4 D

MASSHIGHWAY CRASH RATE WORKSHEETS

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Concord COUNT DATE : 2006

DISTRICT : 4 UNSIGNALIZED : SIGNALIZED : X

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Route 62 ST #

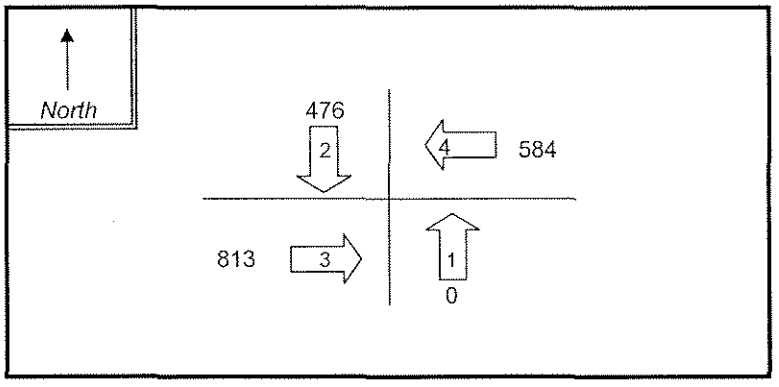
MINOR STREET(S) : High Street ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/**PM**) :	0	476	813	584		1,873

" K " FACTOR : 0.090 APPROACH ADT : 20,811 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 7 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : 2.33

CRASH RATE CALCULATION : 0.31 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : The calculated Crash Rate for this intersection is below the MassHighway District 4 average for a signalized intersection of 0.88

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MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Concord COUNT DATE : 2006

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Route 62 ST #

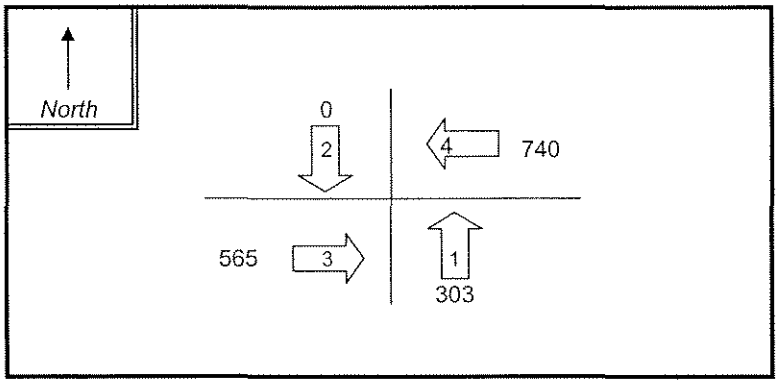
MINOR STREET(S) : Sudbury Road ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/**PM**) :	303	0	565	740		1,608

" K " FACTOR : 0.090 APPROACH ADT : 17,867 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 2 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : 0.67

CRASH RATE CALCULATION : 0.10 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : The calculated Crash Rate for this intersection is below the MassHighway District 4 average for an unsignalized intersection of 0.63

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MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Concord COUNT DATE : 2006

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : High Street ST #

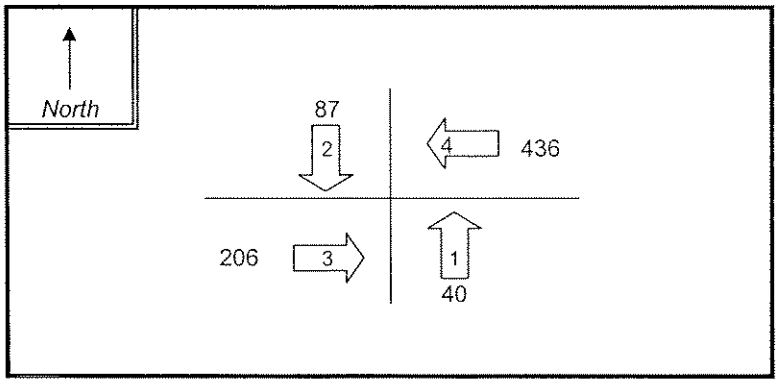
MINOR STREET(S) : Parker Street ST #

ST #

ST #

ST #

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/**PM**) :	40	87	206	436		769

" K " FACTOR : 0.090 APPROACH ADT : 8,544 **ADT** = TOTAL VOL/"K" FACT.

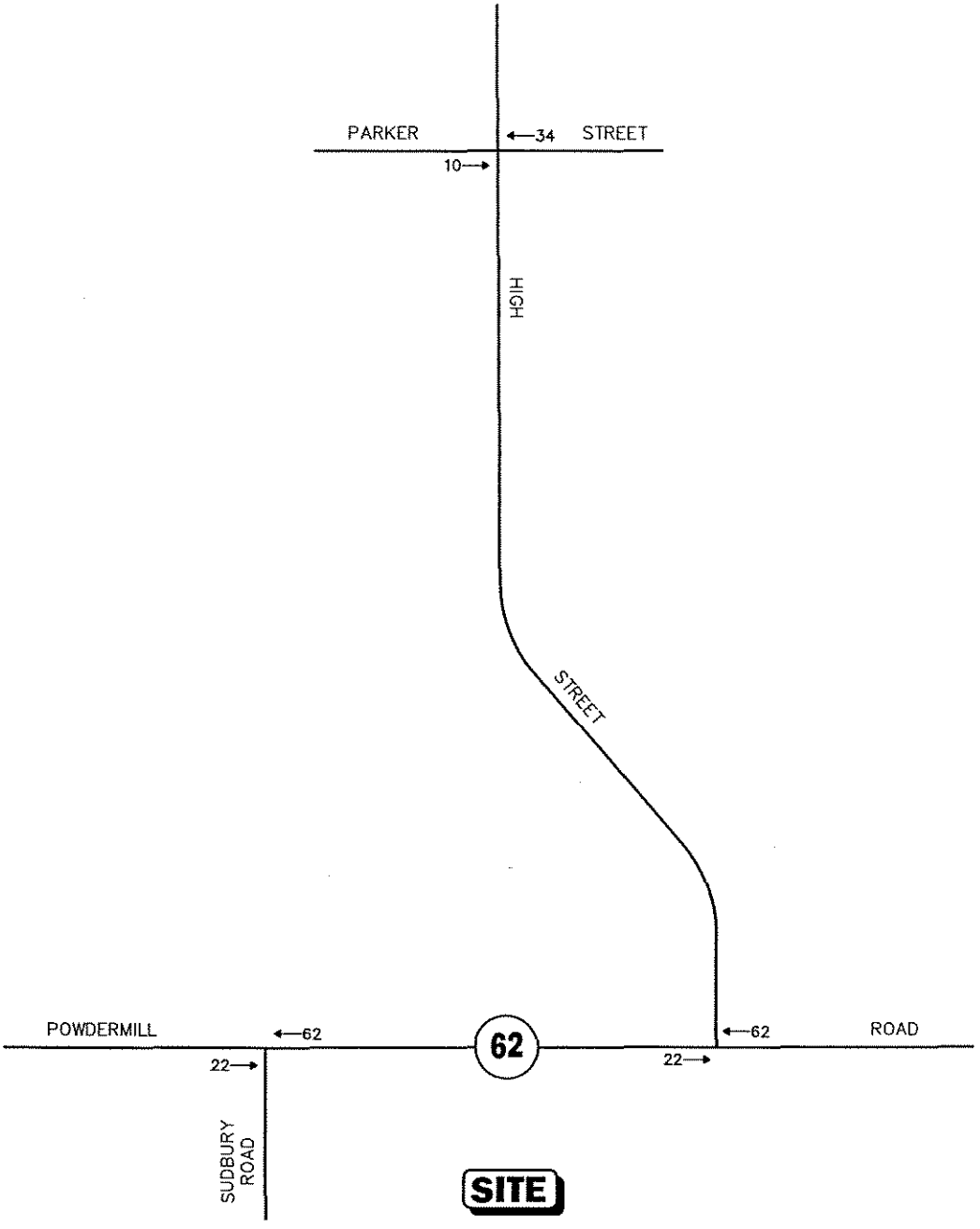
TOTAL # OF ACCIDENTS : 14 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : 4.67

CRASH RATE CALCULATION : 1.50 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : The calculated Crash Rate for this intersection is above the MassHighway District 4 average for an unsignalized intersection of 0.63

S:\Jobs\4984\Accidents\MHD_RATEFORM.XLS

SITE-SPECIFIC DEVELOPMENT TRAFFIC-VOLUME NETWORKS



Not To Scale

Figure A1

Vanasse & Associates, Inc.
Transportation Engineers & Planners

Proposed 129 Parker Street Redevelopment Weekday Morning Peak Hour Traffic Volumes

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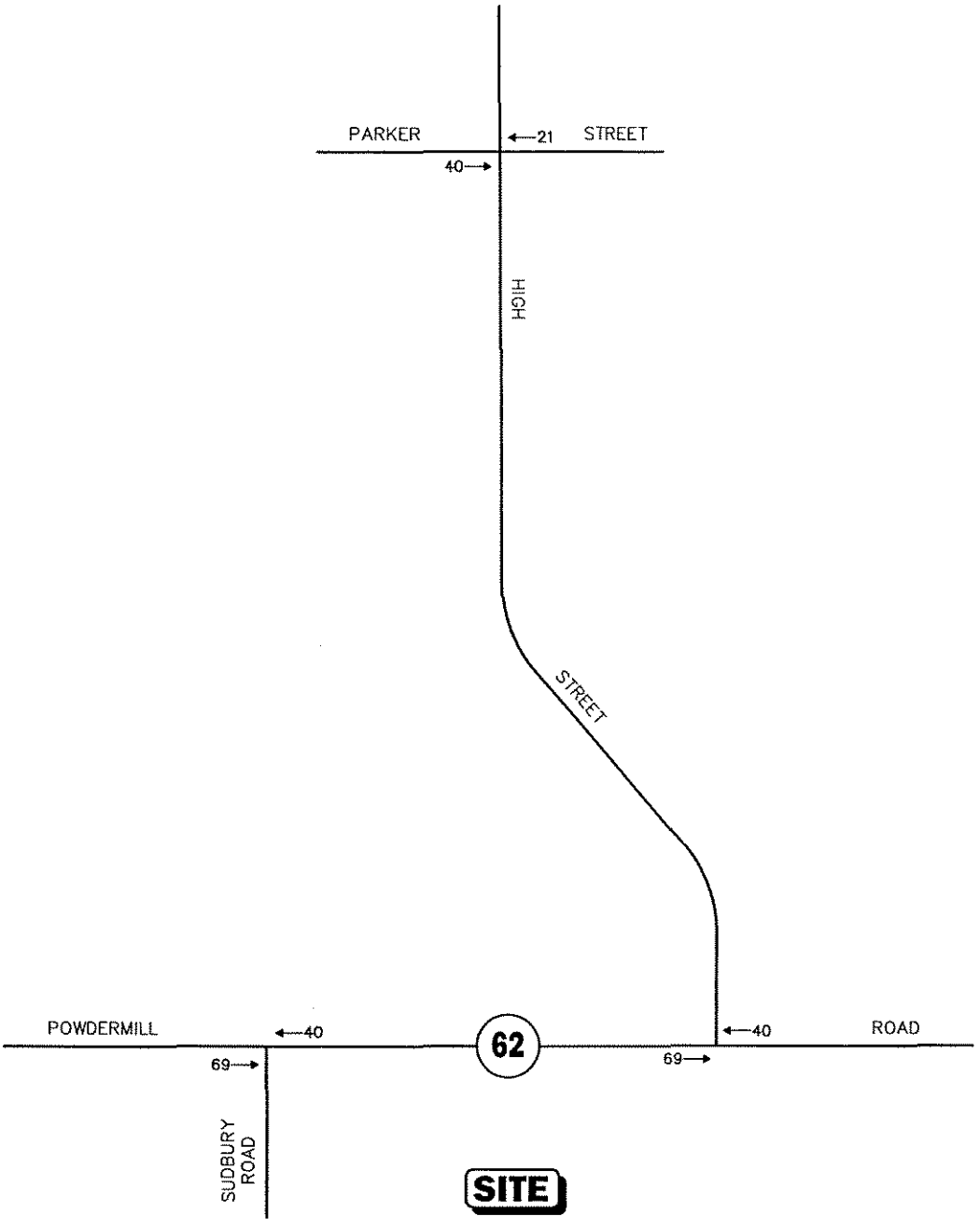

Not To Scale

Figure A2

Vanasse & Associates, Inc.
Transportation Engineers & Planners

Proposed 129 Parker Street Redevelopment Weekday Evening Peak Hour Traffic Volumes

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GENERAL BACKGROUND TRAFFIC GROWTH

General Background Traffic Growth

STA.	CITY/TOWN	ROUTE/STREET	LOCATION	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average Annual Growth Rate
0403 L	CONCORD	RTE. 2	0.2 km EAST OF CONCORD ROTARY		46,879	47,407	47,161	47,011	46,354	47,595	47,137		45,754	-0.14%
4003	CONCORD	RTE. 62	AT ACTON T.L.		12,000			13,900			11,100			-1.16%
4002	ACTON	RTE. 2A & 119	AT LITTLETON T.L.			18,100			17,500			15,500		-2.54%
4001	ACTON	RTE. 27	NORTH OF RTE.2A			11,300			10,200			10,400		-1.36%
4002	ACTON	RTE.119 & 2A	AT LITTLETON T.L.			18,100			17,500			15,500		-2.54%
4167	ACTON	SCHOOL ST.	WEST OF PARKER ST.	3,100			3,300			3,000			4,000	2.44%
4008	MAYNARD	RTE. 62	AT STOW T.L.	11,500			12,200						12,500	1.11%
														-0.60%

TRIP-GENERATION CALCULATIONS

Institute of Transportation Engineers (ITE)
Trip Generation, 7th Edition
Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 350

AVERAGE WEEKDAY DAILY

T = 6.01 * (X) + 150.35
T = 6.01 * 350 + (150.35)
T = 2253.85
T = 2,254 vehicle trips
with 50% (1,127 vpd) entering and 50% (1,127 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.49 * (X) + 3.73
T = 0.49 * 350 + (3.73)
T = 175.23
T = 175 vehicle trips
with 20% (35 vph) entering and 80% (140 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.55 * (X) + 17.65
T = 0.55 * 350 + (17.65)
T = 210.15
T = 210 vehicle trips
with 65% (137 vph) entering and 35% (73 vph) exiting.

CAPACITY ANALYSIS WORKSHEETS

Route 62 at High Street
Route 62 at Sudbury Road
High Street at Parker Street
Sudbury Road at Old Powdermill Road

Route 62 at High Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1829	1827	1827	1524	1770	1599
Flt Permitted	0.41	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	791	1827	1827	1524	1770	1599
Volume (vph)	171	459	281	72	273	317
Peak-hour factor, PHF	0.84	0.84	0.91	0.91	0.91	0.91
Adj. Flow (vph)	204	546	309	79	300	348
RTOR Reduction (vph)	0	0	0	49	0	182
Lane Group Flow (vph)	204	546	309	30	300	166
Heavy Vehicles (%)	2%	4%	4%	6%	2%	1%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	21.2	21.2	13.7	26.6
Effective Green, g (s)	35.1	35.1	22.2	22.2	14.7	27.6
Actuated g/C Ratio	0.61	0.61	0.38	0.38	0.25	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	640	1109	702	585	450	764
v/s Ratio Prot	0.05	c0.30	0.17		c0.17	0.10
v/s Ratio Perm	0.14			0.02		
v/c Ratio	0.32	0.49	0.44	0.05	0.67	0.22
Uniform Delay, d1	5.6	6.4	13.2	11.2	19.4	8.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.6	2.0	0.2	3.7	0.1
Delay (s)	5.9	7.9	15.2	11.4	23.1	8.9
Level of Service	A	A	B	B	C	A
Approach Delay (s)		7.4	14.4		15.5	
Approach LOS		A	B		B	

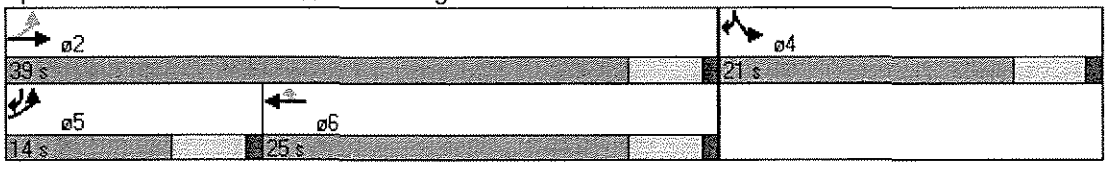
Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	171	459	281	72	273	317
Lane Group Flow (vph)	204	546	309	79	300	348
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	0.33	0.49	0.44	0.12	0.67	0.37
Control Delay	7.2	8.8	16.9	4.5	27.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	8.8	16.9	4.5	27.3	2.3
Queue Length 50th (ft)	30	103	84	0	93	0
Queue Length 95th (ft)	52	153	149	23	164	32
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	628	1110	700	633	502	984
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.49	0.44	0.12	0.60	0.35

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.8
Natural Cycle: 40
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Route 62 & High Street



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1865	1863	1881	1599	1770	1583
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	506	1863	1881	1599	1770	1583
Volume (vph)	429	384	425	159	217	259
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.76	0.76
Adj. Flow (vph)	456	409	452	169	286	341
RTOR Reduction (vph)	0	0	0	107	0	102
Lane Group Flow (vph)	456	409	452	62	286	239
Heavy Vehicles (%)	0%	2%	1%	1%	2%	2%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	20.1	20.1	13.4	27.4
Effective Green, g (s)	35.1	35.1	21.1	21.1	14.4	28.4
Actuated g/C Ratio	0.61	0.61	0.37	0.37	0.25	0.49
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	545	1137	690	587	443	782
v/s Ratio Prot	c0.15	0.22	0.24		c0.16	0.15
v/s Ratio Perm	c0.36			0.04		
v/c Ratio	0.84	0.36	0.66	0.11	0.65	0.31
Uniform Delay, d1	8.2	5.6	15.2	12.0	19.3	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	0.9	4.8	0.4	3.2	0.2
Delay (s)	18.9	6.5	20.0	12.3	22.5	8.9
Level of Service	B	A	B	B	C	A
Approach Delay (s)		13.0	17.9		15.1	
Approach LOS		B	B		B	

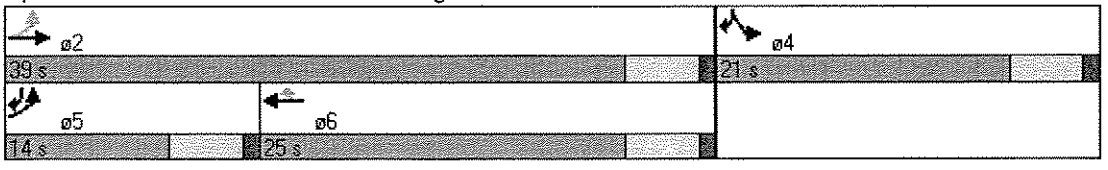
Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	429	384	425	159	217	259
Lane Group Flow (vph)	456	409	452	169	286	341
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	0.86	0.36	0.66	0.24	0.64	0.39
Control Delay	28.3	7.3	21.5	3.8	26.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	7.3	21.5	3.8	26.5	5.0
Queue Length 50th (ft)	77	67	134	0	88	25
Queue Length 95th (ft)	#236	117	229	33	125	45
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	529	1136	688	693	502	915
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.36	0.66	0.24	0.57	0.37

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Route 62 & High Street



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1829	1827	1827	1524	1770	1599
Flt Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	623	1827	1827	1524	1770	1599
Volume (vph)	182	509	360	76	290	337
Peak-hour factor, PHF	0.84	0.84	0.91	0.91	0.91	0.91
Adj. Flow (vph)	217	606	396	84	319	370
RTOR Reduction (vph)	0	0	0	52	0	130
Lane Group Flow (vph)	217	606	396	32	319	240
Heavy Vehicles (%)	2%	4%	4%	6%	2%	1%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	21.1	21.1	13.9	26.9
Effective Green, g (s)	35.1	35.1	22.1	22.1	14.9	27.9
Actuated g/C Ratio	0.61	0.61	0.38	0.38	0.26	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	564	1106	696	581	455	769
v/s Ratio Prot	0.06	c0.33	0.22		c0.18	0.15
v/s Ratio Perm	0.17			0.02		
v/c Ratio	0.38	0.55	0.57	0.06	0.70	0.31
Uniform Delay, d1	6.3	6.8	14.2	11.3	19.5	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.0	3.4	0.2	4.8	0.2
Delay (s)	6.7	8.7	17.5	11.5	24.4	9.4
Level of Service	A	A	B	B	C	A
Approach Delay (s)		8.2	16.5		16.3	
Approach LOS		A	B		B	

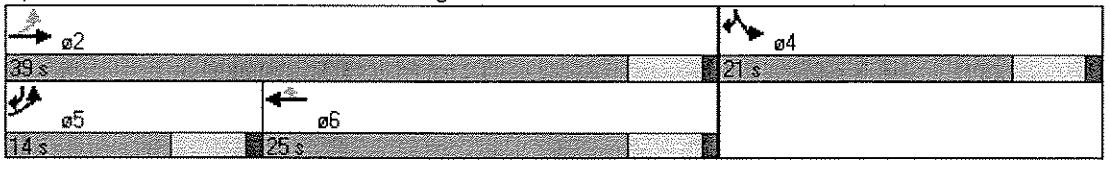
Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	182	509	360	76	290	337
Lane Group Flow (vph)	217	606	396	84	319	370
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	0.40	0.55	0.57	0.13	0.70	0.41
Control Delay	8.0	9.7	19.3	4.5	28.5	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	9.7	19.3	4.5	28.5	4.5
Queue Length 50th (ft)	33	120	115	0	100	21
Queue Length 95th (ft)	55	177	197	24	175	60
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	552	1105	693	631	502	937
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.55	0.57	0.13	0.64	0.39

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 58
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Route 62 & High Street



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1865	1863	1881	1599	1770	1583
Flt Permitted	0.19	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	372	1863	1881	1599	1770	1583
Volume (vph)	455	477	491	169	230	275
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.76	0.76
Adj. Flow (vph)	484	507	522	180	303	362
RTOR Reduction (vph)	0	0	0	114	0	77
Lane Group Flow (vph)	484	507	522	66	303	285
Heavy Vehicles (%)	0%	2%	1%	1%	2%	2%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	20.1	20.1	13.7	27.7
Effective Green, g (s)	35.1	35.1	21.1	21.1	14.7	28.7
Actuated g/C Ratio	0.61	0.61	0.37	0.37	0.25	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	484	1131	687	584	450	786
v/s Ratio Prot	c0.17	0.27	0.28		c0.17	0.18
v/s Ratio Perm	c0.43			0.04		
v/c Ratio	1.00	0.45	0.76	0.11	0.67	0.36
Uniform Delay, d1	13.0	6.1	16.1	12.2	19.4	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.9	1.3	7.7	0.4	4.0	0.3
Delay (s)	53.9	7.4	23.9	12.5	23.3	9.2
Level of Service	D	A	C	B	C	A
Approach Delay (s)		30.1	21.0		15.7	
Approach LOS		C	C		B	

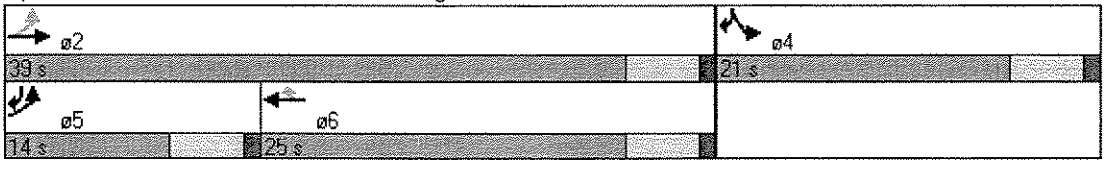
Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	455	477	491	169	230	275
Lane Group Flow (vph)	484	507	522	180	303	362
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	1.03	0.45	0.76	0.26	0.67	0.42
Control Delay	67.9	8.3	26.5	3.8	27.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	8.3	26.5	3.8	27.4	6.6
Queue Length 50th (ft)	~144	92	166	0	94	39
Queue Length 95th (ft)	#308	153	#314	34	133	61
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	469	1130	684	697	502	892
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.45	0.76	0.26	0.60	0.41

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Route 62 & High Street



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1829	1827	1827	1524	1770	1599
Flt Permitted	0.30	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	586	1827	1827	1524	1770	1599
Volume (vph)	203	572	376	76	290	342
Peak-hour factor, PHF	0.84	0.84	0.91	0.91	0.91	0.91
Adj. Flow (vph)	242	681	413	84	319	376
RTOR Reduction (vph)	0	0	0	52	0	121
Lane Group Flow (vph)	242	681	413	32	319	255
Heavy Vehicles (%)	2%	4%	4%	6%	2%	1%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	20.9	20.9	13.9	27.1
Effective Green, g (s)	35.1	35.1	21.9	21.9	14.9	28.1
Actuated g/C Ratio	0.61	0.61	0.38	0.38	0.26	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	552	1106	690	575	455	775
v/s Ratio Prot	0.07	c0.37	0.23		c0.18	0.16
v/s Ratio Perm	0.20			0.02		
v/c Ratio	0.44	0.62	0.60	0.06	0.70	0.33
Uniform Delay, d1	6.5	7.2	14.5	11.5	19.5	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	2.6	3.8	0.2	4.8	0.3
Delay (s)	7.1	9.8	18.3	11.7	24.4	9.4
Level of Service	A	A	B	B	C	A
Approach Delay (s)		9.1	17.2		16.3	
Approach LOS		A	B		B	

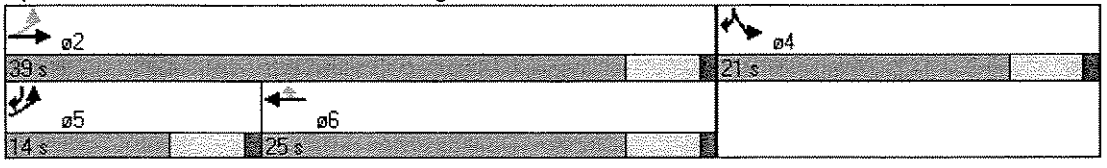
Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	203	572	376	76	290	342
Lane Group Flow (vph)	242	681	413	84	319	376
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	0.46	0.62	0.60	0.13	0.70	0.42
Control Delay	8.7	10.9	20.0	4.5	28.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	10.9	20.0	4.5	28.5	5.0
Queue Length 50th (ft)	37	144	122	0	100	25
Queue Length 95th (ft)	61	211	207	24	175	66
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	540	1105	689	627	502	930
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.62	0.60	0.13	0.64	0.40

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 58
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Route 62 & High Street

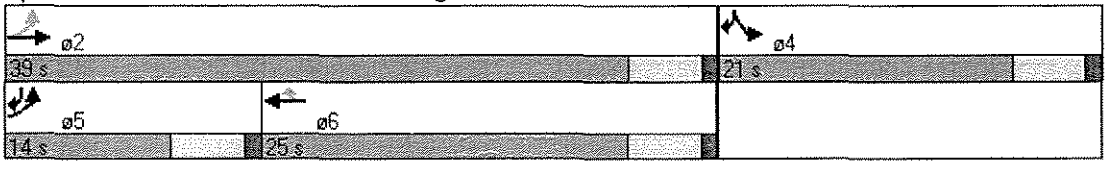


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1865	1863	1881	1599	1770	1583
Flt Permitted	0.16	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	313	1863	1881	1599	1770	1583
Volume (vph)	466	510	552	169	230	296
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.76	0.76
Adj. Flow (vph)	496	543	587	180	303	389
RTOR Reduction (vph)	0	0	0	114	0	60
Lane Group Flow (vph)	496	543	587	66	303	329
Heavy Vehicles (%)	0%	2%	1%	1%	2%	2%
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Actuated Green, G (s)	34.1	34.1	20.1	20.1	13.7	27.7
Effective Green, g (s)	35.1	35.1	21.1	21.1	14.7	28.7
Actuated g/C Ratio	0.61	0.61	0.37	0.37	0.25	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	459	1131	687	584	450	786
v/s Ratio Prot	c0.19	0.29	0.31		c0.17	0.21
v/s Ratio Perm	c0.47			0.04		
v/c Ratio	1.08	0.48	0.85	0.11	0.67	0.42
Uniform Delay, d1	14.6	6.3	16.9	12.2	19.4	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	65.4	1.5	12.9	0.4	4.0	0.4
Delay (s)	80.0	7.8	29.8	12.5	23.3	9.6
Level of Service	F	A	C	B	C	A
Approach Delay (s)		42.3	25.7		15.6	
Approach LOS		D	C		B	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	466	510	552	169	230	296
Lane Group Flow (vph)	496	543	587	180	303	389
Turn Type	pm+pt			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases	2			6		
Detector Phases	5	2	6	6	4	4 5
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	
Total Split (s)	14.0	39.0	25.0	25.0	21.0	35.0
Total Split (%)	23.3%	65.0%	41.7%	41.7%	35.0%	58.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	
v/c Ratio	1.08	0.48	0.86	0.26	0.67	0.46
Control Delay	83.6	8.6	33.5	3.8	27.4	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.6	8.6	33.5	3.8	27.4	8.2
Queue Length 50th (ft)	~161	101	196	0	94	52
Queue Length 95th (ft)	#327	168	#371	34	133	77
Internal Link Dist (ft)		944	618		1906	
Turn Bay Length (ft)	250			240	150	
Base Capacity (vph)	460	1130	684	697	502	875
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.48	0.86	0.26	0.60	0.44

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Route 62 & High Street