



WELLS & ASSOCIATES, LLC

TRAFFIC, TRANSPORTATION, and PARKING CONSULTANTS

MEMORANDUM

TO: Thomas Carroll
Holland + Knight

FROM: Nancy Randall
Catherine Proot

DATE: April 27, 2006

SUBJECT: Transportation Impact Analysis Addendum for Square 776;
Washington, D.C.

Introduction

This addendum presents a revised transportation impact analysis for Square 776, which is bounded by Eye Street on the north, H Street on the south, 3rd Street on the west, and 4th Street on the east, in the northeast section of Washington, D.C.

The original study, dated January 6, 2006, was based on the development of 61,964 square feet (S.F.) of grocery store space and 9,551 S.F. of retail space. The development quantities for this development have been modified to 63,135 S.F. of grocery store space and 5,958 S.F. of retail space.

In addition, the original transportation impact study reflected the use of a 65-percent non-auto mode split for the proposed retail and grocery store space. This non-auto mode split has been decreased to 60-percent based on other projects located in the Washington, D.C. area. The non-auto mode split accounts for transit reductions, internal synergies, and the adjacent population within walking distance to the project site.

Site Trip Generation Analysis

The number of trips that will be generated by the development of Square 776 were estimated based on: (1) Institute of Transportation Engineers, (2) the proximity of the project to the Union Station Metro Station, and (3) experience with other comparable projects in Washington, D.C.

The development is anticipated to generate 183 AM peak hour trips (92 in and 91 out) and 385 PM peak hour trips (192 in and 193 out), at project buildout, as shown in Table 1. This estimate assumes that 50 percent of all residential site-generated person-trips and 60 percent of all retail and grocery store site-generated trips (as previously described) would be made by Metro or some other non-auto mode. The prevailing mode split in this neighborhood is 50 percent, according to the 2000 U.S. Census.

The updated site-generated trips were assigned to the public road network according to the directional distribution described in the original transportation impact study report and are shown on Figure 1.

Total Future Traffic Forecasts

Total future peak hour traffic forecasts (shown on Figure 2), with the development Square 776, were estimated based on the original background traffic forecasts and the revised site traffic assignments shown on Figure 1.

Total Future Levels of Service

Future peak hour levels of service, with the development of Square 776, were estimated at the key intersections in the study area based on the intersection lane usage and traffic control shown on Figure 2-1 of the original report, the revised total future forecasts shown on Figure 2, and the Highway Capacity Manual. The results are included in Appendix A and summarized on Table 2.

Table 3 indicates that all of the key intersections will continue to operate at an overall level of service (LOS) "D" or better during both the AM and PM peak hours with the development of Square 776, except the intersection of 3rd Street and H Street, which will operate at a LOS "E" during the PM peak hour. The southbound movement at this intersection will operate at an LOS "F" during the PM peak hour. However, modifying the traffic signal timings (within the existing cycle length) during the PM peak hour would allow this movement to operate at an acceptable level of service "D" or better, without adversely affecting other intersections.

The garage entrance off 3rd Street is anticipated to operate at a LOS "B" during the AM peak hour and at LOS "C" during the PM peak hour.

Parking Analysis

The subject site is proposed to be zoned as C-2-B. The District of Columbia zoning ordinance minimum parking requirement in zone C-2-B for apartment houses or multiple dwellings is one (1) space for every three units. In zone C-2-B for commercial space, the parking requirements is one (1) space for each 750 S.F. in excess of 3,000 S.F. of gross floor area.

Per the District of Columbia zoning ordinance minimum parking requirements, the subject site would require 92 commercial parking spaces and 78 residential parking spaces, for a total of 170 parking spaces.

Auto availability for owner-occupied residential units in Census Tract 83.01, in which the subject site is located, is 1.35 vehicles per unit, according to the 2000 U.S. Census. Approximately 5 percent of all owner-occupied households owned no vehicle; 61 percent owned one (1) vehicle; and 29 percent owned two (2) or more vehicles.

Auto availability for renter-occupied residential units in Census Tract 83.01 is 0.79 vehicles per unit, according to the 2000 U.S. Census. Approximately 36 percent of all owner-occupied households owned no vehicle; 49 percent owned one (1) vehicle; and 13 percent owned two (2) or more vehicles.

The subject site will be served by three (3) levels of underground parking with approximately 375 parking spaces (254 spaces for the residential space and 121 spaces for the retail/grocery store space). This is 176 more residential parking spaces and 29 more retail/grocery store parking spaces than the minimum number of spaces required by the zoning ordinance.

In summary, the proposed on-site parking supply would exceed the minimum zoning parking requirements.

Table I
Square 776
Site Trip Generation Summary

Trip Type/ Land Use	Development Program	Units	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
<u>ITE Vehicle-Trips ¹</u>								
Retail	5,958	S.F.	17	2	20	15	71	85
Grocery Store	63,135	S.F.	170	108	278	331	318	649
Residential	864	DU	49	241	290	236	116	352
	Subtotal		236	352	588	582	505	1,086
<u>ITE Person-Trips ²</u>								
Retail	5,958	S.F.	31	4	35	26	126	152
Grocery Store	63,135	S.F.	301	193	494	588	565	1,154
Residential	864	DU	63	308	371	302	148	450
	Subtotal		395	505	900	916	840	1,756
<u>Projected Vehicle Trips ³</u>								
Retail	5,958	S.F.	8	1	9	6	32	38
Grocery Store	63,135	S.F.	76	48	124	147	141	288
Residential	864	DU	24	119	143	115	58	173
Total Site-Generated Trips			108	168	276	268	231	499

Notes:

¹ Based on ITE, Trip Generation, 7th Edition.

² Assumptions:

	<u>Retail</u>	<u>Residential</u>	<u>Grocery Store</u>
Non-auto mode split:	10%	10%	10%
Average vehicle occupancy (persons per vehicle)	1.60	1.15	1.60

³ Assumptions:

	<u>Retail</u>	<u>Residential</u>	<u>Grocery Store</u>
Non-auto mode split:	60%	50%	60%
Average vehicle occupancy (persons per vehicle)	1.60	1.3	1.60

Table 2
Square 776
Updated Peak Hour Intersection Levels of Service ¹

Intersection	Type of Control	2005 Existing Conditions		2008 Background Conditions		2008 Total Future Conditions	
		AM	PM	AM	PM	AM	PM
1 3rd Street/Eye Street	Stop Sign						
Eastbound LTR		A[8.1]	A[8.9]	A[9.2]	B[10.9]	A[9.6]	B[12.4]
Northbound LTR		A[9.8]	A[9.3]	B[11.0]	B[10.9]	B[12.1]	B[13.1]
Southbound LTR		A[8.4]	A[9.4]	A[9.5]	B[10.9]	A[9.8]	B[12.1]
2 Eye Street/North Alley	Stop Sign						
Eastbound LTR		A[0.9]	A[0.1]	A[0.5]	A[0.1]	A[0.4]	A[0.1]
Northbound TR		A[9.0]	A[0.0]	A[9.2]	A[0.0]	A[9.1]	A[9.1]
Southbound LT		A[0.0]	A[9.5]	A[0.0]	A[9.8]	A[0.0]	A[9.9]
3 4th Street/Eye Street	Stop Sign						
Eastbound TR		B[12.1]	B[14.1]	B[13.0]	C[15.9]	B[13.1]	C[16.3]
Southbound LT		A[0.3]	A[0.9]	A[0.3]	A[0.9]	A[0.3]	A[0.9]
4 4th Street/East Alley	Stop Sign						
Eastbound R		A[0.0]	A[0.0]	A[0.0]	A[0.0]	B[10.9]	B[10.7]
Westbound LT		B[11.5]	B[11.3]	B[11.9]	B[11.6]	B[11.9]	B[11.7]
5 4th Street/H Street	Signal						
Eastbound		A(6.1)	A(6.1)	A(6.2)	A(6.1)	A(6.5)	A(6.5)
Westbound		B(13.9)	A(9.5)	B(15.2)	A(9.7)	B(15.3)	A(9.9)
Southbound		<u>D(36.1)</u>	<u>C(34.9)</u>	<u>D(39.2)</u>	<u>D(36.9)</u>	<u>D(39.8)</u>	<u>D(37.7)</u>
Overall		B(16.0)	B(11.4)	B(17.3)	B(11.7)	B(17.5)	B(12.1)
6 H Street/South Alley	Stop Sign						
Southbound LR		A[9.2]	B[10.2]	A[9.5]	B[10.4]	N/A	N/A
7 3rd Street/H Street	Signal						
Eastbound		A(6.3)	A(8.8)	A(6.4)	A(9.7)	A(6.6)	B(11.3)
Westbound		A(6.4)	A(5.5)	A(7.8)	A(5.6)	A(8.1)	A(5.5)
Northbound		D(39.2)	D(35.6)	D(42.9)	D(36.5)	D(47.8)	D(39.8)
Southbound		<u>C(33.1)</u>	<u>D(46.9)</u>	<u>D(36.2)</u>	<u>D(55.0)</u>	<u>D(44.3)</u>	<u>F(215.4)</u>
Overall		B(10.8)	B(13.7)	B(12.4)	B(15.0)	B(14.3)	D(39.7)
Modify PM peak hour signal timings							
Eastbound		N/A	N/A	N/A	N/A	A(6.6)	B(19.9)
Westbound		N/A	N/A	N/A	N/A	A(8.1)	B(11.9)
Northbound		N/A	N/A	N/A	N/A	D(48.2)	C(26.8)
Southbound		N/A	N/A	N/A	N/A	D(47.5)	D(52.7)
Overall		N/A	N/A	N/A	N/A	B(14.7)	C(23.0)
8 3rd Street/West Alley	Stop Sign						
Eastbound LTR		B[10.3]	A[0.0]	B[10.9]	A[0.0]	B[11.4]	A[0.0]
Westbound LTR		B[11.5]	B[12.2]	B[12.2]	B[13.1]	N/A	N/A
Northbound LTR		A[0.1]	A[0.0]	A[0.1]	A[0.0]	A[0.1]	A[0.0]
9 3rd Street/Garage Entrance	Stop Sign						
Westbound LR		N/A	N/A	N/A	N/A	B[14.2]	C[18.4]
Southbound LT		N/A	N/A	N/A	N/A	A[1.3]	A[2.0]

Notes: ¹ Analysis performed using Synchro/Simtraffic Version 6.0

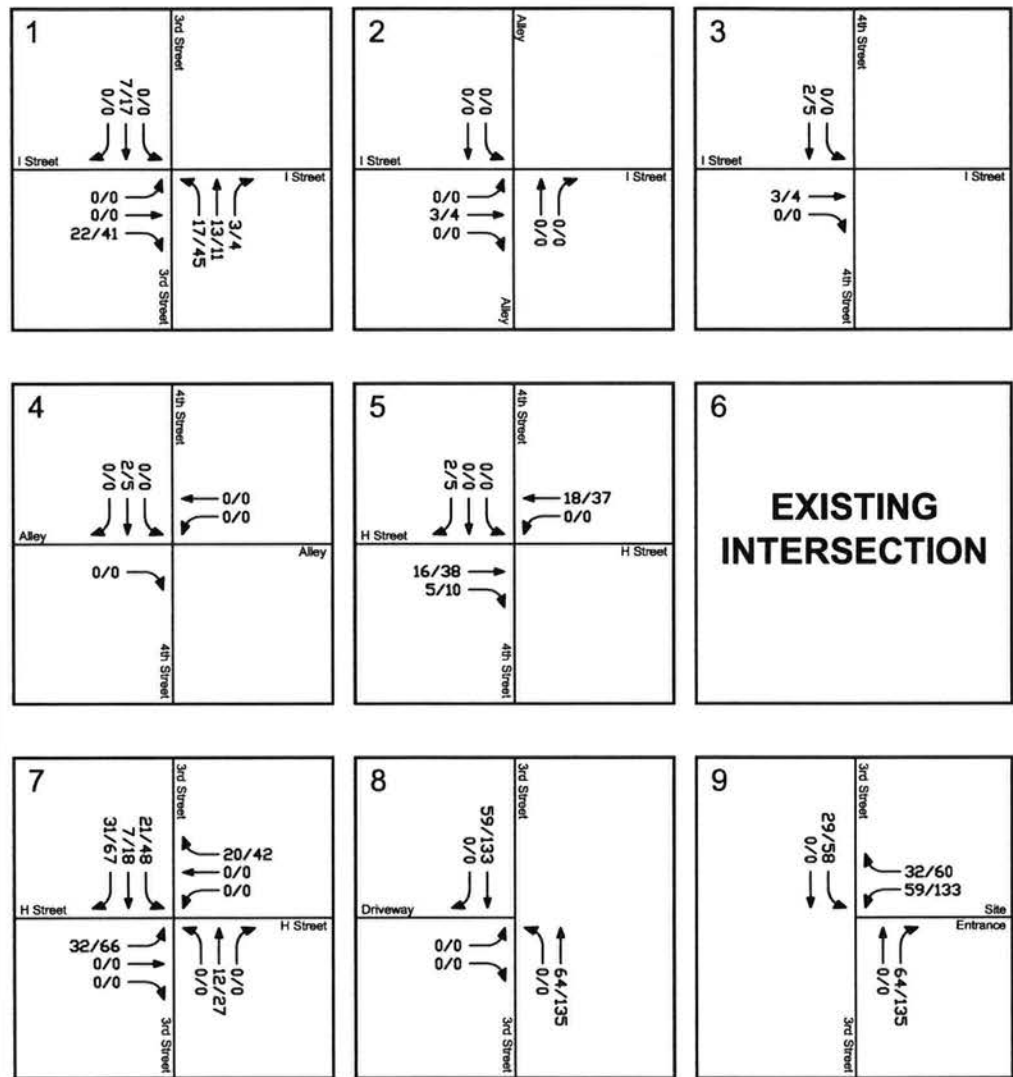
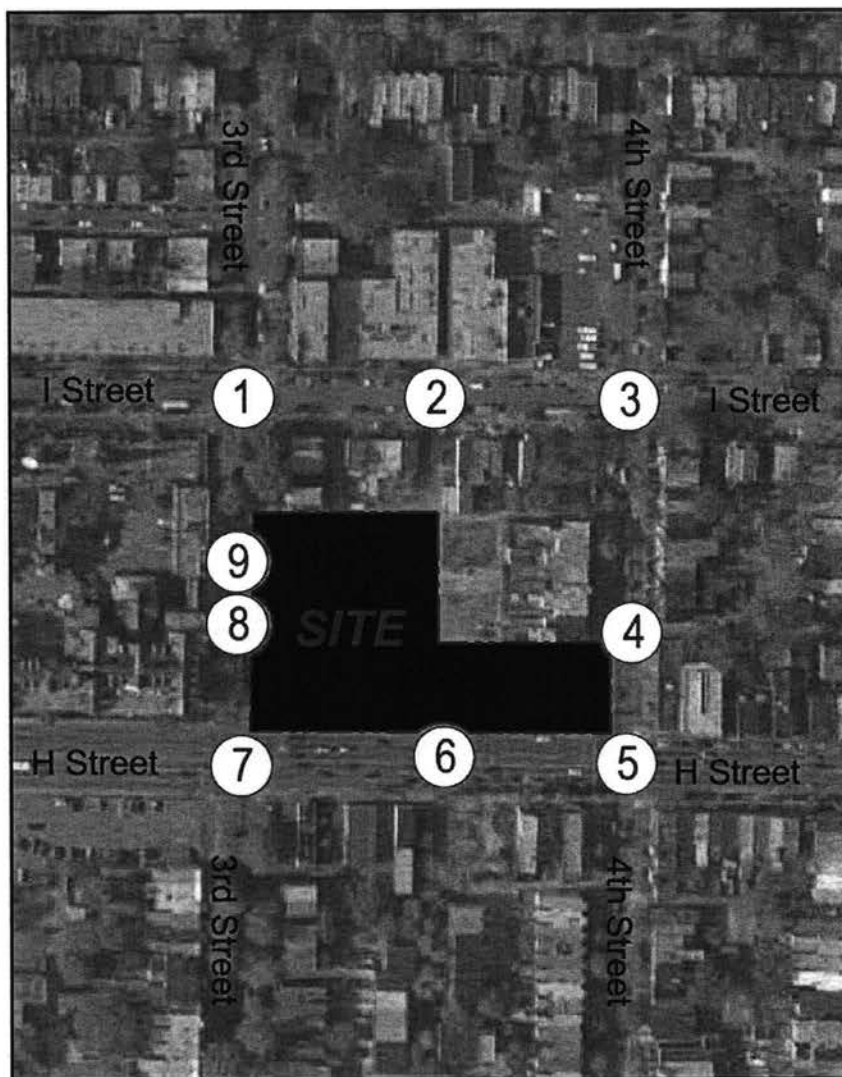


Figure 1
Site-Generated Traffic Assignments (Updated)

AM PEAK HOUR
PM PEAK HOUR
000/000



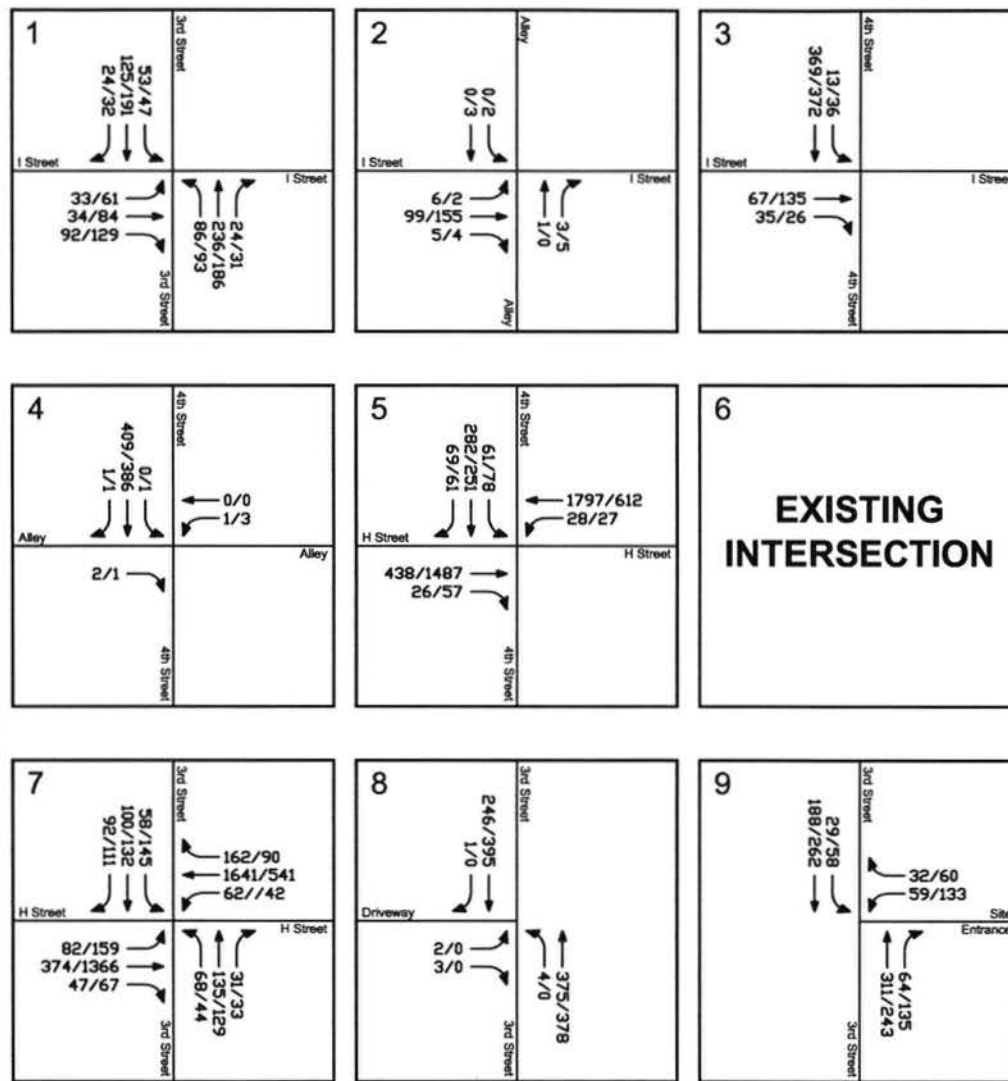
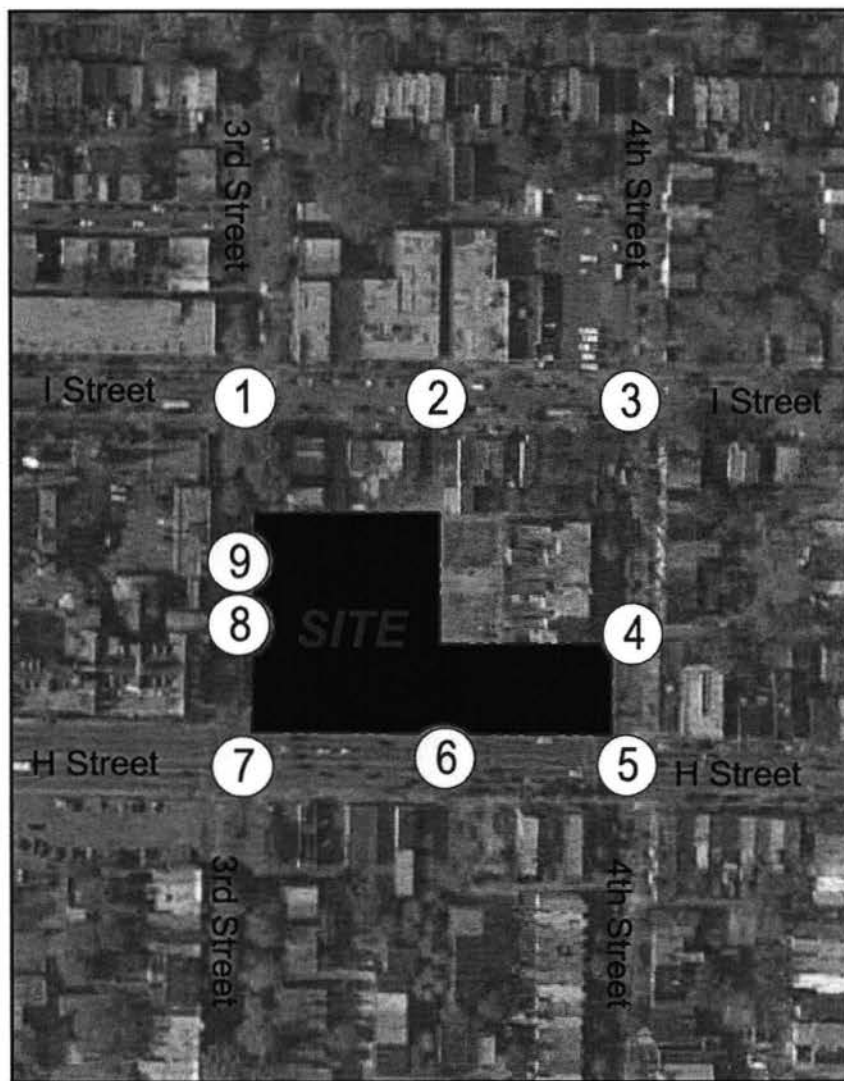


Figure 2
2008 Total Future Peak Hour Traffic Forecasts (Updated)

AM Peak Hour
PM Peak Hour
000/000



Appendix A

Total Future Levels of Service (Updated)

Total Future Condition
1: I Street & 3rd Street

AM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Sign Control		Stop			Yield			Stop			Stop	
Volume (vph)	33	34	92	0	0	0	86	236	24	53	125	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	37	100	0	0	0	93	257	26	58	136	26
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total (vph)	173	376	220									
Volume Left (vph)	36	93	58									
Volume Right (vph)	100	26	26									
Hadj (s)	-0.27	0.04	0.02									
Departure Headway (s)	5.0	4.7	4.8									
Degree Utilization, x	0.24	0.49	0.29									
Capacity (veh/h)	648	744	707									
Control Delay (s)	9.6	12.1	9.8									
Approach Delay (s)	9.6	12.1	9.8									
Approach LOS	A	B	A									
Intersection Summary												
Delay			10.9									
HCM Level of Service			B									
Intersection Capacity Utilization			40.3%	ICU Level of Service						A		
Analysis Period (min)			15									

Total Future Condition
2: I Street & North Alley

AM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	99	5	0	0	0	0	1	3	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	108	5	0	0	0	0	1	3	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			113			123	123	110	127	126	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			113			123	123	110	127	126	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1623			1476			848	764	943	840	761	1085
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	120	4	0									
Volume Left	7	0	0									
Volume Right	5	3	0									
cSH	1623	891	1700									
Volume to Capacity	0.00	0.00	0.00									
Queue Length 95th (ft)	0	0	0									
Control Delay (s)	0.4	9.1	0.0									
Lane LOS	A	A	A									
Approach Delay (s)	0.4	9.1	0.0									
Approach LOS		A	A									
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization		15.8%		ICU Level of Service					A			
Analysis Period (min)		15										

Total Future Condition
3: I Street & 4th Street

AM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	67	35	0	0	0	0	0	0	13	369	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	73	38	0	0	0	0	0	0	14	401	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								450				
pX, platoon unblocked												
vC, conflicting volume	429	429	401	504	429	0	401			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	429	429	401	504	429	0	401			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	86	94	100	100	100	100			99		
cM capacity (veh/h)	532	514	649	399	514	1085	1158			1623		
Direction, Lane #	EB 1	SB 1										
Volume Total	111	415										
Volume Left	0	14										
Volume Right	38	0										
cSH	553	1623										
Volume to Capacity	0.20	0.01										
Queue Length 95th (ft)	19	1										
Control Delay (s)	13.1	0.3										
Lane LOS	B	A										
Approach Delay (s)	13.1	0.3										
Approach LOS	B											
Intersection Summary												
Average Delay		3.0										
Intersection Capacity Utilization		32.5%									A	
ICU Level of Service												
Analysis Period (min)		15										

Total Future Condition
4: East Alley & 4th Street

AM Peak Period
4/27/2006

												
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%			0%	
Volume (veh/h)	0	0	2	1	0	0	0	0	0	0	409	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2	1	0	0	0	0	0	0	445	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								140				
pX, platoon unblocked												
vC, conflicting volume	445	445	445	447	446	0	446			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445	445	445	447	446	0	446			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	523	508	613	520	507	1085	1115			1623		
Direction, Lane #	EB 1	WB 1	SB 1									
Volume Total	2	1	446									
Volume Left	0	1	0									
Volume Right	2	0	1									
cSH	613	520	1623									
Volume to Capacity	0.00	0.00	0.00									
Queue Length 95th (ft)	0	0	0									
Control Delay (s)	10.9	11.9	0.0									
Lane LOS	B	B										
Approach Delay (s)	10.9	11.9	0.0									
Approach LOS	B	B										
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			38.3%			ICU Level of Service				A		
Analysis Period (min)			15									

Total Future Condition
5: H Street & 4th Street

AM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑						↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0						4.0	
Lane Util. Factor		0.91			0.91						1.00	
Frt		0.99			1.00						0.98	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		5043			5081						1807	
Flt Permitted		1.00			0.92						0.99	
Satd. Flow (perm)		5043			4703						1807	
Volume (vph)	0	438	26	28	1797	0	0	0	0	61	282	69
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	476	28	30	1953	0	0	0	0	66	307	75
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	498	0	0	1983	0	0	0	0	0	441	0
Turn Type		Perm								Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		60.0			60.0						32.0	
Effective Green, g (s)		60.0			60.0						32.0	
Actuated g/C Ratio		0.60			0.60						0.32	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		3026			2822						578	
v/s Ratio Prot		0.10										
v/s Ratio Perm					0.42						0.24	
v/c Ratio		0.16			0.70						0.76	
Uniform Delay, d1		8.9			13.8						30.6	
Progression Factor		0.72			1.00						1.00	
Incremental Delay, d2		0.1			1.5						9.2	
Delay (s)		6.5			15.3						39.8	
Level of Service		A			B						D	
Approach Delay (s)		6.5			15.3			0.0			39.8	
Approach LOS		A			B			A			D	
Intersection Summary												
HCM Average Control Delay		17.5			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		76.7%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

Total Future Condition
7: H Street & 3rd Street

AM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑			↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frt		0.99			0.99			0.98			0.95	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		4974			5011			1803			1750	
Flt Permitted		0.66			0.89			0.74			0.82	
Satd. Flow (perm)		3326			4464			1355			1453	
Volume (vph)	82	374	47	62	1641	162	68	135	31	58	100	92
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	407	51	67	1784	176	74	147	34	63	109	100
RTOR Reduction (vph)	0	12	0	0	11	0	0	5	0	0	21	0
Lane Group Flow (vph)	0	535	0	0	2016	0	0	250	0	0	251	0
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)		67.0			55.0			25.0			25.0	
Effective Green, g (s)		67.0			55.0			25.0			25.0	
Actuated g/C Ratio		0.67			0.55			0.25			0.25	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2360			2455			339			363	
v/s Ratio Prot		c0.02										
v/s Ratio Perm		0.13			c0.45			c0.18			0.17	
v/c Ratio		0.23			0.82			0.74			0.69	
Uniform Delay, d1		6.4			18.5			34.5			34.0	
Progression Factor		1.00			0.31			1.00			1.00	
Incremental Delay, d2		0.2			2.3			13.4			10.3	
Delay (s)		6.6			8.1			47.8			44.3	
Level of Service		A			A			D			D	
Approach Delay (s)		6.6			8.1			47.8			44.3	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM Average Control Delay		14.3			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		75.1%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

Total Future Condition
8: West Alley & 3rd Street

AM Peak Period
4/27/2006

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	2	3	4	375	246	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	4	408	267	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)				260		
pX, platoon unblocked	0.99					
vC, conflicting volume	684	268	268			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	268	268			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	411	771	1295			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	5	412	268			
Volume Left	2	4	0			
Volume Right	3	0	1			
cSH	571	1295	1700			
Volume to Capacity	0.01	0.00	0.16			
Queue Length 95th (ft)	1	0	0			
Control Delay (s)	11.4	0.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.4	0.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		32.9%		ICU Level of Service		A
Analysis Period (min)		15				

Total Future Condition
9: Garage Entrance & 3rd Street

AM Peak Period
4/27/2006

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	59	32	311	64	29	188
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	35	338	70	32	204
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)			320			
pX, platoon unblocked						
vC, conflicting volume	640	373			408	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	640	373			408	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	95			97	
cM capacity (veh/h)	427	673			1151	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	99	408	236			
Volume Left	64	0	32			
Volume Right	35	70	0			
cSH	490	1700	1151			
Volume to Capacity	0.20	0.24	0.03			
Queue Length 95th (ft)	19	0	2			
Control Delay (s)	14.2	0.0	1.3			
Lane LOS	B		A			
Approach Delay (s)	14.2	0.0	1.3			
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		46.3%		ICU Level of Service		A
Analysis Period (min)		15				

Total Future Condition
1: I Street & 3rd Street

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Yield			Stop			Stop	
Volume (vph)	61	84	129	0	0	0	93	186	31	47	191	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	91	140	0	0	0	101	202	34	51	208	35
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total (vph)	298	337	293									
Volume Left (vph)	66	101	51									
Volume Right (vph)	140	34	35									
Hadj (s)	-0.20	0.03	0.00									
Departure Headway (s)	5.3	5.2	5.3									
Degree Utilization, x	0.44	0.49	0.43									
Capacity (veh/h)	630	651	651									
Control Delay (s)	12.4	13.1	12.1									
Approach Delay (s)	12.4	13.1	12.1									
Approach LOS	B	B	B									
Intersection Summary												
Delay			12.6									
HCM Level of Service			B									
Intersection Capacity Utilization			50.7%	ICU Level of Service						A		
Analysis Period (min)			15									

Total Future Condition
2: I Street & North Alley

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	155	4	0	0	0	0	0	5	2	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	168	4	0	0	0	0	0	5	2	3	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			173			177	175	171	180	177	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			173			177	175	171	180	177	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1623			1404			782	717	873	776	715	1085
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	175	5	5									
Volume Left	2	0	2									
Volume Right	4	5	0									
cSH	1623	873	738									
Volume to Capacity	0.00	0.01	0.01									
Queue Length 95th (ft)	0	0	1									
Control Delay (s)	0.1	9.1	9.9									
Lane LOS	A	A	A									
Approach Delay (s)	0.1	9.1	9.9									
Approach LOS		A	A									
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization		18.5%		ICU Level of Service						A		
Analysis Period (min)		15										

Total Future Condition
3: I Street & 4th Street

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	135	26	0	0	0	0	0	0	36	372	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	147	28	0	0	0	0	0	0	39	404	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								450				
pX, platoon unblocked												
vC, conflicting volume	483	483	404	584	483	0	404			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	483	483	404	584	483	0	404			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	69	96	100	100	100	100			98		
cM capacity (veh/h)	485	472	646	302	472	1085	1154			1623		
Direction, Lane #	EB 1	SB 1										
Volume Total	175	443										
Volume Left	0	39										
Volume Right	28	0										
cSH	493	1623										
Volume to Capacity	0.35	0.02										
Queue Length 95th (ft)	40	2										
Control Delay (s)	16.3	0.9										
Lane LOS	C	A										
Approach Delay (s)	16.3	0.9										
Approach LOS	C											
Intersection Summary												
Average Delay		5.2										
Intersection Capacity Utilization		36.9%										
Analysis Period (min)		15										

Total Future Condition
4: East Alley & 4th Street

PM Peak Period
4/27/2006

												
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%			0%	
Volume (veh/h)	0	0	1	3	0	0	0	0	0	1	386	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1	3	0	0	0	0	0	1	420	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								140				
pX, platoon unblocked												
vC, conflicting volume	422	422	420	423	423	0	421			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	422	422	420	423	423	0	421			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	100	100			100		
cM capacity (veh/h)	542	523	633	540	522	1085	1138			1623		
Direction, Lane #	EB 1	WB 1	SB 1									
Volume Total	1	3	422									
Volume Left	0	3	1									
Volume Right	1	0	1									
cSH	633	540	1623									
Volume to Capacity	0.00	0.01	0.00									
Queue Length 95th (ft)	0	0	0									
Control Delay (s)	10.7	11.7	0.0									
Lane LOS	B	B	A									
Approach Delay (s)	10.7	11.7	0.0									
Approach LOS	B	B										
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization		37.1%				ICU Level of Service				A		
Analysis Period (min)		15										

Total Future Condition
5: H Street & 4th Street

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑						↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0						4.0	
Lane Util. Factor		0.91			0.91						1.00	
Frt		0.99			1.00						0.98	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		5057			5075						1806	
Flt Permitted		1.00			0.82						0.99	
Satd. Flow (perm)		5057			4186						1806	
Volume (vph)	0	1487	57	27	612	0	0	0	0	78	251	61
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1616	62	29	665	0	0	0	0	85	273	66
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	1674	0	0	694	0	0	0	0	0	417	0
Turn Type				Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		60.0			60.0						32.0	
Effective Green, g (s)		60.0			60.0						32.0	
Actuated g/C Ratio		0.60			0.60						0.32	
Clearance Time (s)		4.0			4.0						4.0	
Lane Grp Cap (vph)		3034			2512						578	
v/s Ratio Prot		c0.33										
v/s Ratio Perm					0.17						0.23	
v/c Ratio		0.55			0.28						0.72	
Uniform Delay, d1		12.0			9.6						30.1	
Progression Factor		0.51			1.00						1.00	
Incremental Delay, d2		0.4			0.3						7.6	
Delay (s)		6.5			9.9						37.7	
Level of Service		A			A						D	
Approach Delay (s)		6.5			9.9			0.0			37.7	
Approach LOS		A			A			A			D	
Intersection Summary												
HCM Average Control Delay			12.1			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			59.9%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Total Future Condition
7: H Street & 3rd Street

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			  			  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frt		0.99			0.98			0.98			0.96	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		5028			4968			1803			1758	
Flt Permitted		0.73			0.76			0.81			0.67	
Satd. Flow (perm)		3692			3805			1473			1208	
Volume (vph)	159	1366	67	42	541	90	44	129	33	145	132	111
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	173	1485	73	46	588	98	48	140	36	158	143	121
RTOR Reduction (vph)	0	5	0	0	21	0	0	7	0	0	14	0
Lane Group Flow (vph)	0	1726	0	0	711	0	0	217	0	0	408	0
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)		67.0			55.0			25.0			25.0	
Effective Green, g (s)		67.0			55.0			25.0			25.0	
Actuated g/C Ratio		0.67			0.55			0.25			0.25	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2581			2093			368			302	
v/s Ratio Prot		c0.05										
v/s Ratio Perm		c0.39			0.19			0.15			c0.34	
v/c Ratio		1.12dl			0.34			0.59			1.35	
Uniform Delay, d1		9.9			12.5			33.0			37.5	
Progression Factor		1.00			0.41			1.00			1.00	
Incremental Delay, d2		1.4			0.4			6.8			177.9	
Delay (s)		11.3			5.5			39.8			215.4	
Level of Service		B			A			D			F	
Approach Delay (s)		11.3			5.5			39.8			215.4	
Approach LOS		B			A			D			F	
Intersection Summary												
HCM Average Control Delay		39.7			HCM Level of Service			D				
HCM Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		90.7%			ICU Level of Service			E				
Analysis Period (min)		15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Total Future Condition (optimized)
7: H Street & 3rd Street

PM Peak Period
4/27/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frt		0.99			0.98			0.98			0.96	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		5028			4968			1803			1758	
Flt Permitted		0.72			0.76			0.85			0.73	
Satd. Flow (perm)		3625			3787			1547			1308	
Volume (vph)	159	1366	67	42	541	90	44	129	33	145	132	111
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	173	1485	73	46	588	98	48	140	36	158	143	121
RTOR Reduction (vph)	0	5	0	0	21	0	0	7	0	0	14	0
Lane Group Flow (vph)	0	1726	0	0	711	0	0	217	0	0	408	0
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)		57.0			45.0			35.0			35.0	
Effective Green, g (s)		57.0			45.0			35.0			35.0	
Actuated g/C Ratio		0.57			0.45			0.35			0.35	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2178			1704			541			458	
v/s Ratio Prot		c0.06										
v/s Ratio Perm		c0.39			0.19			0.14			c0.31	
v/c Ratio		1.14dl			0.42			0.40			0.89	
Uniform Delay, d1		16.9			18.6			24.6			30.7	
Progression Factor		1.00			0.60			1.00			1.00	
Incremental Delay, d2		3.1			0.7			2.2			22.0	
Delay (s)		19.9			11.9			26.8			52.7	
Level of Service		B			B			C			D	
Approach Delay (s)		19.9			11.9			26.8			52.7	
Approach LOS		B			B			C			D	
Intersection Summary												
HCM Average Control Delay		23.0			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.83										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		90.7%			ICU Level of Service			E				
Analysis Period (min)		15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Total Future Condition
8: West Alley & 3rd Street

PM Peak Period
4/27/2006

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	0	378	395	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	411	429	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)				260		
pX, platoon unblocked	0.97					
vC, conflicting volume	840	429	429			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	836	429	429			
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	100	100			
cM capacity (veh/h)	328	626	1130			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	411	429			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1130	1700			
Volume to Capacity	0.00	0.00	0.25			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		24.1%		ICU Level of Service		A
Analysis Period (min)		15				

Total Future Condition
9: Garage Entrance & 3rd Street

PM Peak Period
4/27/2006

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	133	60	243	135	58	262
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	145	65	264	147	63	285
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
Upstream signal (ft)			320			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	748	338			411	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	329			403	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	59	91			94	
cM capacity (veh/h)	356	703			1141	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1		
Volume Total	145	65	411	348		
Volume Left	145	0	0	63		
Volume Right	0	65	147	0		
cSH	356	703	1700	1141		
Volume to Capacity	0.41	0.09	0.24	0.06		
Queue Length 95th (ft)	48	8	0	4		
Control Delay (s)	21.9	10.6	0.0	2.0		
Lane LOS	C	B		A		
Approach Delay (s)	18.4		0.0	2.0		
Approach LOS	C					
Intersection Summary						
Average Delay			4.7			
Intersection Capacity Utilization			55.4%		ICU Level of Service	B
Analysis Period (min)			15			