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Volume (vph)	1	5	0	30	0	993	1	0	194	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.887			0.865						
Flt Protected	0.992									
Satd. Flow (prot)	1639	0	0	1611	0	1863	0	0	1863	0
Flt Permitted	0.992									
Satd. Flow (perm)	1639	0	0	1611	0	1863	0	0	1863	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	458		450			2583			566	
Travel Time (s)	10.4		10.2			58.7			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	5	0	33	0	1079	1	0	211	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	6	0	0	33	0	1080	0	0	211	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		0			0			0	
Link Offset(ft)	0		0			0			0	
Crosswalk Width(ft)	16		16			16			16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15		9	15		9
Sign Control	Stop		Yield			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 62.3% ICU Level of Service B

Analysis Period (min) 15

Lanes, Volumes, Timings

1: West St & Central Ave

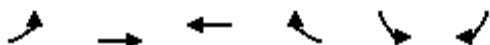
10/2/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	194	34	417	204	53	592
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980		0.956			
Flt Protected	0.959					0.996
Satd. Flow (prot)	1751	0	1781	0	0	1855
Flt Permitted	0.959					0.996
Satd. Flow (perm)	1751	0	1781	0	0	1855
Link Speed (mph)	30		30			30
Link Distance (ft)	2024		232			2583
Travel Time (s)	46.0		5.3			58.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	37	453	222	58	643
Shared Lane Traffic (%)						
Lane Group Flow (vph)	248	0	675	0	0	701
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	91.3%			ICU Level of Service F		
Analysis Period (min)	15					

Lanes, Volumes, Timings

6: West St & Glen Gary

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	264	230	4	55	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.998		0.955	
Flt Protected		0.999			0.968	
Satd. Flow (prot)	0	1861	1859	0	1722	0
Flt Permitted		0.999			0.968	
Satd. Flow (perm)	0	1861	1859	0	1722	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2024	262		334	
Travel Time (s)		46.0	6.0		7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	287	250	4	60	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	291	254	0	90	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

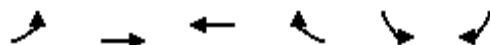
Intersection Capacity Utilization 28.5% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

7: West St & McColluch

10/2/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	30	294	234	60	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.972			
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	1853	1811	0	1770	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	1853	1811	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		262	435		536	
Travel Time (s)		6.0	9.9		12.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	320	254	65	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	353	319	0	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.4% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
8: Hunnewel St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	26	134	194	31	94	29	115	384	28	39	331	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.926			0.974			0.990			0.992	
Flt Protected		0.996			0.990		0.950				0.995	
Satd. Flow (prot)	0	1718	0	0	1796	0	1770	1844	0	0	1839	0
Flt Permitted		0.953			0.555		0.372				0.868	
Satd. Flow (perm)	0	1644	0	0	1007	0	693	1844	0	0	1604	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			9			5			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		551			930			566			380	
Travel Time (s)		12.5			21.1			12.9			8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	146	211	34	102	32	125	417	30	42	360	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	385	0	0	168	0	125	447	0	0	428	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		10			14		5	2			6	
Permitted Phases	10			14			2			6		
Detector Phase	10	10		14	14		5	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	7.0		7.0	7.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0

Lanes, Volumes, Timings
8: Hunnewel St & Central Ave

10/2/2015

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Total Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	
Total Split (%)	21.7%	21.7%		21.7%	21.7%		21.7%	60.9%		39.1%	39.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
Yellow Time (s)	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	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		20.0			20.0		65.0	65.0			40.0	
Actuated g/C Ratio		0.17			0.17		0.57	0.57			0.35	
v/c Ratio		1.19			0.92		0.22	0.43			0.77	
Control Delay		149.8			94.6		14.8	15.8			43.6	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		149.8			94.6		14.8	15.8			43.6	
LOS		F			F		B	B			D	
Approach Delay		149.8			94.6			15.5			43.6	
Approach LOS		F			F			B			D	
90th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
90th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
70th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
70th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
50th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
50th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
30th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
30th %ile Term Code	Max	Max		Max	Max		Hold	MaxR		MaxR	MaxR	
10th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
10th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
Stops (vph)		252			125		52	224			342	
Fuel Used(gal)		14			5		1	4			7	
CO Emissions (g/hr)		958			335		80	305			458	
NOx Emissions (g/hr)		186			65		16	59			89	
VOC Emissions (g/hr)		222			78		18	71			106	
Dilemma Vehicles (#)		0			0		0	0			0	
Queue Length 50th (ft)		~315			118		41	178			278	
Queue Length 95th (ft)		#510			#253		71	255			406	
Internal Link Dist (ft)		471			850			486			300	
Turn Bay Length (ft)												
Base Capacity (vph)		323			182		579	1044			559	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		1.19			0.92		0.22	0.43			0.77	

Lanes, Volumes, Timings

8: Hunnewel St & Central Ave

10/2/2015

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.19

Intersection Signal Delay: 65.1

Intersection LOS: E

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 115

70th %ile Actuated Cycle: 115

50th %ile Actuated Cycle: 115

30th %ile Actuated Cycle: 115

10th %ile Actuated Cycle: 115

~ 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: 8: Hunnewel St & Central Ave

 ø2 70 s	 ø3 20 s	 ø10 25 s
 ø6 45 s	 ø5 25 s	 ø14 25 s

Lane Group	ø3
Total Split (s)	20.0
Total Split (%)	17%
Maximum Green (s)	18.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	0.2
Recall Mode	Ped
Walk Time (s)	5.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	6
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	18.0
90th %ile Term Code	Ped
70th %ile Green (s)	18.0
70th %ile Term Code	Ped
50th %ile Green (s)	18.0
50th %ile Term Code	Ped
30th %ile Green (s)	18.0
30th %ile Term Code	Ped
10th %ile Green (s)	18.0
10th %ile Term Code	Ped
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Lanes, Volumes, Timings

11: Central Ave & Booth St & Taylor St

10/2/2015



Lane Group	WBL	WBR	SBL	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	W	R	L	R	L	R	R	L	R	R
Volume (vph)	7	2	0	76	0	427	7	6	548	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973			0.865		0.998				
Flt Protected	0.962								0.999	
Satd. Flow (prot)	1744	0	0	1611	0	1859	0	0	1861	0
Flt Permitted	0.962								0.999	
Satd. Flow (perm)	1744	0	0	1611	0	1859	0	0	1861	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	458		450			2583			566	
Travel Time (s)	10.4		10.2			58.7			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	0	83	0	464	8	7	596	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	10	0	0	83	0	472	0	0	603	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		0			0			0	
Link Offset(ft)	0		0			0			0	
Crosswalk Width(ft)	16		16			16			16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15		9	15		9
Sign Control	Stop		Yield			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 43.6% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

15:

10/5/2015

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	21	80	80	991	219	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.893				0.988	
Flt Protected	0.990			0.996		
Satd. Flow (prot)	1647	0	0	1855	1840	0
Flt Permitted	0.990			0.996		
Satd. Flow (perm)	1647	0	0	1855	1840	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	332			1622	950	
Travel Time (s)	7.5			36.9	21.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	87	87	1077	238	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	0	0	1164	261	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	85.5%			ICU Level of Service E		
Analysis Period (min)	15					

Lanes, Volumes, Timings

1:

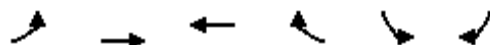
10/5/2015

						
Lane Group	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Volume (vph)	117	86	110	597	426	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.943		0.886		0.960	
Flt Protected	0.972		0.992		0.966	
Satd. Flow (prot)	1707	0	1637	0	1727	0
Flt Permitted	0.972		0.992		0.966	
Satd. Flow (perm)	1707	0	1637	0	1727	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	2050		1622		274	
Travel Time (s)	46.6		36.9		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	93	120	649	463	196
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	769	0	659	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	99.3%			ICU Level of Service F		
Analysis Period (min)	15					

Lanes, Volumes, Timings

6:

10/5/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	2	288	286	2	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.999		0.932	
Flt Protected					0.976	
Satd. Flow (prot)	0	1863	1861	0	1694	0
Flt Permitted					0.976	
Satd. Flow (perm)	0	1863	1861	0	1694	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2050	254		318	
Travel Time (s)		46.6	5.8		7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	313	311	2	1	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	315	313	0	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.7% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

7:

10/5/2015



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	2	287	286	2	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.999		0.955	
Flt Protected					0.968	
Satd. Flow (prot)	0	1863	1861	0	1722	0
Flt Permitted					0.968	
Satd. Flow (perm)	0	1863	1861	0	1722	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		254	441		509	
Travel Time (s)		5.8	10.0		11.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	312	311	2	2	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	314	313	0	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.7% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

8:

10/5/2015

												
Lane Group	EBU	EBL	EBR	NWL2	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	25	131	189	39	92	28	112	287	36	38	333	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.926			0.976			0.983			0.989	
Flt Protected		0.978			0.960		0.950				0.995	
Satd. Flow (prot)	0	1687	0	0	1745	0	1770	1831	0	0	1833	0
Flt Permitted		0.978			0.960		0.398				0.938	
Satd. Flow (perm)	0	1687	0	0	1745	0	741	1831	0	0	1728	0
Right Turn on Red						Yes			Yes			Yes
Satd. Flow (RTOR)					85			9			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		554			879			577			420	
Travel Time (s)		12.6			20.0			13.1			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	142	205	42	100	30	122	312	39	41	362	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	374	0	0	172	0	122	351	0	0	439	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	R NA	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	9	15	9	15	15	9	15		9	15		9
Number of Detectors	1	1		1	1		1	2		1	2	
Detector Template	Left	Left		Left	Left		Left	Thru		Left	Thru	
Leading Detector (ft)	20	20		20	20		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	20		20	20		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		10!			14!		5	2			6	
Permitted Phases	10			14			2			6		
Detector Phase	10	10		14	14		5	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	

Lanes, Volumes, Timings

8:

10/5/2015

Lane Group	ø3
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0

Lanes, Volumes, Timings

8:

10/5/2015

												
Lane Group	EBU	EBL	EBR	NWL2	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Split (s)	25.0	25.0		25.0	25.0		25.0	70.0		45.0	45.0	
Total Split (%)	21.7%	21.7%		21.7%	21.7%		21.7%	60.9%		39.1%	39.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
Yellow Time (s)	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	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		20.0			20.0		65.0	65.0			40.0	
Actuated g/C Ratio		0.20			0.20		0.63	0.63			0.39	
v/c Ratio		1.14			0.42		0.18	0.30			0.65	
Control Delay		130.9			22.0		9.2	9.1			30.7	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		130.9			22.0		9.2	9.1			30.7	
LOS		F			C		A	A			C	
Approach Delay		130.9			22.0			9.1			30.7	
Approach LOS		F			C			A			C	
90th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
90th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
70th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
70th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
50th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
50th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
30th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
30th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
10th %ile Green (s)	20.0	20.0		20.0	20.0		20.0	65.0		40.0	40.0	
10th %ile Term Code	Max	Max		Hold	Hold		Hold	MaxR		MaxR	MaxR	
Stops (vph)		283			72		42	134			322	
Fuel Used(gal)		12			2		1	3			6	
CO Emissions (g/hr)		854			153		66	195			394	
NOx Emissions (g/hr)		166			30		13	38			77	
VOC Emissions (g/hr)		198			35		15	45			91	
Dilemma Vehicles (#)		0			0		0	0			0	
Queue Length 50th (ft)		~287			49		29	92			229	
Queue Length 95th (ft)		#469			112		51	140			339	
Internal Link Dist (ft)		474			799			497			340	
Turn Bay Length (ft)												
Base Capacity (vph)		329			408		670	1164			676	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		1.14			0.42		0.18	0.30			0.65	

Lanes, Volumes, Timings

8:

10/5/2015

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 102.5

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.14

Intersection Signal Delay: 48.4

Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 102.5

70th %ile Actuated Cycle: 102.5

50th %ile Actuated Cycle: 102.5

30th %ile Actuated Cycle: 102.5

10th %ile Actuated Cycle: 102.5

~ Volume exceeds capacity, queue is theoretically infinite.

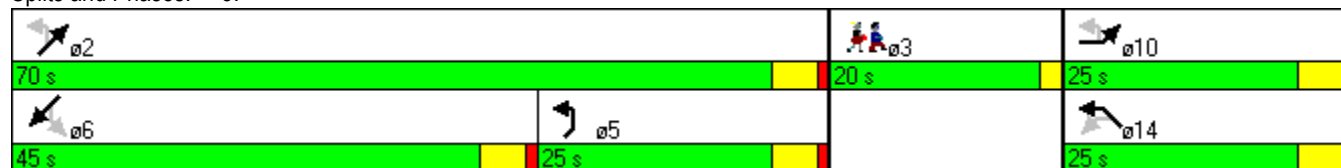
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 8:



Lanes, Volumes, Timings

8:

10/5/2015

Lane Group	ø3
Total Split (s)	20.0
Total Split (%)	17%
Maximum Green (s)	18.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Min
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	5.5
90th %ile Term Code	Gap
70th %ile Green (s)	5.5
70th %ile Term Code	Gap
50th %ile Green (s)	5.5
50th %ile Term Code	Gap
30th %ile Green (s)	5.5
30th %ile Term Code	Gap
10th %ile Green (s)	5.5
10th %ile Term Code	Gap
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Lanes, Volumes, Timings

11:

10/5/2015

										
Lane Group	WBL	WBR	NBT	NBR	NBR2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations										
Volume (vph)	7	2	0	436	7	0	74	6	554	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973			0.865						
Flt Protected	0.962								0.950	
Satd. Flow (prot)	1744	0	0	1611	0	0	1863	0	1770	0
Flt Permitted	0.962								0.950	
Satd. Flow (perm)	1744	0	0	1611	0	0	1863	0	1770	0
Link Speed (mph)	30		30				30		30	
Link Distance (ft)	458		950				324		577	
Travel Time (s)	10.4		21.6				7.4		13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	0	474	8	0	80	7	602	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	10	0	0	482	0	0	80	0	609	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Left	Right
Median Width(ft)	12		0				0		12	
Link Offset(ft)	0		0				0		0	
Crosswalk Width(ft)	16		16				16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	9	15		15	15	9
Sign Control	Stop		Free				Yield		Free	
Intersection Summary										
Area Type:	Other									
Control Type:	Unsignalized									
Intersection Capacity Utilization	48.3%					ICU Level of Service A				
Analysis Period (min)	15									

Lanes, Volumes, Timings

15:

10/5/2015

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	77	77	443	616	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.892				0.996	
Flt Protected	0.990			0.993		
Satd. Flow (prot)	1645	0	0	1850	1855	0
Flt Permitted	0.990			0.993		
Satd. Flow (perm)	1645	0	0	1850	1855	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	332			1622	950	
Travel Time (s)	7.5			36.9	21.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	84	84	482	670	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	0	0	566	691	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	76.9%			ICU Level of Service D		
Analysis Period (min)	15					

Mission Statement

We define ourselves by what we do – provide quality site, development, and infrastructure-related services – and, more importantly, by how we do it – with integrity, close personal attention to the needs and goals of our clients, commitment to professional standards, and, at all times, a pleasant demeanor and caring attitude.

Nitsch Engineering

2 Center Plaza, Suite 430, Boston, MA 02108

T: 617-338-0063

F: 617-338-6472

W: nitscheng.com

E: info@nitscheng.com