Appendix A

Trip Generation Analysis

Trip Generation Calculations

Independent Variable (X):	**213**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

Formula:	Ln (T) = A x Ln (X) + B	or T = C x X
or	*T = A x X + B*	

Where:	A=	B=	T=	C =	T =	ENTERING %	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Street Peak	*0.83*	*-28.88*	***148***	0.73	155	77%	*114*	*34*	*0.67*
Wkdy PM Street Peak	*0.78*	*-12.89*	***153***	0.74	158	36%	*55*	*98*	*0.75*
Wkdy AM Site Peak	*0.83*	*-17.71*	***159***	0.78	166	68%	*108*	*51*	*0.81*
Wkdy PM Site Peak	*0.76*	*-5.15*	***157***	0.75	160	52%	*81*	*75*	*0.83*
Wkdy Daily	*3.88*	*-20.7*	***806***	3.82	814	50%	*403*	*403*	*0.87*
Saturday Site Peak	0	0	1	2.26	**481**	50%	241	241	
Saturday Daily	0	0	1	1.49	**317**	50%	159	159	

Source: Trip Generation, Eighth Edition, Institute of Transportation Engineers, 2008.
Land Use Code 140 - Manufacturing

Trip Generation Calculations

Independent Variable (X):	**637**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

Formula:	Ln (T) = A x Ln (X) + B	or T = C x X
or	*T = A x X + B*	

Where:	A=	B=	T=	C =	T =	ENTERING %	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Peak	0.8	1.55	**825**	1.55	987	88%	726	99	0.83
Wkdy PM Peak	*1.12*	*78.81*	***792***	1.49	949	17%	*135*	*657*	*0.82*
Wkdy Daily	0.77	3.65	**5550**	11.01	7012	50%	2775	2775	0.59
Saturday Site Peak	0.81	-0.12	**166**	0.41	261	54%	89	76	0.80
Saturday Daily	*2.14*	*18.47*	***1381***	2.37	1509	50%	*691*	*691*	*0.66*

Source: Trip Generation, Eighth Edition, Institute of Transportation Engineers, 2008.
Land Use Code 710 - General Office Building

Trip Generation Calculations

Independent Variable (X):	**221**	Floor Area (KSF)
Dependent Variable (T):		Vehicle Trips

Formula:	Ln (T) = A x Ln (X) + B	or
or	*T = A x X + B*	

or T = C x X

Where:	A=	B=	T=	C =	T =	ENTERING %	ENTERING TRIPS *	EXITING TRIPS	R-Squared
Wkdy AM Peak Hour	0.88	0.88	**279**	1.24	275	83%	232	47	0.75
Wkdy PM Peak Hour	0.83	1.06	**255**	1.08	239	15%	38	217	0.78
Wkdy Daily	0.82	3.14	**1936**	8.11	1796	50%	968	968	0.72
Saturday Site Peak	*0.15*	*12.75*	***46***	0.24	53	50%	*23*	*23*	*0.66*
Saturday Daily	*1.27*	*104.92*	***386***	1.90	421	50%	*193*	*193*	*0.7*

Source: Trip Generation, Eighth Edition, Institute of Transportation Engineers, 2008.
Land Use Code 760 - Research and Development Center

Appendix B

Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis
1: Concord Ave & Rte 2 EB Ramp

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	198	176	116	0	0	329
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	215	191	126	0	0	358
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	126				748	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	126				748	126
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				100	61
cM capacity (veh/h)	1460				324	924

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	215	191	126	0	358
Volume Left	215	0	0	0	0
Volume Right	0	0	0	0	358
cSH	1460	1700	1700	1700	924
Volume to Capacity	0.15	0.11	0.07	0.00	0.39
Queue Length 95th (ft)	13	0	0	0	46
Control Delay (s)	7.9	0.0	0.0	0.0	11.3
Lane LOS	A				B
Approach Delay (s)	4.2		0.0		11.3
Approach LOS					B

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	167	278	125	115	259	668
Peak Hour Factor	0.90	0.90	0.77	0.77	0.94	0.94
Hourly flow rate (vph)	186	309	162	149	276	711
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	Raised					
Median storage veh)	0					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1499	237			312	
vC1, stage 1 conf vol	237					
vC2, stage 2 conf vol	1262					
vCu, unblocked vol	1499	237			312	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	61			78	
cM capacity (veh/h)	132	802			1249	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	186	309	312	276	711
Volume Left	186	0	0	276	0
Volume Right	0	309	149	0	0
cSH	132	802	1700	1249	1700
Volume to Capacity	1.41	0.39	0.18	0.22	0.42
Queue Length 95th (ft)	308	46	0	21	0
Control Delay (s)	283.3	12.3	0.0	8.7	0.0
Lane LOS	F	B		A	
Approach Delay (s)	114.0		0.0	2.4	
Approach LOS	F				

Intersection Summary			
Average Delay	32.8		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	10	7	7	172	14	58	45	157	220	102	723	13
Peak Hour Factor	0.60	0.60	0.60	0.91	0.91	0.91	0.87	0.87	0.87	0.88	0.88	0.88
Hourly flow rate (vph)	17	12	12	189	15	64	52	180	253	116	822	15
Pedestrians		6			4			1				
Lane Width (ft)		12.0			13.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1422	1608	836	1486	1489	311	842			437		
vC1, stage 1 conf vol	1067	1067		414	414							
vC2, stage 2 conf vol	355	541		1072	1074							
vCu, unblocked vol	1422	1608	836	1486	1489	311	842			437		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	91	97	0	88	91	93			90		
cM capacity (veh/h)	130	134	365	106	130	727	789			1118		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	17	23	189	15	64	52	433	116	836
Volume Left	17	0	189	0	0	52	0	116	0
Volume Right	0	12	0	0	64	0	253	0	15
cSH	130	196	106	130	727	789	1700	1118	1700
Volume to Capacity	0.13	0.12	1.78	0.12	0.09	0.07	0.25	0.10	0.49
Queue Length 95th (ft)	11	10	377	10	7	5	0	9	0
Control Delay (s)	36.8	25.9	456.5	36.4	10.4	9.9	0.0	8.6	0.0
Lane LOS	E	D	F	E	B	A		A	
Approach Delay (s)	30.4		326.4			1.1		1.0	
Approach LOS	D		F						

Intersection Summary			
Average Delay	51.7		
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	12	23	203	827	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	23	203	827	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1078	830	832			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1078	830	832			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	97			
cM capacity (veh/h)	235	370	801			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	226	832
Volume Left	0	23	0
Volume Right	12	0	5
cSH	370	801	1700
Volume to Capacity	0.03	0.03	0.49
Queue Length 95th (ft)	3	2	0
Control Delay (s)	15.0	1.3	0.0
Lane LOS	C	A	
Approach Delay (s)	15.0	1.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	273	452	394	406	98	111
Peak Hour Factor	0.91	0.91	0.94	0.94	0.89	0.89
Hourly flow rate (vph)	300	497	419	432	110	125
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			797		1819	548
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			797		1819	548
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			49		0	77
cM capacity (veh/h)			825		42	536

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	797	851	235
Volume Left	0	419	110
Volume Right	497	0	125
cSH	1700	825	82
Volume to Capacity	0.47	0.51	2.85
Queue Length 95th (ft)	0	73	573
Control Delay (s)	0.0	11.5	944.4
Lane LOS		B	F
Approach Delay (s)	0.0	11.5	944.4
Approach LOS			F

Intersection Summary			
Average Delay	123.0		
Intersection Capacity Utilization	107.5%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	384	0	0	772	28	23
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	384	0	0	772	28	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			384		1156	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			384		1156	384
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		87	97
cM capacity (veh/h)			1174		217	664

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	384	772	51
Volume Left	0	0	28
Volume Right	0	0	23
cSH	1700	1700	312
Volume to Capacity	0.23	0.45	0.16
Queue Length 95th (ft)	0	0	14
Control Delay (s)	0.0	0.0	18.8
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.8
Approach LOS			C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Hayden Ave & Rte 2 WB On-Ramp

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	208	67	168	320	0	0
Peak Hour Factor	0.88	0.88	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	236	76	187	356	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			312		965	236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			312		965	236
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		100	100
cM capacity (veh/h)			1248		240	803

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	236	76	187	356
Volume Left	0	0	187	0
Volume Right	0	76	0	0
cSH	1700	1700	1248	1700
Volume to Capacity	0.14	0.04	0.15	0.21
Queue Length 95th (ft)	0	0	13	0
Control Delay (s)	0.0	0.0	8.4	0.0
Lane LOS			A	
Approach Delay (s)	0.0		2.9	
Approach LOS				

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	277.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	111	0	0	405	338	521
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	128	0	0	500	363	560
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				Raised		
Median storage veh)					0	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			128		628	128
vC1, stage 1 conf vol					128	
vC2, stage 2 conf vol					500	
vCu, unblocked vol			128		628	128
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		6	39
cM capacity (veh/h)			1458		385	923

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	128	500	363	560
Volume Left	0	0	363	0
Volume Right	0	0	0	560
cSH	1700	1700	385	923
Volume to Capacity	0.08	0.29	0.94	0.61
Queue Length 95th (ft)	0	0	260	106
Control Delay (s)	0.0	0.0	65.8	14.7
Lane LOS			F	B
Approach Delay (s)	0.0	0.0	34.8	
Approach LOS			D	

Intersection Summary			
Average Delay	20.7		
Intersection Capacity Utilization	256.3%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Hayden Ave & Waltham Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	39	592	264	425	993	141
Peak Hour Factor	0.93	0.93	0.93	0.93	0.95	0.95
Hourly flow rate (vph)	42	637	284	457	1045	148
Pedestrians	2					
Lane Width (ft)	16.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	Raised					
Median storage veh)	0					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1918	599	1196			
vC1, stage 1 conf vol	1121					
vC2, stage 2 conf vol	796					
vCu, unblocked vol	1918	599	1196			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	53	0	51			
cM capacity (veh/h)	90	444	578			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	42	637	284	228	228	697	497
Volume Left	42	0	284	0	0	0	0
Volume Right	0	637	0	0	0	0	148
cSH	90	444	578	1700	1700	1700	1700
Volume to Capacity	0.47	1.43	0.49	0.13	0.13	0.41	0.29
Queue Length 95th (ft)	49	791	67	0	0	0	0
Control Delay (s)	76.2	232.3	17.1	0.0	0.0	0.0	0.0
Lane LOS	F	F	C				
Approach Delay (s)	222.7		6.5			0.0	
Approach LOS	F						

Intersection Summary			
Average Delay	59.7		
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	57	27	176	815	4
Peak Hour Factor	0.90	0.90	0.74	0.74	0.79	0.79
Hourly flow rate (vph)	6	63	36	238	1032	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1345	1034	1037			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1345	1034	1037			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	78	95			
cM capacity (veh/h)	158	282	671			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	69	274	1037
Volume Left	6	36	0
Volume Right	63	0	5
cSH	265	671	1700
Volume to Capacity	0.26	0.05	0.61
Queue Length 95th (ft)	25	4	0
Control Delay (s)	23.3	2.0	0.0
Lane LOS	C	A	
Approach Delay (s)	23.3	2.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	308	158	105	0	0	222
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	335	172	114	0	0	241
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	114				955	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	114				955	114
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	77				100	74
cM capacity (veh/h)	1475				221	938

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	335	172	114	0	241
Volume Left	335	0	0	0	0
Volume Right	0	0	0	0	241
cSH	1475	1700	1700	1700	938
Volume to Capacity	0.23	0.10	0.07	0.00	0.26
Queue Length 95th (ft)	22	0	0	0	26
Control Delay (s)	8.2	0.0	0.0	0.0	10.2
Lane LOS	A				B
Approach Delay (s)	5.4		0.0		10.2
Approach LOS					B

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	119	208	474	350	116	264
Peak Hour Factor	0.90	0.90	0.77	0.77	0.94	0.94
Hourly flow rate (vph)	132	231	616	455	123	281
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1371	843			1070	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371	843			1070	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	36			81	
cM capacity (veh/h)	130	364			651	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	132	231	1070	123	281
Volume Left	132	0	0	123	0
Volume Right	0	231	455	0	0
cSH	130	364	1700	651	1700
Volume to Capacity	1.01	0.64	0.63	0.19	0.17
Queue Length 95th (ft)	179	104	0	17	0
Control Delay (s)	147.8	30.7	0.0	11.8	0.0
Lane LOS	F	D		B	
Approach Delay (s)	73.3		0.0	3.6	
Approach LOS	F				

Intersection Summary			
Average Delay	15.3		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	13	18	24	98	5	124	5	523	162	53	256	2
Peak Hour Factor	0.60	0.60	0.60	0.91	0.91	0.91	0.87	0.87	0.87	0.88	0.88	0.88
Hourly flow rate (vph)	22	30	40	108	5	136	6	601	186	60	291	2
Pedestrians		6			4			1				
Lane Width (ft)		12.0			13.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1170	1221	299	1177	1129	698	299			791		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1170	1221	299	1177	1129	698	299			791		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	80	82	95	15	97	69	100			93		
cM capacity (veh/h)	106	164	736	127	187	439	1256			826		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	22	70	108	5	136	6	787	60	293
Volume Left	22	0	108	0	0	6	0	60	0
Volume Right	0	40	0	0	136	0	186	0	2
cSH	106	296	127	187	439	1256	1700	826	1700
Volume to Capacity	0.20	0.24	0.85	0.03	0.31	0.00	0.46	0.07	0.17
Queue Length 95th (ft)	18	23	131	2	33	0	0	6	0
Control Delay (s)	47.3	20.9	108.0	24.9	16.9	7.9	0.0	9.7	0.0
Lane LOS	E	C	F	C	C	A		A	
Approach Delay (s)	27.1		56.4			0.1		1.7	
Approach LOS	D		F						

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	24	8	651	288	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	24	8	651	288	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	956	289	290			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	956	289	290			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	284	750	1272			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	29	659	290
Volume Left	5	8	0
Volume Right	24	0	2
cSH	585	1272	1700
Volume to Capacity	0.05	0.01	0.17
Queue Length 95th (ft)	4	0	0
Control Delay (s)	11.5	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	369	189	112	229	272	360
Peak Hour Factor	0.91	0.91	0.94	0.94	0.89	0.89
Hourly flow rate (vph)	405	208	119	244	306	404
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			613		991	509
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			613		991	509
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		0	28
cM capacity (veh/h)			966		239	564

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	613	363	710
Volume Left	0	119	306
Volume Right	208	0	404
cSH	1700	966	356
Volume to Capacity	0.36	0.12	2.00
Queue Length 95th (ft)	0	11	1241
Control Delay (s)	0.0	3.9	482.5
Lane LOS		A	F
Approach Delay (s)	0.0	3.9	482.5
Approach LOS			F

Intersection Summary			
Average Delay	204.1		
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	729	0	0	338	3	4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	729	0	0	338	3	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			729		1067	729
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			729		1067	729
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			875		246	423

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	729	338	7
Volume Left	0	0	3
Volume Right	0	0	4
cSH	1700	1700	323
Volume to Capacity	0.43	0.20	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	16.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.4
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	211	157	220	208	0	0
Peak Hour Factor	0.88	0.88	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	240	178	244	231	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			418		960	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			418		960	240
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		100	100
cM capacity (veh/h)			1141		224	799

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	240	178	244	231
Volume Left	0	0	244	0
Volume Right	0	178	0	0
cSH	1700	1700	1141	1700
Volume to Capacity	0.14	0.10	0.21	0.14
Queue Length 95th (ft)	0	0	20	0
Control Delay (s)	0.0	0.0	9.0	0.0
Lane LOS			A	
Approach Delay (s)	0.0		4.6	
Approach LOS				

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	321	0	0	193	98	247
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	369	0	0	238	105	266
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			369		607	369
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			369		607	369
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		77	61
cM capacity (veh/h)			1190		460	677

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	369	238	105	266
Volume Left	0	0	105	0
Volume Right	0	0	0	266
cSH	1700	1700	460	677
Volume to Capacity	0.22	0.14	0.23	0.39
Queue Length 95th (ft)	0	0	22	47
Control Delay (s)	0.0	0.0	15.1	13.7
Lane LOS			C	B
Approach Delay (s)	0.0	0.0	14.1	
Approach LOS			B	

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	101	467	145	660	590	47
Peak Hour Factor	0.93	0.93	0.93	0.93	0.95	0.95
Hourly flow rate (vph)	109	502	156	710	621	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1312	335	671			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1312	335	671			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	13	24	83			
cM capacity (veh/h)	124	661	916			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	109	502	156	355	355	414	256
Volume Left	109	0	156	0	0	0	0
Volume Right	0	502	0	0	0	0	49
cSH	124	661	916	1700	1700	1700	1700
Volume to Capacity	0.87	0.76	0.17	0.21	0.21	0.24	0.15
Queue Length 95th (ft)	137	176	15	0	0	0	0
Control Delay (s)	115.7	25.6	9.7	0.0	0.0	0.0	0.0
Lane LOS	F	D	A				
Approach Delay (s)	41.6		1.8			0.0	
Approach LOS	E						

Intersection Summary			
Average Delay	12.5		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	3	32	93	598	243	4
Peak Hour Factor	0.90	0.90	0.74	0.74	0.79	0.79
Hourly flow rate (vph)	3	36	126	808	308	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1370	310	313			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1370	310	313			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	95	90			
cM capacity (veh/h)	145	730	1248			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	39	934	313
Volume Left	3	126	0
Volume Right	36	0	5
cSH	543	1248	1700
Volume to Capacity	0.07	0.10	0.18
Queue Length 95th (ft)	6	8	0
Control Delay (s)	12.1	2.5	0.0
Lane LOS	B	A	
Approach Delay (s)	12.1	2.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	215	198	201	5	0	574
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	234	215	218	5	0	624
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	224				901	218
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	224				901	218
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				100	24
cM capacity (veh/h)	1345				255	821

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	234	215	218	5	624
Volume Left	234	0	0	0	0
Volume Right	0	0	0	5	624
cSH	1345	1700	1700	1700	821
Volume to Capacity	0.17	0.13	0.13	0.00	0.76
Queue Length 95th (ft)	16	0	0	0	183
Control Delay (s)	8.2	0.0	0.0	0.0	21.8
Lane LOS	A				C
Approach Delay (s)	4.3		0.0		21.8
Approach LOS					C

Intersection Summary			
Average Delay	12.0		
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	176	599	179	121	292	711
Peak Hour Factor	0.90	0.90	0.77	0.77	0.94	0.94
Hourly flow rate (vph)	196	666	232	157	311	756
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1689	311			390	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1689	311			390	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	9			73	
cM capacity (veh/h)	75	729			1169	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	196	666	390	311	756
Volume Left	196	0	0	311	0
Volume Right	0	666	157	0	0
cSH	75	729	1700	1169	1700
Volume to Capacity	2.59	0.91	0.23	0.27	0.44
Queue Length 95th (ft)	473	308	0	27	0
Control Delay (s)	840.8	39.5	0.0	9.2	0.0
Lane LOS	F	E		A	
Approach Delay (s)	221.5		0.0	2.7	
Approach LOS	F				

Intersection Summary			
Average Delay	83.5		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Patriot Way & Spring Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	33	44	30	183	96	62	282	195	320	123	760	150
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.87	0.87	0.87	0.88	0.88	0.88
Hourly flow rate (vph)	36	48	33	201	105	68	324	224	368	140	864	170
Pedestrians		6			4			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2228	2479	956	2261	2380	412	1040			596		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2228	2479	956	2261	2380	412	1040			596		
tC, single (s)	7.4	6.8	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.3	3.6	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	88	0	0	89	51			86		
cM capacity (veh/h)	0	11	277	0	15	640	661			982		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	36	80	201	105	68	324	592	140	1034
Volume Left	36	0	201	0	0	324	0	140	0
Volume Right	0	33	0	0	68	0	368	0	170
cSH	0	17	0	15	640	661	1700	982	1700
Volume to Capacity	Err	4.63	Err	7.03	0.11	0.49	0.35	0.14	0.61
Queue Length 95th (ft)	Err	Err	Err	Err	9	68	0	12	0
Control Delay (s)	Err	Err	Err	Err	11.3	15.6	0.0	9.3	0.0
Lane LOS	F	F	F	F	B	C		A	
Approach Delay (s)	Err		Err			5.5		1.1	
Approach LOS	F		F						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	12	23	267	1023	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	23	267	1023	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1338	1026	1028			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1338	1026	1028			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	97			
cM capacity (veh/h)	163	285	676			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	290	1028
Volume Left	0	23	0
Volume Right	12	0	5
cSH	285	676	1700
Volume to Capacity	0.04	0.03	0.60
Queue Length 95th (ft)	3	3	0
Control Delay (s)	18.2	1.2	0.0
Lane LOS	C	A	
Approach Delay (s)	18.2	1.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	287	578	509	398	118	128
Peak Hour Factor	0.91	0.91	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	315	635	541	423	128	139
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			953		2141	635
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			953		2141	635
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			25		0	71
cM capacity (veh/h)			720		13	478

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	951	965	267
Volume Left	0	541	128
Volume Right	635	0	139
cSH	1700	720	27
Volume to Capacity	0.56	0.75	9.95
Queue Length 95th (ft)	0	173	Err
Control Delay (s)	0.0	23.5	Err
Lane LOS		C	F
Approach Delay (s)	0.0	23.5	Err
Approach LOS			F

Intersection Summary			
Average Delay	1235.3		
Intersection Capacity Utilization	124.2%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	405	0	0	812	30	25
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	405	0	0	812	30	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			405		1217	405
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			405		1217	405
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		85	96
cM capacity (veh/h)			1154		200	646

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	405	812	55
Volume Left	0	0	30
Volume Right	0	0	25
cSH	1700	1700	291
Volume to Capacity	0.24	0.48	0.19
Queue Length 95th (ft)	0	0	17
Control Delay (s)	0.0	0.0	20.2
Lane LOS			C
Approach Delay (s)	0.0	0.0	20.2
Approach LOS			C

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	230	115	177	536	0	0
Peak Hour Factor	0.88	0.88	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	261	131	197	596	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			392		1250	261
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			392		1250	261
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		100	100
cM capacity (veh/h)			1166		159	777

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	261	131	197	596
Volume Left	0	0	197	0
Volume Right	0	131	0	0
cSH	1700	1700	1166	1700
Volume to Capacity	0.15	0.08	0.17	0.35
Queue Length 95th (ft)	0	0	15	0
Control Delay (s)	0.0	0.0	8.7	0.0
Lane LOS			A	
Approach Delay (s)	0.0		2.2	
Approach LOS				

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	279.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	128	0	0	478	503	548
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	147	0	0	590	541	589
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			147		737	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			147		737	147
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	35
cM capacity (veh/h)			1435		386	900

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	147	590	541	589
Volume Left	0	0	541	0
Volume Right	0	0	0	589
cSH	1700	1700	386	900
Volume to Capacity	0.09	0.35	1.40	0.65
Queue Length 95th (ft)	0	0	673	126
Control Delay (s)	0.0	0.0	223.2	16.3
Lane LOS			F	C
Approach Delay (s)	0.0	0.0	115.3	
Approach LOS			F	

Intersection Summary			
Average Delay	69.8		
Intersection Capacity Utilization	253.6%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Hayden Ave & Waltham Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	46	628	301	457	1044	178
Peak Hour Factor	0.93	0.93	0.93	0.93	0.95	0.95
Hourly flow rate (vph)	49	675	324	491	1099	187
Pedestrians				2	2	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2088	645	1286			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2088	645	1286			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	0	40			
cM capacity (veh/h)	18	414	535			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	49	675	324	246	246	733	554
Volume Left	49	0	324	0	0	0	0
Volume Right	0	675	0	0	0	0	187
cSH	18	414	535	1700	1700	1700	1700
Volume to Capacity	2.76	1.63	0.60	0.14	0.14	0.43	0.33
Queue Length 95th (ft)	168	978	100	0	0	0	0
Control Delay (s)	1238.9	318.4	21.5	0.0	0.0	0.0	0.0
Lane LOS	F	F	C				
Approach Delay (s)	381.3		8.5			0.0	
Approach LOS	F						

Intersection Summary			
Average Delay	100.2		
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	6	60	29	187	1054	5
Peak Hour Factor	0.74	0.74	0.79	0.79	0.90	0.90
Hourly flow rate (vph)	8	81	37	237	1171	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1484	1174	1177			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1484	1174	1177			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	65	94			
cM capacity (veh/h)	129	234	594			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	89	273	1177
Volume Left	8	37	0
Volume Right	81	0	6
cSH	218	594	1700
Volume to Capacity	0.41	0.06	0.69
Queue Length 95th (ft)	47	5	0
Control Delay (s)	32.6	2.3	0.0
Lane LOS	D	A	
Approach Delay (s)	32.6	2.3	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	394	203	127	1	0	270
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	428	221	138	1	0	293
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	139				1215	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	139				1215	138
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	70				100	68
cM capacity (veh/h)	1444				141	910

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	428	221	138	1	293
Volume Left	428	0	0	0	0
Volume Right	0	0	0	1	293
cSH	1444	1700	1700	1700	910
Volume to Capacity	0.30	0.13	0.08	0.00	0.32
Queue Length 95th (ft)	31	0	0	0	35
Control Delay (s)	8.5	0.0	0.0	0.0	10.8
Lane LOS	A				B
Approach Delay (s)	5.6		0.0		10.8
Approach LOS					B

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	126	271	507	368	229	320
Peak Hour Factor	0.93	0.93	0.86	0.86	0.88	0.88
Hourly flow rate (vph)	135	291	590	428	260	364
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1688	803			1017	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1688	803			1017	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	24			62	
cM capacity (veh/h)	64	383			682	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	135	291	1017	260	364
Volume Left	135	0	0	260	0
Volume Right	0	291	428	0	0
cSH	64	383	1700	682	1700
Volume to Capacity	2.13	0.76	0.60	0.38	0.21
Queue Length 95th (ft)	323	155	0	45	0
Control Delay (s)	661.0	38.8	0.0	13.5	0.0
Lane LOS	F	E		B	
Approach Delay (s)	236.2		0.0	5.6	
Approach LOS	F				

Intersection Summary			
Average Delay	50.5		
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	117	182	128	133	21	146	50	554	183	58	285	28
Peak Hour Factor	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	127	198	139	141	22	155	60	660	218	67	328	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1422	1473	344	1586	1381	768	360			877		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1422	1473	344	1586	1381	768	360			877		
tC, single (s)	7.2	6.6	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	80	0	82	61	95			91		
cM capacity (veh/h)	53	108	690	0	126	403	1204			770		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	127	337	141	22	155	60	877	67	360
Volume Left	127	0	141	0	0	60	0	67	0
Volume Right	0	139	0	0	155	0	218	0	32
cSH	53	165	0	126	403	1204	1700	770	1700
Volume to Capacity	2.38	2.04	Err	0.18	0.39	0.05	0.52	0.09	0.21
Queue Length 95th (ft)	323	656	Err	15	44	4	0	7	0
Control Delay (s)	795.5	532.8	Err	39.7	19.4	8.1	0.0	10.1	0.0
Lane LOS	F	F	F	E	C	A		B	
Approach Delay (s)	604.8		Err			0.5		1.6	
Approach LOS	F		F						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	24	8	807	346	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	24	8	807	346	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1170	347	348			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1170	347	348			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	212	696	1211			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	29	815	348
Volume Left	5	8	0
Volume Right	24	0	2
cSH	499	1211	1700
Volume to Capacity	0.06	0.01	0.20
Queue Length 95th (ft)	5	0	0
Control Delay (s)	12.7	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	12.7	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Marrett Rd (Rte 2A) & Spring Street

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	388	217	135	238	376	439
Peak Hour Factor	0.92	0.92	0.86	0.86	0.92	0.92
Hourly flow rate (vph)	422	236	157	277	409	477
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			660		1132	542
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			660		1132	542
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		0	12
cM capacity (veh/h)			927		187	542

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	658	434	886
Volume Left	0	157	409
Volume Right	236	0	477
cSH	1700	927	289
Volume to Capacity	0.39	0.17	3.07
Queue Length 95th (ft)	0	15	Err
Control Delay (s)	0.0	4.7	Err
Lane LOS		A	F
Approach Delay (s)	0.0	4.7	Err
Approach LOS			F

Intersection Summary			
Average Delay	4481.0		
Intersection Capacity Utilization	111.5%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	782	0	0	358	4	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	782	0	0	358	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			782		1140	782
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			782		1140	782
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			836		222	394

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	782	358	9
Volume Left	0	0	4
Volume Right	0	0	5
cSH	1700	1700	293
Volume to Capacity	0.46	0.21	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	17.7
Lane LOS			C
Approach Delay (s)	0.0	0.0	17.7
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	333	427	232	250	0	0
Peak Hour Factor	0.82	0.82	0.89	0.89	1.00	1.00
Hourly flow rate (vph)	406	521	261	281	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			927		1208	406
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			927		1208	406
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			65		100	100
cM capacity (veh/h)			738		131	645

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	406	521	261	281
Volume Left	0	0	261	0
Volume Right	0	521	0	0
cSH	1700	1700	738	1700
Volume to Capacity	0.24	0.31	0.35	0.17
Queue Length 95th (ft)	0	0	40	0
Control Delay (s)	0.0	0.0	12.5	0.0
Lane LOS			B	
Approach Delay (s)	0.0		6.0	
Approach LOS				

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	449	0	0	211	126	260
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	516	0	0	260	135	280
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			516		777	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			516		777	516
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		63	50
cM capacity (veh/h)			1050		366	559

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	516	260	135	280
Volume Left	0	0	135	0
Volume Right	0	0	0	280
cSH	1700	1700	366	559
Volume to Capacity	0.30	0.15	0.37	0.50
Queue Length 95th (ft)	0	0	42	69
Control Delay (s)	0.0	0.0	20.5	17.7
Lane LOS			C	C
Approach Delay (s)	0.0	0.0	18.6	
Approach LOS			C	

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	159	550	157	702	621	54
Peak Hour Factor	0.93	0.93	0.95	0.95	0.89	0.89
Hourly flow rate (vph)	171	591	165	739	698	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1428	379	758			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1428	379	758			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	4	81			
cM capacity (veh/h)	101	619	849			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	171	591	165	369	369	465	293
Volume Left	171	0	165	0	0	0	0
Volume Right	0	591	0	0	0	0	61
cSH	101	619	849	1700	1700	1700	1700
Volume to Capacity	1.69	0.96	0.19	0.22	0.22	0.27	0.17
Queue Length 95th (ft)	337	332	18	0	0	0	0
Control Delay (s)	420.6	51.9	10.3	0.0	0.0	0.0	0.0
Lane LOS	F	F	B				
Approach Delay (s)	134.6		1.9			0.0	
Approach LOS	F						

Intersection Summary			
Average Delay	43.0		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	34	98	778	290	5
Peak Hour Factor	0.74	0.74	0.79	0.79	0.90	0.90
Hourly flow rate (vph)	5	46	124	985	322	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1558	325	328			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1558	325	328			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	94	90			
cM capacity (veh/h)	111	716	1232			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	51	1109	328
Volume Left	5	124	0
Volume Right	46	0	6
cSH	456	1232	1700
Volume to Capacity	0.11	0.10	0.19
Queue Length 95th (ft)	9	8	0
Control Delay (s)	13.9	2.7	0.0
Lane LOS	B	A	
Approach Delay (s)	13.9	2.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Concord Ave & Rte 2 EB Ramp

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	234	199	204	5	8	690
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	254	216	222	5	9	750
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	227				947	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				947	222
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	81				96	8
cM capacity (veh/h)	1341				235	818

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	254	216	222	5	759
Volume Left	254	0	0	0	9
Volume Right	0	0	0	5	750
cSH	1341	1700	1700	1700	795
Volume to Capacity	0.19	0.13	0.13	0.00	0.95
Queue Length 95th (ft)	17	0	0	0	368
Control Delay (s)	8.3	0.0	0.0	0.0	44.5
Lane LOS	A				E
Approach Delay (s)	4.5		0.0		44.5
Approach LOS					E

Intersection Summary			
Average Delay	24.6		
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	176	718	192	121	312	714
Peak Hour Factor	0.90	0.90	0.77	0.77	0.94	0.94
Hourly flow rate (vph)	196	798	249	157	332	760
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1751	328			406	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1751	328			406	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			71	
cM capacity (veh/h)	67	713			1152	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	196	798	406	332	760
Volume Left	196	0	0	332	0
Volume Right	0	798	157	0	0
cSH	67	713	1700	1152	1700
Volume to Capacity	2.93	1.12	0.24	0.29	0.45
Queue Length 95th (ft)	495	584	0	30	0
Control Delay (s)	1000.6	93.7	0.0	9.4	0.0
Lane LOS	F	F		A	
Approach Delay (s)	272.2		0.0	2.9	
Approach LOS	F				

Intersection Summary			
Average Delay	109.8		
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	45	85	53	183	228	62	414	195	320	123	760	216
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.87	0.87	0.87	0.88	0.88	0.88
Hourly flow rate (vph)	49	92	58	201	251	68	476	224	368	140	864	245
Pedestrians		6			4			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2641	2820	993	2612	2758	412	1115			596		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2641	2820	993	2612	2758	412	1115			596		
tC, single (s)	7.4	6.8	6.5	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.3	3.6	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	78	0	0	89	23			86		
cM capacity (veh/h)	0	3	263	0	4	640	620			982		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	49	150	201	251	68	476	592	140	1109
Volume Left	49	0	201	0	0	476	0	140	0
Volume Right	0	58	0	0	68	0	368	0	245
cSH	0	5	0	4	640	620	1700	982	1700
Volume to Capacity	Err	32.91	Err	64.42	0.11	0.77	0.35	0.14	0.65
Queue Length 95th (ft)	Err	Err	Err	Err	9	178	0	12	0
Control Delay (s)	Err	Err	Err	Err	11.3	27.4	0.0	9.3	0.0
Lane LOS	F	F	F	F	B	D		A	
Approach Delay (s)	Err		Err			12.2		1.0	
Approach LOS	F		F						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	107.6%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	12	23	279	1089	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	23	279	1089	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1416	1092	1094			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1416	1092	1094			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	96			
cM capacity (veh/h)	146	261	638			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	302	1094
Volume Left	0	23	0
Volume Right	12	0	5
cSH	261	638	1700
Volume to Capacity	0.05	0.04	0.64
Queue Length 95th (ft)	4	3	0
Control Delay (s)	19.5	1.3	0.0
Lane LOS	C	A	
Approach Delay (s)	19.5	1.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	287	611	542	398	126	132
Peak Hour Factor	0.91	0.91	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	315	671	577	423	137	143
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			989		2230	653
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			989		2230	653
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			17		0	69
cM capacity (veh/h)			698		8	466

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	987	1000	280
Volume Left	0	577	137
Volume Right	671	0	143
cSH	1700	698	16
Volume to Capacity	0.58	0.83	17.05
Queue Length 95th (ft)	0	224	Err
Control Delay (s)	0.0	31.0	Err
Lane LOS		D	F
Approach Delay (s)	0.0	31.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	1250.5		
Intersection Capacity Utilization	128.8%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	419	0	0	845	30	25
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	419	0	0	845	30	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			419		1264	419
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			419		1264	419
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		84	96
cM capacity (veh/h)			1140		187	634

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	419	845	55
Volume Left	0	0	30
Volume Right	0	0	25
cSH	1700	1700	275
Volume to Capacity	0.25	0.50	0.20
Queue Length 95th (ft)	0	0	18
Control Delay (s)	0.0	0.0	21.3
Lane LOS			C
Approach Delay (s)	0.0	0.0	21.3
Approach LOS			C

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	245	141	177	668	0	0
Peak Hour Factor	0.88	0.88	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	278	160	197	742	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			439		1414	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			439		1414	278
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		100	100
cM capacity (veh/h)			1121		125	760

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	278	160	197	742
Volume Left	0	0	197	0
Volume Right	0	160	0	0
cSH	1700	1700	1121	1700
Volume to Capacity	0.16	0.09	0.18	0.44
Queue Length 95th (ft)	0	0	16	0
Control Delay (s)	0.0	0.0	8.9	0.0
Lane LOS			A	
Approach Delay (s)	0.0		1.9	
Approach LOS				

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	281.6%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	143	0	0	528	586	548
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	164	0	0	652	630	589
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			164		816	164
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			164		816	164
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	33
cM capacity (veh/h)			1414		347	880

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	164	652	630	589
Volume Left	0	0	630	0
Volume Right	0	0	0	589
cSH	1700	1700	347	880
Volume to Capacity	0.10	0.38	1.82	0.67
Queue Length 95th (ft)	0	0	1029	133
Control Delay (s)	0.0	0.0	404.9	17.0
Lane LOS			F	C
Approach Delay (s)	0.0	0.0	217.5	
Approach LOS			F	

Intersection Summary			
Average Delay	130.3		
Intersection Capacity Utilization	251.8%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	57	632	318	457	1044	211
Peak Hour Factor	0.93	0.93	0.93	0.93	0.95	0.95
Hourly flow rate (vph)	61	680	342	491	1099	222
Pedestrians				2	2	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2142	663	1321			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2142	663	1321			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	0	34			
cM capacity (veh/h)	14	403	519			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	61	680	342	246	246	733	588
Volume Left	61	0	342	0	0	0	0
Volume Right	0	680	0	0	0	0	222
cSH	14	403	519	1700	1700	1700	1700
Volume to Capacity	4.31	1.68	0.66	0.14	0.14	0.43	0.35
Queue Length 95th (ft)	Err	1019	119	0	0	0	0
Control Delay (s)	Err	342.6	24.3	0.0	0.0	0.0	0.0
Lane LOS	F	F	C				
Approach Delay (s)	1141.5		10.0			0.0	
Approach LOS	F						

Intersection Summary			
Average Delay	295.0		
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	6	60	29	199	1120	5
Peak Hour Factor	0.74	0.74	0.79	0.79	0.90	0.90
Hourly flow rate (vph)	8	81	37	252	1244	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1573	1247	1250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1573	1247	1250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	62	93			
cM capacity (veh/h)	113	212	557			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	89	289	1250
Volume Left	8	37	0
Volume Right	81	0	6
cSH	196	557	1700
Volume to Capacity	0.45	0.07	0.74
Queue Length 95th (ft)	54	5	0
Control Delay (s)	37.8	2.3	0.0
Lane LOS	E	A	
Approach Delay (s)	37.8	2.3	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Concord Ave & Rte 2 EB Ramp

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	469	206	128	1	6	303
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	510	224	139	1	7	329
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	140				1383	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140				1383	139
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	65				94	64
cM capacity (veh/h)	1443				103	909

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	510	224	139	1	336
Volume Left	510	0	0	0	7
Volume Right	0	0	0	1	329
cSH	1443	1700	1700	1700	789
Volume to Capacity	0.35	0.13	0.08	0.00	0.43
Queue Length 95th (ft)	40	0	0	0	54
Control Delay (s)	8.9	0.0	0.0	0.0	12.9
Lane LOS	A				B
Approach Delay (s)	6.1		0.0		12.9
Approach LOS					B

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	2%		0%			-2%
Volume (veh/h)	126	305	511	368	307	332
Peak Hour Factor	0.93	0.93	0.86	0.86	0.88	0.88
Hourly flow rate (vph)	135	328	594	428	349	377
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1883	808			1022	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1883	808			1022	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	14			49	
cM capacity (veh/h)	38	381			679	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	135	328	1022	349	377
Volume Left	135	0	0	349	0
Volume Right	0	328	428	0	0
cSH	38	381	1700	679	1700
Volume to Capacity	3.58	0.86	0.60	0.51	0.22
Queue Length 95th (ft)	Err	207	0	74	0
Control Delay (s)	Err	51.4	0.0	15.8	0.0
Lane LOS	F	F		C	
Approach Delay (s)	2959.5		0.0	7.6	
Approach LOS	F				

Intersection Summary			
Average Delay	622.6		
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Patriot Way & Spring Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-2%	
Volume (veh/h)	162	347	218	133	60	146	88	554	183	58	285	48
Peak Hour Factor	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	176	377	237	141	64	155	105	660	218	67	328	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1545	1575	355	1864	1494	768	383			877		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1545	1575	355	1864	1494	768	383			877		
tC, single (s)	7.2	6.6	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	65	0	38	61	91			91		
cM capacity (veh/h)	25	89	680	0	103	403	1181			770		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	176	614	141	64	155	105	877	67	383
Volume Left	176	0	141	0	0	105	0	67	0
Volume Right	0	237	0	0	155	0	218	0	55
cSH	25	135	0	103	403	1181	1700	770	1700
Volume to Capacity	7.00	4.56	Err	0.62	0.39	0.09	0.52	0.09	0.23
Queue Length 95th (ft)	Err	Err	Err	76	44	7	0	7	0
Control Delay (s)	Err	Err	Err	85.1	19.4	8.3	0.0	10.1	0.0
Lane LOS	F	F	F	F	C	A		B	
Approach Delay (s)	Err		Err			0.9		1.5	
Approach LOS	F		F						

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	24	8	852	366	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	24	8	852	366	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1235	367	368			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1235	367	368			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	193	678	1191			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	29	860	368
Volume Left	5	8	0
Volume Right	24	0	2
cSH	474	1191	1700
Volume to Capacity	0.06	0.01	0.22
Queue Length 95th (ft)	5	1	0
Control Delay (s)	13.1	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.1	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	388	227	145	238	406	454
Peak Hour Factor	0.92	0.92	0.86	0.86	0.92	0.92
Hourly flow rate (vph)	422	247	169	277	441	493
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			670		1161	547
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			670		1161	547
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		0	8
cM capacity (veh/h)			918		177	538

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	668	445	935
Volume Left	0	169	441
Volume Right	247	0	493
cSH	1700	918	274
Volume to Capacity	0.39	0.18	3.41
Queue Length 95th (ft)	0	17	Err
Control Delay (s)	0.0	5.0	Err
Lane LOS		A	F
Approach Delay (s)	0.0	5.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	4563.7		
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	842	0	0	368	4	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	842	0	0	368	4	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			842		1210	842
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			842		1210	842
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			794		202	364

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	842	368	9
Volume Left	0	0	4
Volume Right	0	0	5
cSH	1700	1700	268
Volume to Capacity	0.50	0.22	0.03
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	0.0	18.9
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.9
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	-2%			2%	0%	
Volume (veh/h)	393	532	232	289	0	0
Peak Hour Factor	0.82	0.82	0.89	0.89	1.00	1.00
Hourly flow rate (vph)	479	649	261	325	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1128		1325	479
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1128		1325	479
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			58		100	100
cM capacity (veh/h)			619		99	586

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	479	649	261	325
Volume Left	0	0	261	0
Volume Right	0	649	0	0
cSH	1700	1700	619	1700
Volume to Capacity	0.28	0.38	0.42	0.19
Queue Length 95th (ft)	0	0	52	0
Control Delay (s)	0.0	0.0	15.0	0.0
Lane LOS			B	
Approach Delay (s)	0.0		6.7	
Approach LOS				

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	2%			0%	-2%	
Volume (veh/h)	509	0	0	226	150	260
Peak Hour Factor	0.87	0.87	0.81	0.81	0.93	0.93
Hourly flow rate (vph)	585	0	0	279	161	280
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			585		864	585
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			585		864	585
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		50	45
cM capacity (veh/h)			990		325	511

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	585	279	161	280
Volume Left	0	0	161	0
Volume Right	0	0	0	280
cSH	1700	1700	325	511
Volume to Capacity	0.34	0.16	0.50	0.55
Queue Length 95th (ft)	0	0	66	81
Control Delay (s)	0.0	0.0	26.5	20.2
Lane LOS			D	C
Approach Delay (s)	0.0	0.0	22.5	
Approach LOS			C	

Intersection Summary			
Average Delay	7.6		
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Hayden Ave & Waltham Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			2%	-2%	
Volume (veh/h)	204	565	162	702	621	64
Peak Hour Factor	0.93	0.93	0.95	0.95	0.89	0.89
Hourly flow rate (vph)	219	608	171	739	698	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1444	385	770			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1444	385	770			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	1	80			
cM capacity (veh/h)	98	613	841			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	219	608	171	369	369	465	304
Volume Left	219	0	171	0	0	0	0
Volume Right	0	608	0	0	0	0	72
cSH	98	613	841	1700	1700	1700	1700
Volume to Capacity	2.24	0.99	0.20	0.22	0.22	0.27	0.18
Queue Length 95th (ft)	486	368	19	0	0	0	0
Control Delay (s)	660.2	59.9	10.4	0.0	0.0	0.0	0.0
Lane LOS	F	F	B				
Approach Delay (s)	219.1		1.9			0.0	
Approach LOS	F						

Intersection Summary			
Average Delay	73.0		
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	34	98	823	310	5
Peak Hour Factor	0.74	0.74	0.79	0.79	0.90	0.90
Hourly flow rate (vph)	5	46	124	1042	344	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1637	347	350			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1637	347	350			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	93	90			
cM capacity (veh/h)	99	696	1209			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	51	1166	350
Volume Left	5	124	0
Volume Right	46	0	6
cSH	426	1209	1700
Volume to Capacity	0.12	0.10	0.21
Queue Length 95th (ft)	10	9	0
Control Delay (s)	14.6	2.9	0.0
Lane LOS	B	A	
Approach Delay (s)	14.6	2.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

Appendix C

Signal Warrant Analysis

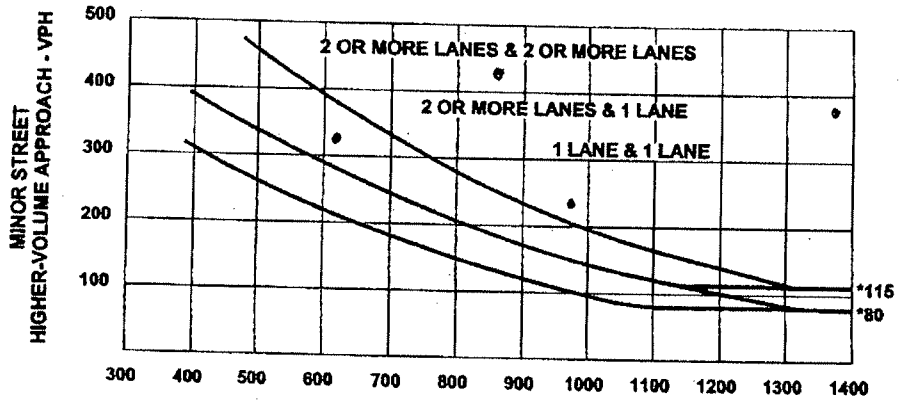
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	**Project No:**	127-3679-09001
Location:	Lexington, MA	**Data Source:**	
Compiled By:	Nathan Brackett	**Date:**	2/17/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

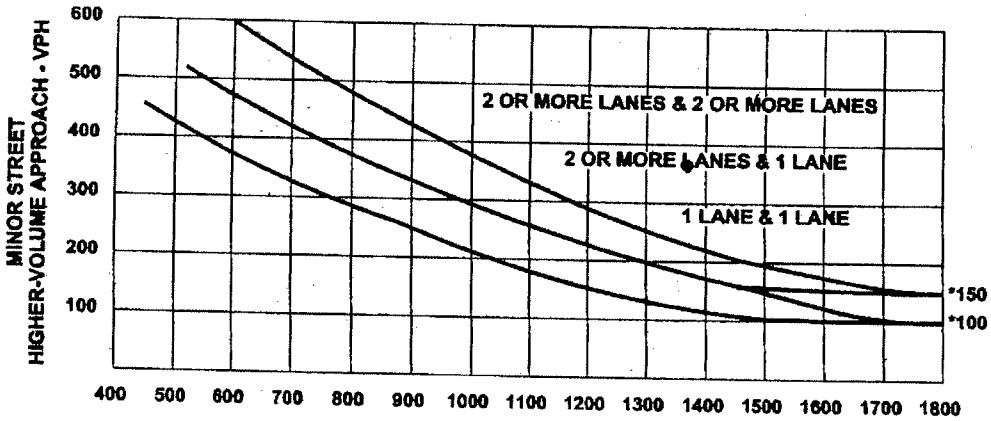
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
7-8AM	975	235
8-9AM	1371	377
4-5PM	623	327
5-6PM	864	418

Warrant 2 Met?		
YES	NO	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
8-9AM	1371	377

Warrant 3 Met?		
YES	NO	(CIRCLE)

Spring St / Hayden St / Patriot Way

Existing

TETRA TECH RIZZO

Signal Warrant Worksheet

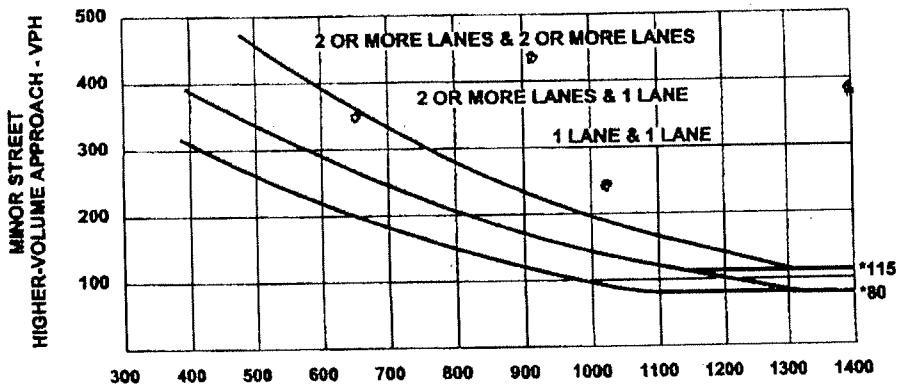
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	**Project No:**	127-3679-09001
Location:	Lexington, MA	**Data Source:**	
Compiled By:	Nathan Brackett	**Date:**	2/17/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

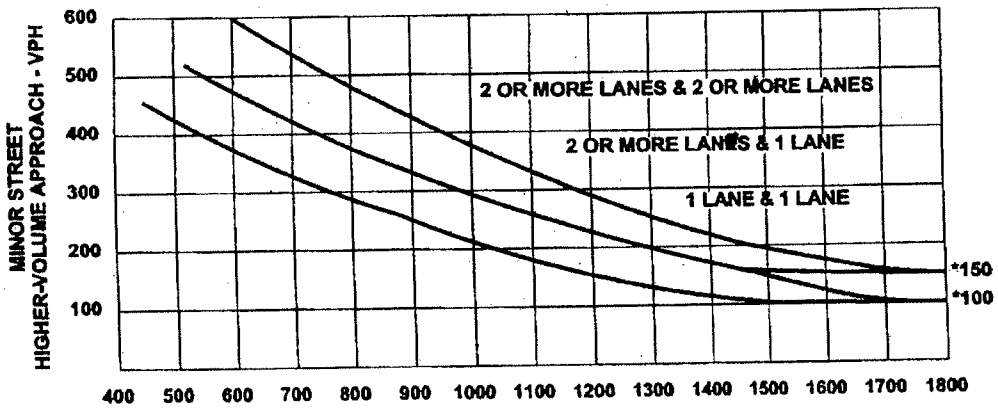
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
7-8am	1025	247
8-9am	1441	396
4-5pm	655	344
5-6pm	909	439

Warrant 2 Met?		
YES	(NO)	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
8-9am	1441	396

Warrant 3 Met?		
(YES)	NO	(CIRCLE)

Spring St / Hayden St / Patriot Way

2014 No Build

TETRA TECH RIZZO

Signal Warrant Worksheet

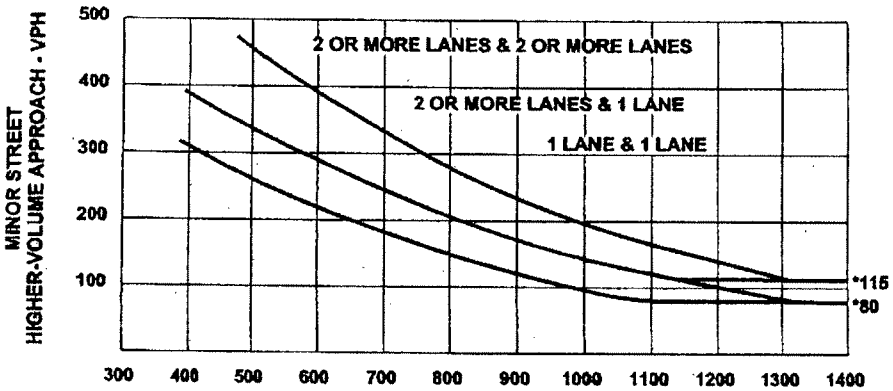
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	**Project No:**	127-3679-09001
Location:	Lexington, MA	**Data Source:**	
Compiled By:	Nathan Brackett	**Date:**	2/12/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

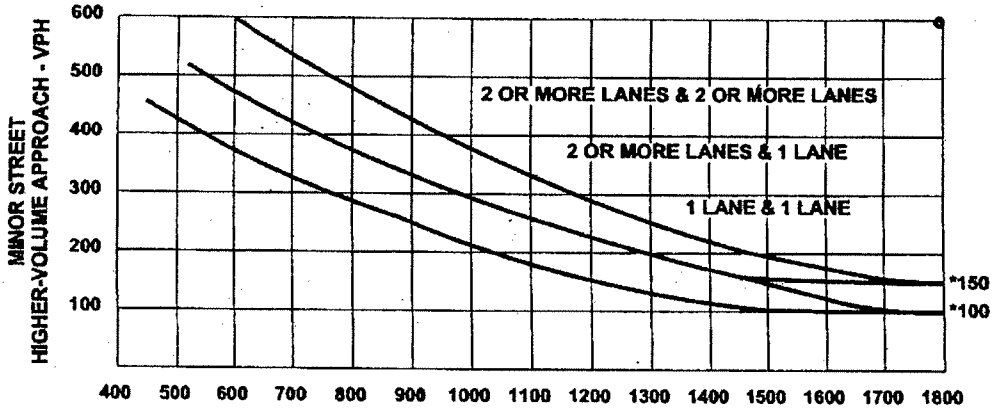
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume

Warrant 2 Met?		
YES	NO	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
pm 8-9	2028	656

Warrant 3 Met?		
YES	NO	(CIRCLE)

Spring St / Hayden St / Patriot Way
2014 Build

TETRA TECH RIZZO

Signal Warrant Worksheet

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

N/S: Spring Street
E/W: Hayden Avenue/ Patriot Way
City/State: Lexington, MA
Client: Tetra Tech Rizzo/ E. Fellinger

File Name : 91812A
Site Code : 36790900
Start Date : 2/4/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Spring Street From North			Hayden Avenue From East			Spring Street From South			Patriot Way From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	10	61	9	6	4	22	18	28	21	3	1	0	183
07:15 AM	10	87	11	10	7	34	39	38	17	2	3	1	259
07:30 AM	4	135	15	10	5	41	39	26	19	1	1	1	297
07:45 AM	11	181	30	10	5	46	56	29	18	1	2	4	393
Total	35	464	65	36	21	143	152	121	75	7	7	6	1132
08:00 AM	13	178	20	15	12	54	77	44	16	3	2	3	437
08:15 AM	9	126	27	19	7	52	49	41	15	4	3	2	354
08:30 AM	6	163	30	16	6	63	70	34	16	4	4	2	414
08:45 AM	8	148	34	10	11	49	92	46	20	4	4	3	429
Total	36	615	111	60	36	218	288	165	67	15	13	10	1634
Grand Total	71	1079	176	96	57	361	440	286	142	22	20	16	2766
Apprch %	5.4	81.4	13.3	18.7	11.1	70.2	50.7	32.9	16.4	37.9	34.5	27.6	
Total %	2.6	39	6.4	3.5	2.1	13.1	15.9	10.3	5.1	0.8	0.7	0.6	
Cars	67	1071	170	91	55	354	429	281	134	16	14	14	2696
% Cars	94.4	99.3	96.6	94.8	96.5	98.1	97.5	98.3	94.4	72.7	70	87.5	97.5
Heavy Vehicles	4	8	6	5	2	7	11	5	8	6	6	2	70
% Heavy Vehicles	5.6	0.7	3.4	5.2	3.5	1.9	2.5	1.7	5.6	27.3	30	12.5	2.5

	Spring Street From North				Hayden Avenue From East				Spring Street From South				Patriot Way From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	13	178	20	211	15	12	54	81	77	44	16	137	3	2	3	8	437
08:15 AM	9	126	27	162	19	7	52	78	49	41	15	105	4	3	2	9	354
08:30 AM	6	163	30	199	16	6	63	85	70	34	16	120	4	4	2	10	414
08:45 AM	8	148	34	190	10	11	49	70	92	46	20	158	4	4	3	11	429
Total Volume	36	615	111	762	60	36	218	314	288	165	67	520	15	13	10	38	1634
% App. Total	4.7	80.7	14.6		19.1	11.5	69.4		55.4	31.7	12.9		39.5	34.2	26.3		
PHF	.692	.864	.816	.903	.789	.750	.865	.924	.783	.897	.838	.823	.938	.813	.833	.864	.935
Cars	32	613	108	753	58	34	214	306	283	162	62	507	11	9	8	28	1594
% Cars	88.9	99.7	97.3	98.8	96.7	94.4	98.2	97.5	98.3	98.2	92.5	97.5	73.3	69.2	80.0	73.7	97.6
Heavy Vehicles	4	2	3	9	2	2	4	8	5	3	5	13	4	4	2	10	40
% Heavy Vehicles	11.1	0.3	2.7	1.2	3.3	5.6	1.8	2.5	1.7	1.8	7.5	2.5	26.7	30.8	20.0	26.3	2.4

	From North Spring st	From East Hayden Ave	From South Spring St.	From West Patriot Way
8-9	815	336	556	41
7-8	603	214	372	21

((OURS) 1.07) = BEAL

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

N/S: Spring Street
E/W: Hayden Avenue/ Patriot Way
City/State: Lexington, MA
Client: Tetra Tech Rizzo/ E. Fellinger

File Name : 91812AA
Site Code : 36790900
Start Date : 2/4/2009
Page No : 1

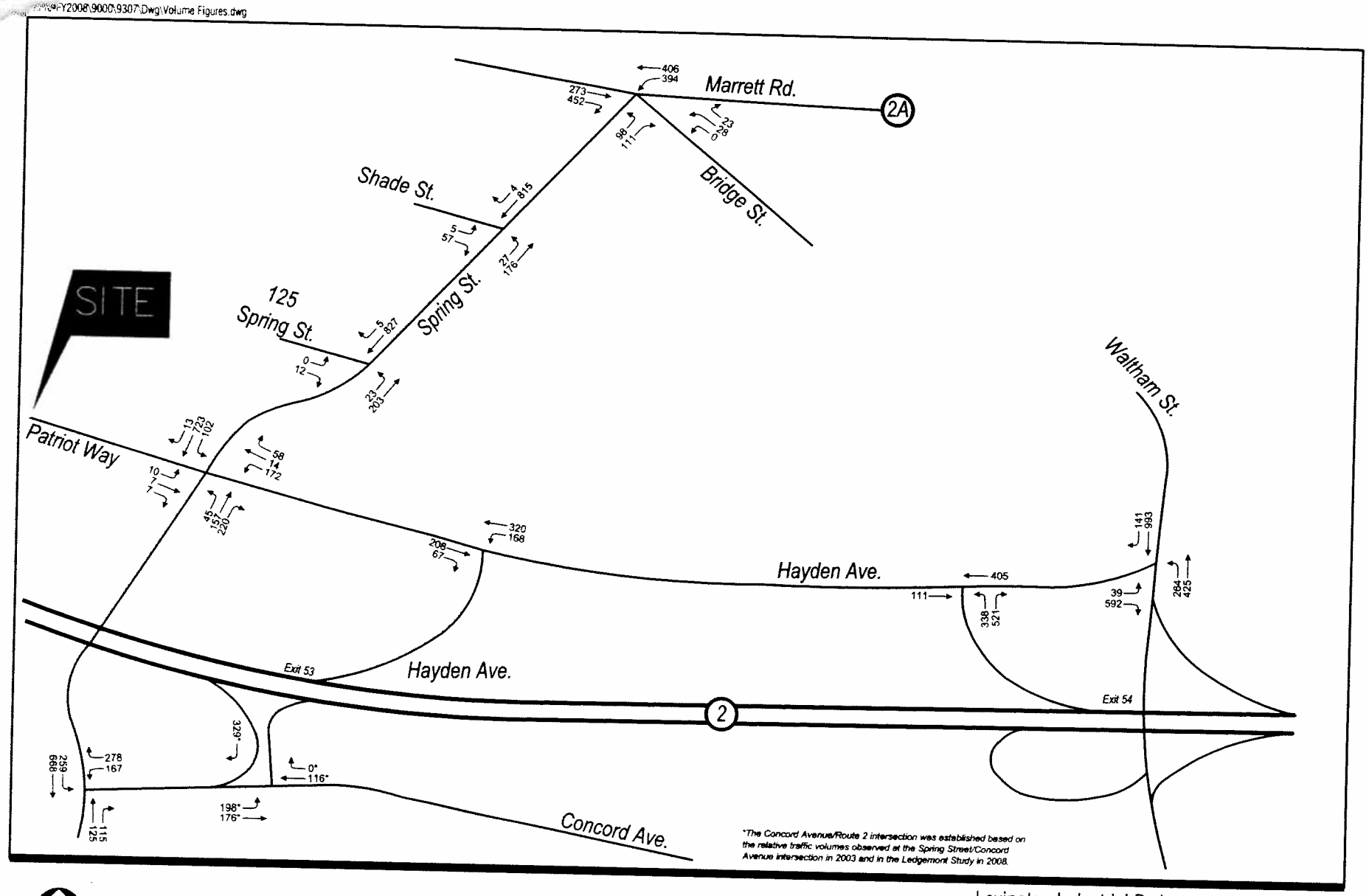
Groups Printed- Cars - Heavy Vehicles

	Spring Street From North			Hayden Avenue From East			Spring Street From South			Patriot Way From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	2	46	6	22	2	19	19	48	3	8	9	5	189
04:15 PM	1	30	5	20	1	18	27	62	1	7	13	6	191
04:30 PM	1	38	3	18	2	20	22	62	0	16	19	4	205
04:45 PM	3	42	5	25	3	22	28	78	0	10	8	3	227
Total	7	156	19	85	8	79	96	250	4	41	49	18	812
05:00 PM	0	53	11	31	1	24	31	77	1	13	17	12	271
05:15 PM	0	57	13	26	3	28	33	92	3	6	7	10	278
05:30 PM	0	65	8	26	0	44	31	86	1	10	10	12	293
05:45 PM	1	58	7	30	2	21	33	78	0	5	12	7	254
Total	1	233	39	113	6	117	128	333	5	34	46	41	1096
Grand Total	8	389	58	198	14	196	224	583	9	75	95	59	1908
Apprch %	1.8	85.5	12.7	48.5	3.4	48	27.5	71.4	1.1	32.8	41.5	25.8	
Total %	0.4	20.4	3	10.4	0.7	10.3	11.7	30.6	0.5	3.9	5	3.1	
Cars	8	389	55	192	14	190	222	581	7	75	95	57	1885
% Cars	100	100	94.8	97	100	96.9	99.1	99.7	77.8	100	100	96.6	98.8
Heavy Vehicles	0	0	3	6	0	6	2	2	2	0	0	2	23
% Heavy Vehicles	0	0	5.2	3	0	3.1	0.9	0.3	22.2	0	0	3.4	1.2

	Spring Street From North				Hayden Avenue From East				Spring Street From South				Patriot Way From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	53	11	64	31	1	24	56	31	77	1	109	13	17	12	42	271
05:15 PM	0	57	13	70	26	3	28	57	33	92	3	128	6	7	10	23	278
05:30 PM	0	65	8	73	26	0	44	70	31	86	1	118	10	10	12	32	293
05:45 PM	1	58	7	66	30	2	21	53	33	78	0	111	5	12	7	24	254
Total Volume	1	233	39	273	113	6	117	236	128	333	5	466	34	46	41	121	1096
% App. Total	0.4	85.3	14.3		47.9	2.5	49.6		27.5	71.5	1.1		28.1	38	33.9		
PHF	.250	.896	.750	.935	.911	.500	.665	.843	.970	.905	.417	.910	.654	.676	.854	.720	.935
Cars	1	233	38	272	111	6	115	232	127	332	4	463	34	46	40	120	1087
% Cars	100	100	97.4	99.6	98.2	100	98.3	98.3	99.2	99.7	80.0	99.4	100	100	97.6	99.2	99.2
Heavy Vehicles	0	0	1	1	2	0	2	4	1	1	1	3	0	0	1	1	9
% Heavy Vehicles	0	0	2.6	0.4	1.8	0	1.7	1.7	0.8	0.3	20.0	0.6	0	0	2.4	0.8	0.8
	From North Spring St				From East Hayden Ave				From South S Spring St.				From West Patriot Way				
4-5				213				201				410				126	
5-6				319				276				545				142	

(OURS) 1.17 = BEAL

FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

TETRA TECH RIZZO

Existing Morning Peak Hour Traffic Volumes

Figure 2

Traffic Study
Lexington Technology Park
Lexington, Massachusetts

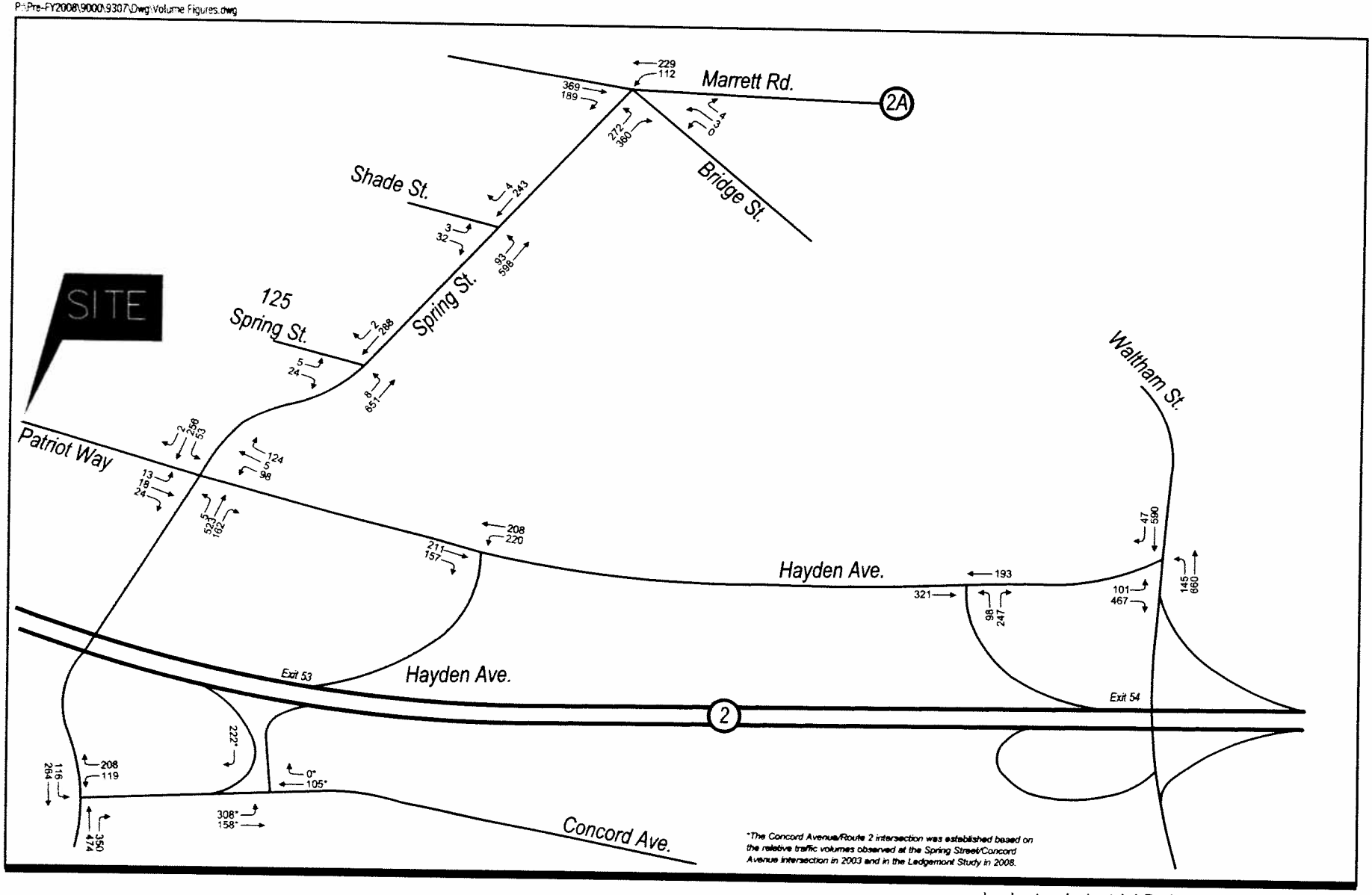
TETRA TECH RIZZO

Base Map: MA USGS
Topographic Maps from CD

Project Location Map
and Study Intersections

Figure 1

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

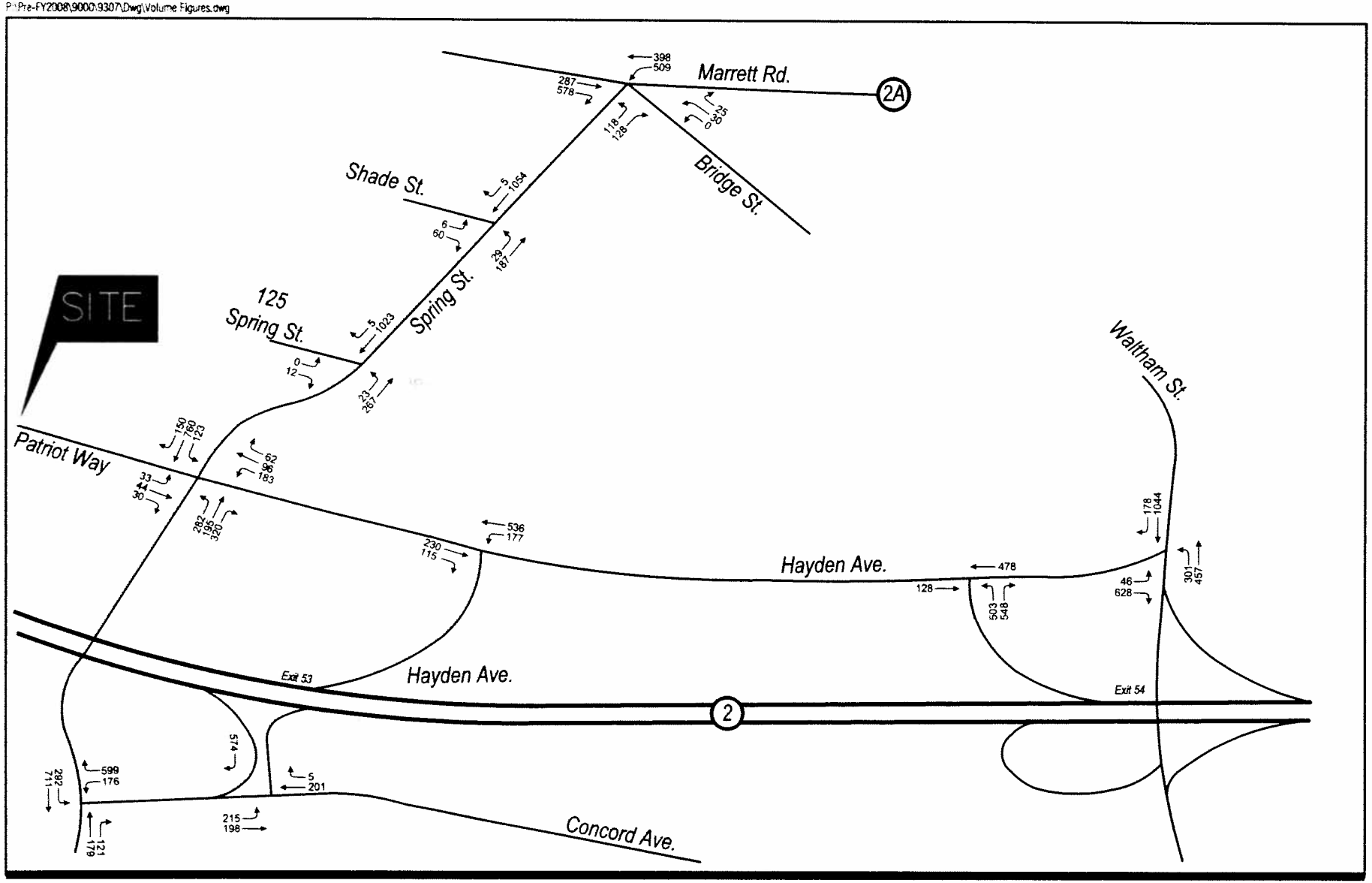
Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

TETRA TECH RIZZO

Existing Afternoon Peak Hour Traffic Volumes

Figure 3

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

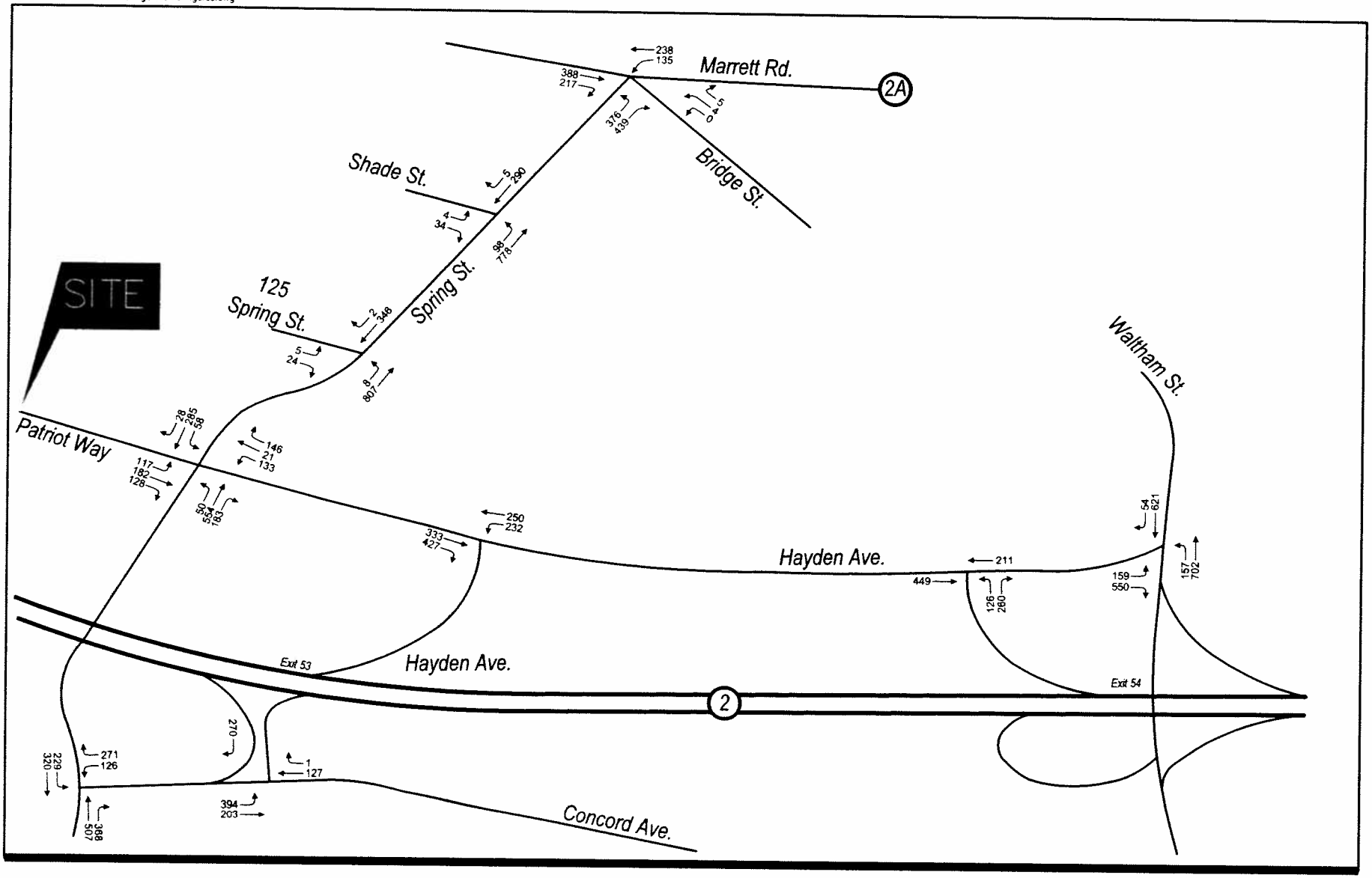
TETRA TECH RIZZO

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

2014 No Build Morning
Peak Hour Traffic
Volumes

Figure 4

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

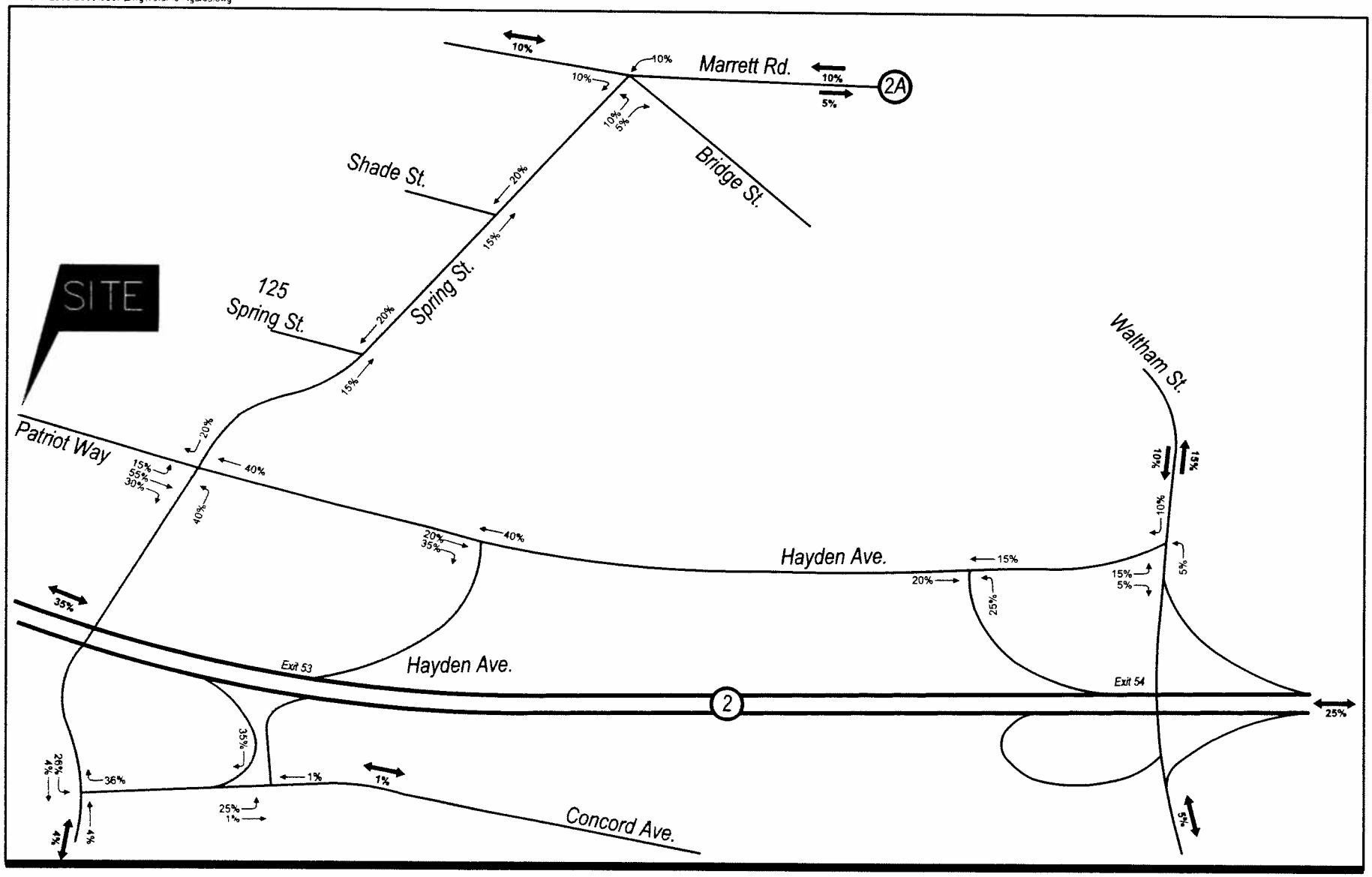
TETRA TECH RIZZO

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

2014 No Build Afternoon
Peak Hour Traffic
Volumes

Figure 5

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

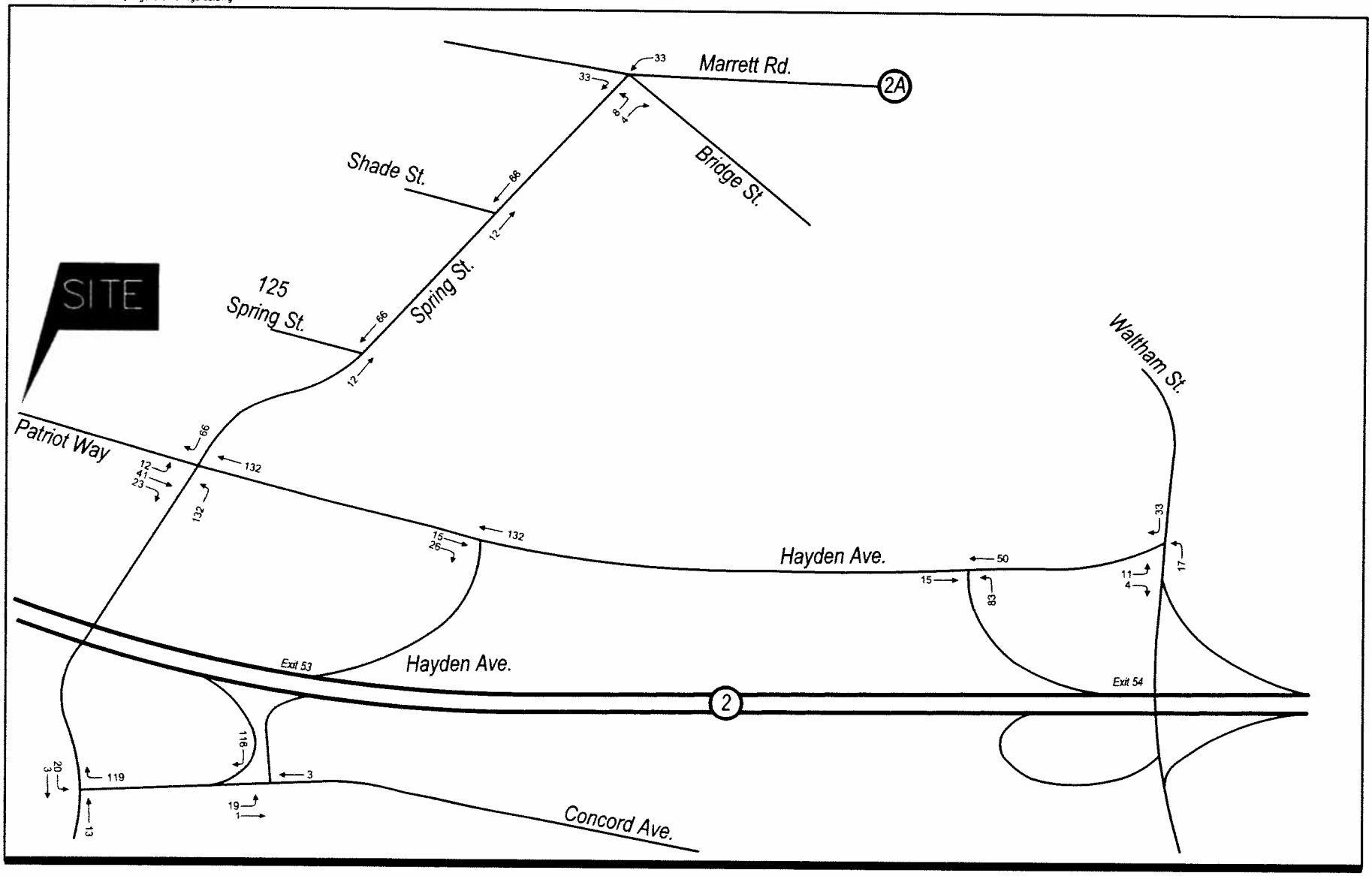
Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

TETRA TECH RIZZO

Project Trip Distribution

Figure 6

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



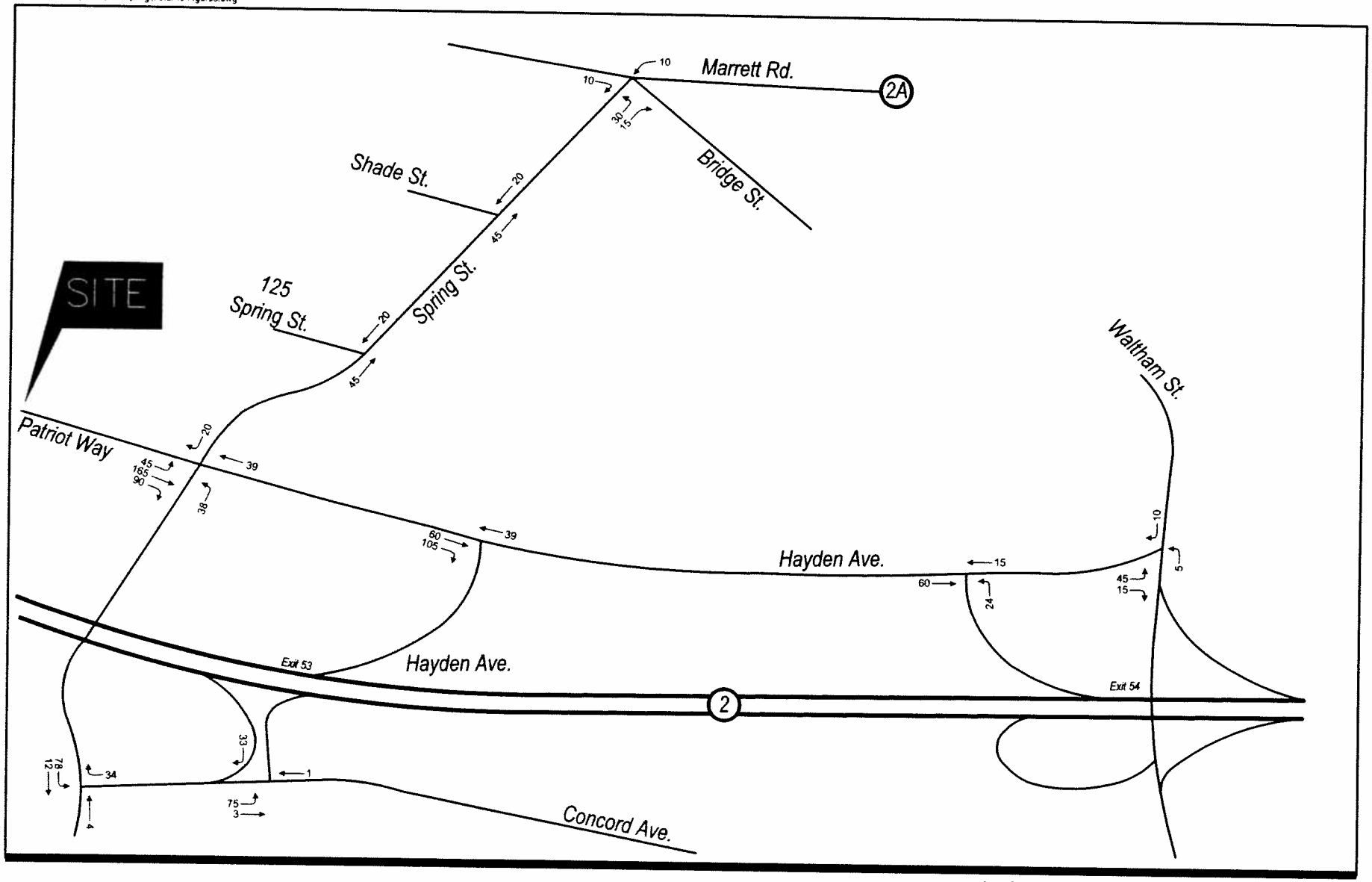
Not to Scale

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

TETRA TECH RIZZO

Morning Peak Hour
Project Generated Trips Figure 7

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

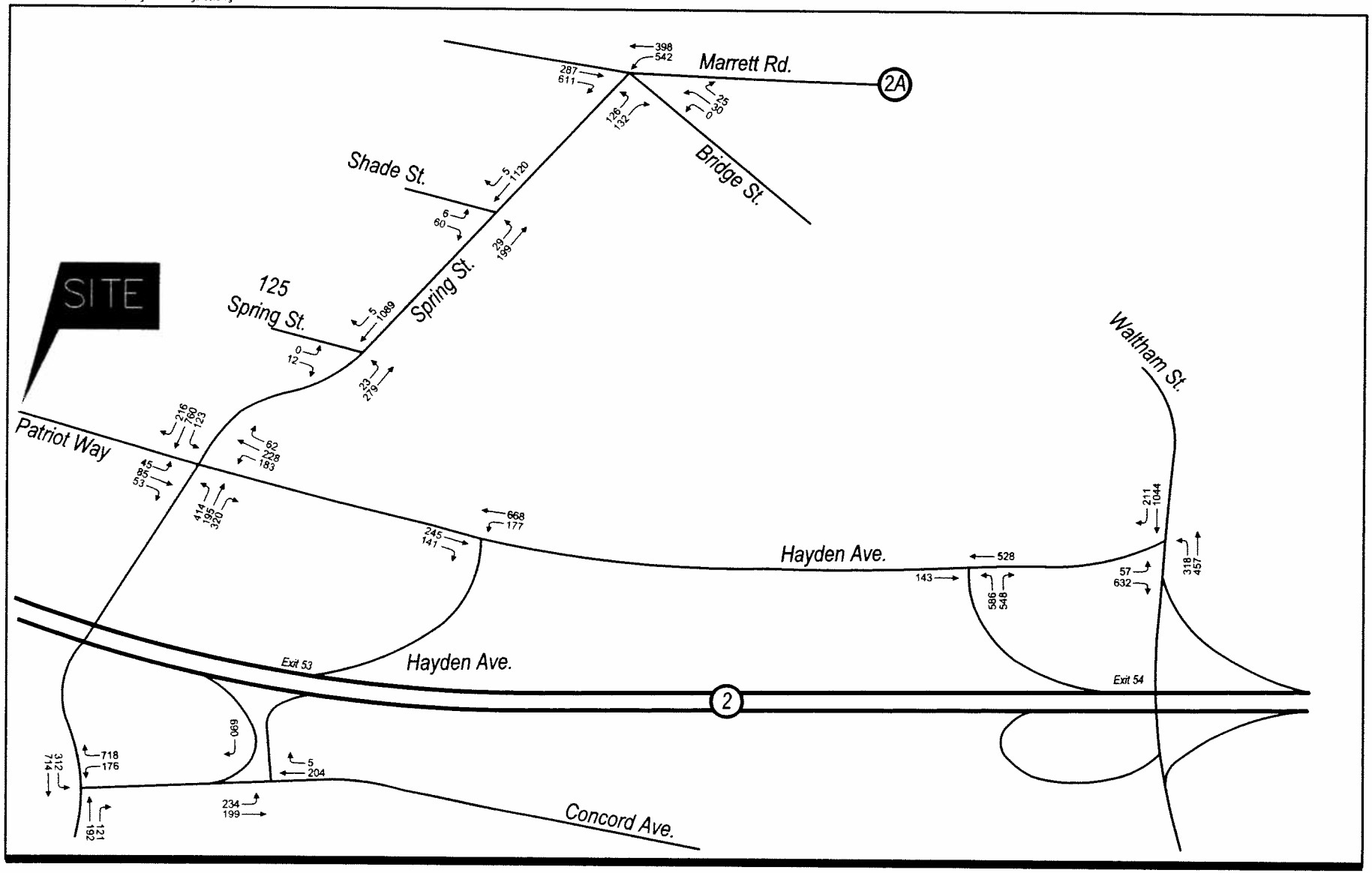
Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

TETRA TECH RIZZO

Afternoon Peak Hour
Project Generated Trips

Figure 8

P:\Pre-FY2008\9000-9307\Dwg\Volume Figures.dwg



Not to Scale

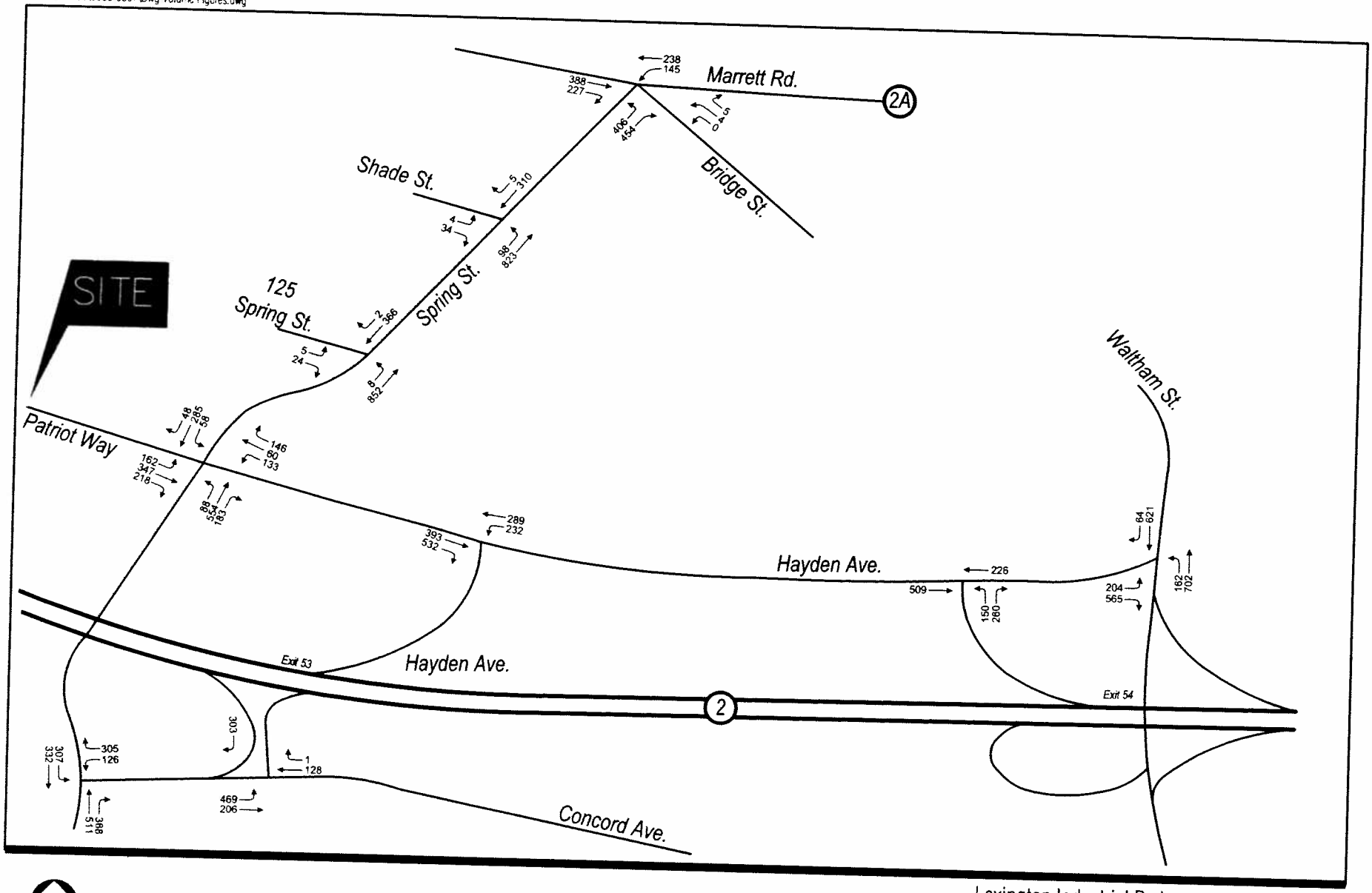
TETRA TECH RIZZO

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

2014 Build Morning
Peak Hour Traffic
Volumes

Figure 9

P:\Pre-FY2008\9000\9307\Dwg\Volume Figures.dwg



Not to Scale

TETRA TECH RIZZO

Lexington Industrial Park,
Patriot Way, Lexington Massachusetts

2014 Build Afternoon
Peak Hour Traffic
Volumes

Figure 10

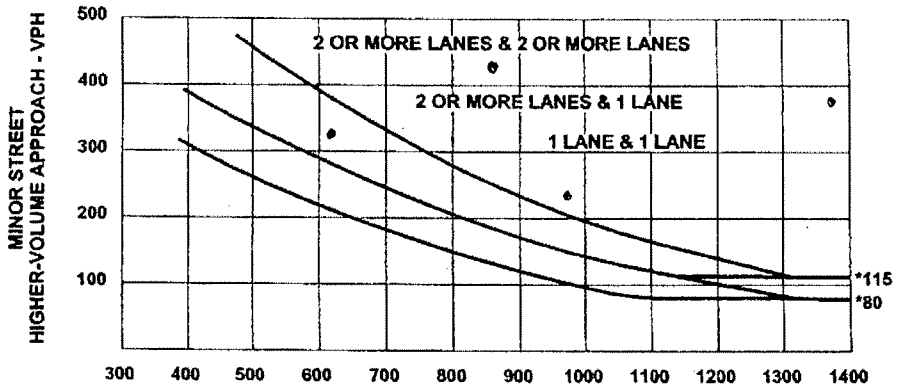
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	Project No:	127-3679-09001
Location:	Lexington, MA	Data Source:	
Compiled By:	Nathan Brackett	Date:	2/17/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

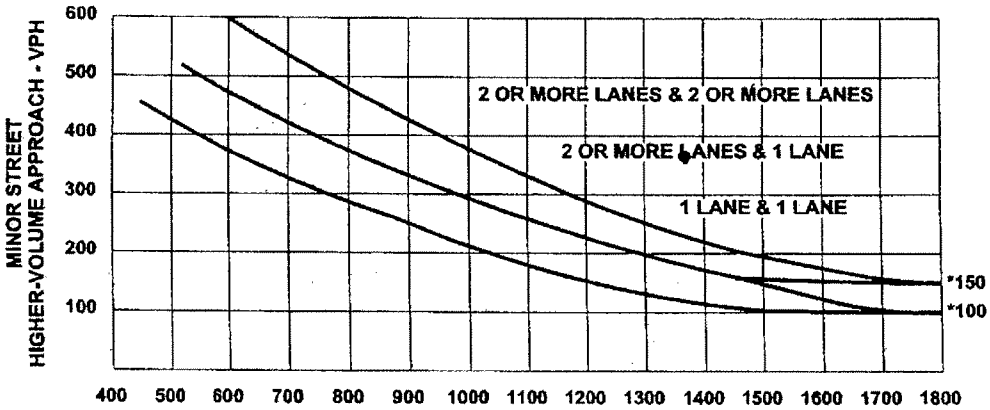
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
7-8AM	975	235
8-9AM	1371	377
4-5PM	623	327
5-6PM	864	418

Warrant 2 Met?		
YES	(NO)	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
8-9AM	1371	377

Warrant 3 Met?		
(YES)	NO	(CIRCLE)

Spring St / Hayden St / Patriot Way

Existing

TETRA TECH RIZZO

Signal Warrant Worksheet

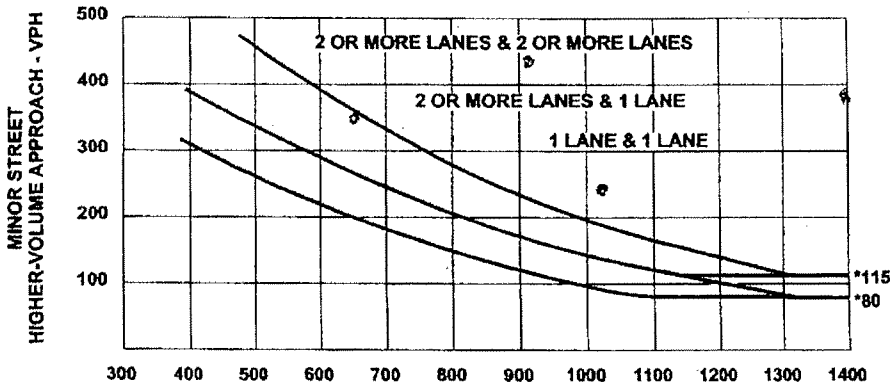
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	Project No:	127-3679-09001
Location:	Lexington, MA	Data Source:	
Compiled By:	Nathan Brackett	Date:	2/17/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



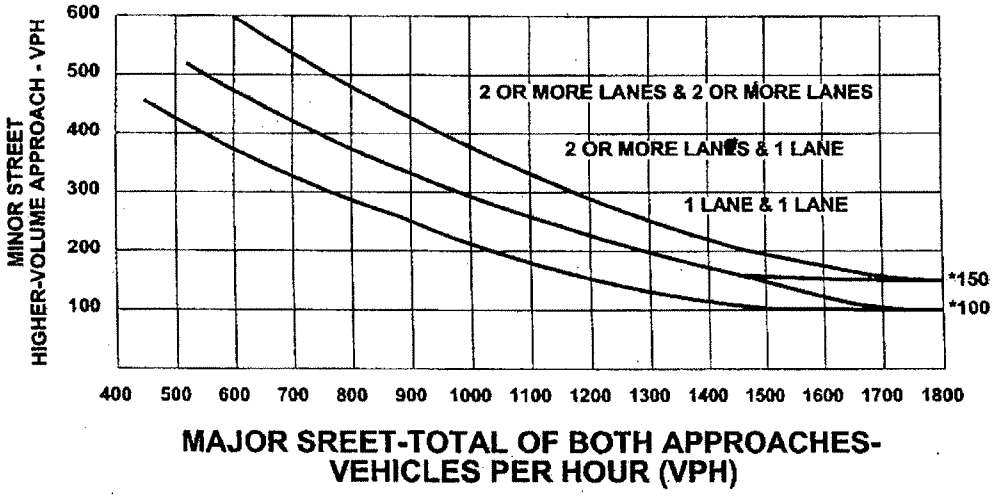
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
7-8am	1025	247
8-9am	1441	396
4-5pm	655	344
5-6pm	909	439

Warrant 2 Met?		
YES	(NO)	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
8-9am	1441	396

Warrant 3 Met?		
(YES)	NO	(CIRCLE)

Spring St/Hayden St/Patriot Way

2014 No Build

TETRA TECH RIZZO

Signal Warrant Worksheet

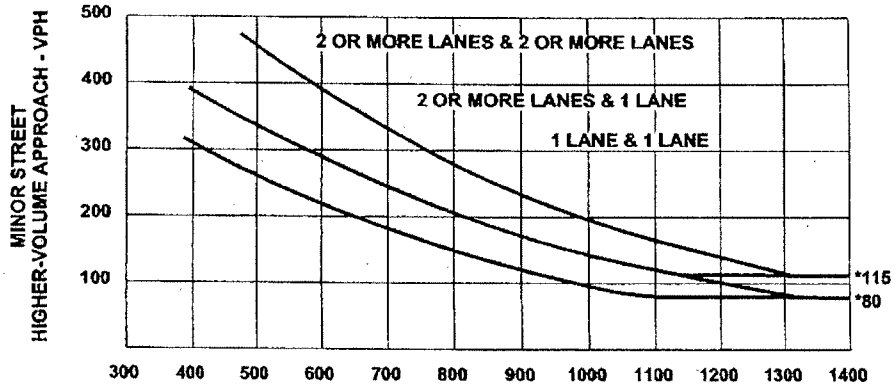
SIGNAL WARRANT WORKSHEET

WARRANT 2 *(FOUR HOUR VOLUME)* & WARRANT 3 *(PEAK HOUR VOLUME)*

Project Name:	Lexington Technology Park	**Project No:**	127-3679-09001
Location:	Lexington, MA	**Data Source:**	
Compiled By:	Nathan Brackett	**Date:**	2/12/09

2003 Edition

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

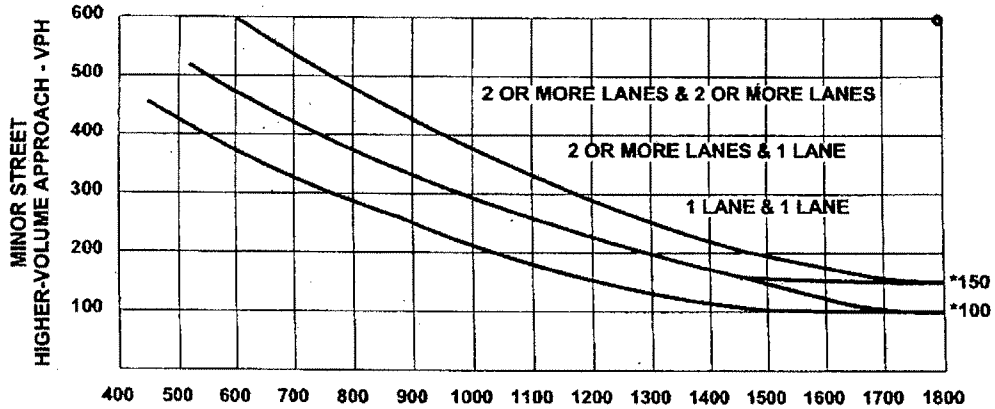
*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume

Warrant 2 Met?		
YES	NO	(CIRCLE)

2003 Edition

Figure 4C-3. Warrant 3, Peak Hour



MAJOR SREET-TOTAL OF BOTH APPROACHES-VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street Volume	Minor Street Volume
pm 8-9	2028	656

Warrant 3 Met?		
YES	NO	(CIRCLE)

Spring St / Hayden St / Patriot Way
2014 BUILD

TETRA TECH RIZZO

Signal Warrant Worksheet

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

N/S: Spring Street
E/W: Hayden Avenue/ Patriot Way
City/State: Lexington, MA
Client: Tetra Tech Rizzo/ E. Fellinger

File Name : 91812A
Site Code : 36790900
Start Date : 2/4/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Spring Street From North			Hayden Avenue From East			Spring Street From South			Patriot Way From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	10	61	9	6	4	22	18	28	21	3	1	0	183
07:15 AM	10	87	11	10	7	34	39	38	17	2	3	1	259
07:30 AM	4	135	15	10	5	41	39	26	19	1	1	1	297
07:45 AM	11	181	30	10	5	46	56	29	18	1	2	4	393
Total	35	464	65	36	21	143	152	121	75	7	7	6	1132
08:00 AM	13	178	20	15	12	54	77	44	16	3	2	3	437
08:15 AM	9	126	27	19	7	52	49	41	15	4	3	2	354
08:30 AM	6	163	30	16	6	63	70	34	16	4	4	2	414
08:45 AM	8	148	34	10	11	49	92	46	20	4	4	3	429
Total	36	615	111	60	36	218	288	165	67	15	13	10	1634
Grand Total	71	1079	176	96	57	361	440	286	142	22	20	16	2766
Apprch %	5.4	81.4	13.3	18.7	11.1	70.2	50.7	32.9	16.4	37.9	34.5	27.6	
Total %	2.6	39	6.4	3.5	2.1	13.1	15.9	10.3	5.1	0.8	0.7	0.6	
Cars	67	1071	170	91	55	354	429	281	134	16	14	14	2696
% Cars	94.4	99.3	96.6	94.8	96.5	98.1	97.5	98.3	94.4	72.7	70	87.5	97.5
Heavy Vehicles	4	8	6	5	2	7	11	5	8	6	6	2	70
% Heavy Vehicles	5.6	0.7	3.4	5.2	3.5	1.9	2.5	1.7	5.6	27.3	30	12.5	2.5

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Spring Street From North				Hayden Avenue From East				Spring Street From South				Patriot Way From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
08:00 AM	**13**	**178**	20	**211**	15	**12**	54	81	77	44	16	137	3	2	**3**	8	**437**
08:15 AM	9	126	27	162	**19**	7	52	78	49	41	15	105	**4**	3	2	9	354
08:30 AM	6	163	30	199	16	6	**63**	**85**	70	34	16	120	**4**	**4**	2	10	414
08:45 AM	8	148	**34**	190	10	**11**	49	70	**92**	**46**	**20**	**158**	4	4	3	**11**	429
Total Volume	36	615	111	762	60	36	218	314	288	165	67	520	15	13	10	38	1634
% App. Total	4.7	80.7	14.6		19.1	11.5	69.4		55.4	31.7	12.9		39.5	34.2	26.3		
PHF	.692	.864	.816	.903	.789	.750	.865	.924	.783	.897	.838	.823	.938	.813	.833	.864	.935
Cars	32	613	108	753	58	34	214	306	283	162	62	507	11	9	8	28	1594
% Cars	88.9	99.7	97.3	98.8	96.7	94.4	98.2	97.5	98.3	98.2	92.5	97.5	73.3	69.2	80.0	73.7	97.6
Heavy Vehicles	4	2	3	9	2	2	4	8	5	3	5	13	4	4	2	10	40
% Heavy Vehicles	11.1	0.3	2.7	1.2	3.3	5.6	1.8	2.5	1.7	1.8	7.5	2.5	26.7	30.8	20.0	26.3	2.4

	From North Spring st	From East Hayden Ave	From South Spring St.	From West Patriot Way
8-9	815	336	556	41
7-8	603	214	372	21

((OURS) 1.07) = BEAL

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

N/S: Spring Street
E/W: Hayden Avenue/ Patriot Way
City/State: Lexington, MA
Client: Tetra Tech Rizzo/ E. Fellinger

File Name : 91812AA
Site Code : 36790900
Start Date : 2/4/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Spring Street From North			Hayden Avenue From East			Spring Street From South			Patriot Way From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	2	46	6	22	2	19	19	48	3	8	9	5	189
04:15 PM	1	30	5	20	1	18	27	62	1	7	13	6	191
04:30 PM	1	38	3	18	2	20	22	62	0	16	19	4	205
04:45 PM	3	42	5	25	3	22	28	78	0	10	8	3	227
Total	7	156	19	85	8	79	96	250	4	41	49	18	812
05:00 PM	0	53	11	31	1	24	31	77	1	13	17	12	271
05:15 PM	0	57	13	26	3	28	33	92	3	6	7	10	278
05:30 PM	0	65	8	26	0	44	31	86	1	10	10	12	293
05:45 PM	1	58	7	30	2	21	33	78	0	5	12	7	254
Total	1	233	39	113	6	117	128	333	5	34	46	41	1096
Grand Total	8	389	58	198	14	196	224	583	9	75	95	59	1908
Apprch %	1.8	85.5	12.7	48.5	3.4	48	27.5	71.4	1.1	32.8	41.5	25.8	
Total %	0.4	20.4	3	10.4	0.7	10.3	11.7	30.6	0.5	3.9	5	3.1	
Cars	8	389	55	192	14	190	222	581	7	75	95	57	1885
% Cars	100	100	94.8	97	100	96.9	99.1	99.7	77.8	100	100	96.6	98.8
Heavy Vehicles	0	0	3	6	0	6	2	2	2	0	0	2	23
% Heavy Vehicles	0	0	5.2	3	0	3.1	0.9	0.3	22.2	0	0	3.4	1.2

	Spring Street From North				Hayden Avenue From East				Spring Street From South				Patriot Way From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	53	11	64	**31**	1	24	56	31	77	1	109	**13**	**17**	**12**	**42**	271
05:15 PM	0	57	**13**	70	26	**3**	28	57	**33**	**92**	**3**	**128**	6	7	10	23	278
05:30 PM	0	**65**	8	**73**	26	0	**44**	**70**	31	86	1	118	10	10	12	32	**293**
05:45 PM	**1**	58	7	66	30	2	21	53	33	78	0	111	5	12	7	24	254
Total Volume	1	233	39	273	113	6	117	236	128	333	5	466	34	46	41	121	1096
% App. Total	0.4	85.3	14.3		47.9	2.5	49.6		27.5	71.5	1.1		28.1	38	33.9		
PHF	.250	.896	.750	.935	.911	.500	.665	.843	.970	.905	.417	.910	.654	.676	.854	.720	.935
Cars	1	233	38	272	111	6	115	232	127	332	4	463	34	46	40	120	1087
% Cars	100	100	97.4	99.6	98.2	100	98.3	98.3	99.2	99.7	80.0	99.4	100	100	97.6	99.2	99.2
Heavy Vehicles	0	0	1	1	2	0	2	4	1	1	1	3	0	0	1	1	9
% Heavy Vehicles	0	0	2.6	0.4	1.8	0	1.7	1.7	0.8	0.3	20.0	0.6	0	0	2.4	0.8	0.8
	From North Spring St				From East Hayden Ave				From South S Spring St.				From West Patriot Way				
4-5				213				201				410				126	
5-6				319				276				545				142	

(OURS) 1.17 = BEAC