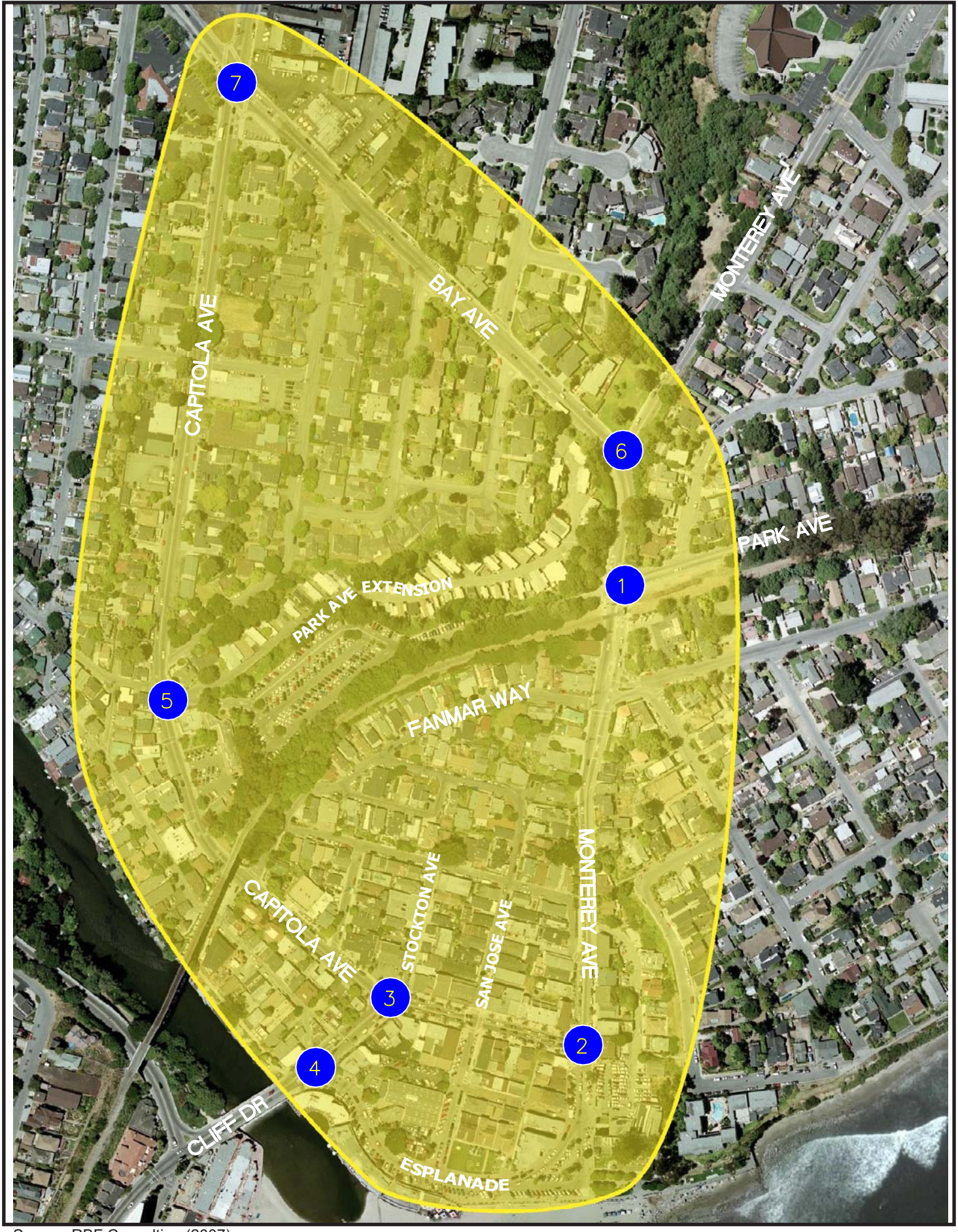


Source: RBF Consulting (2007)

RBF CONSULTING

2/19/08 JN: 70-100117

CAPITOLA VILLAGE ONE-WAY ANALYSIS

Study Intersections

Figure 1

Source: RBF Consulting (2007)

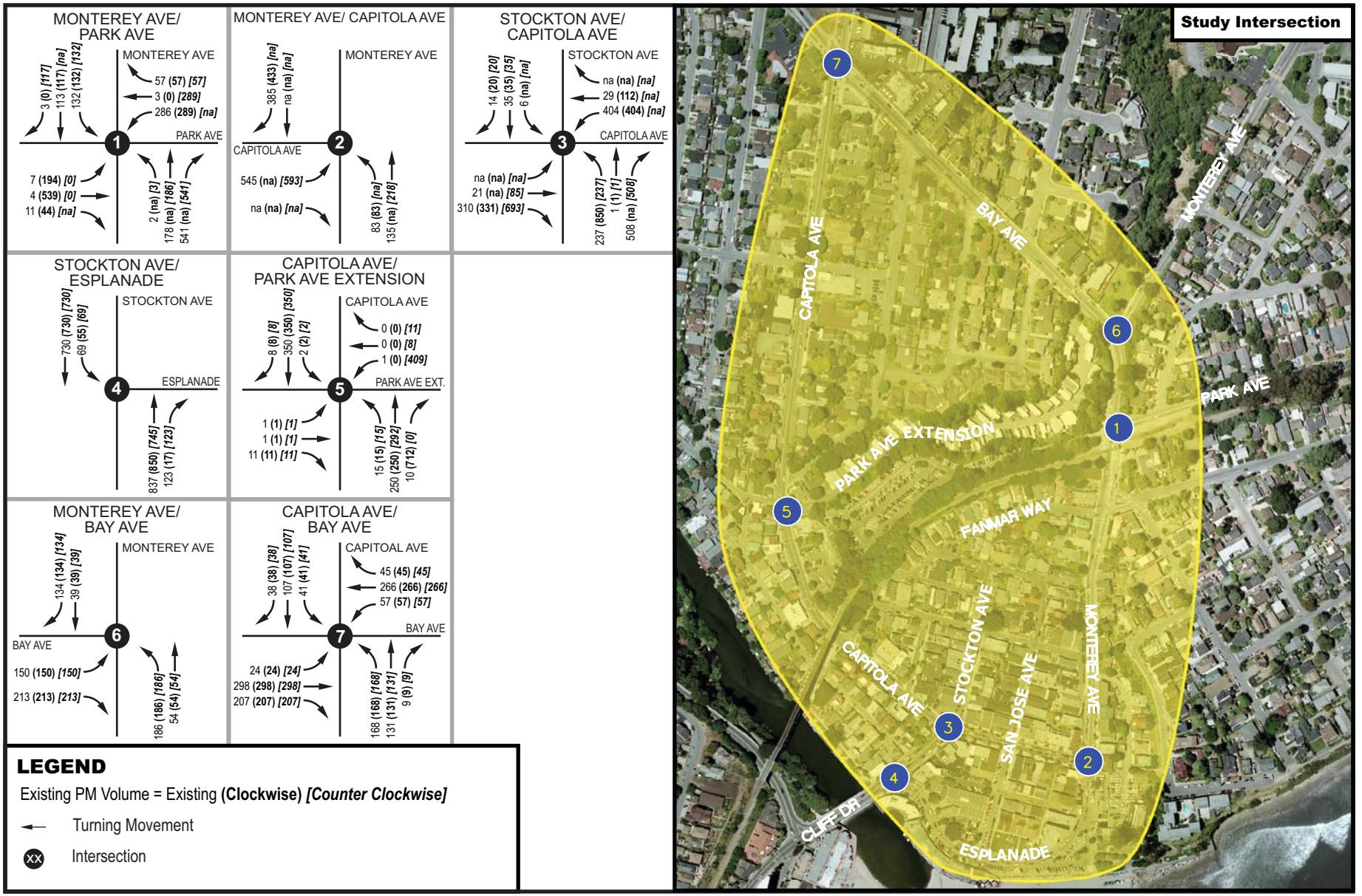
RBF CONSULTING

2/19/08 JN: 70-100117

CAPITOLA VILLAGE ONE-WAY ANALYSIS

PM Peak Hour Volumes - October

Figure 2



Source: RBF Consulting (2007)

RBF CONSULTING

2/19/08 JN: 70-100117

CAPITOLA VILLAGE ONE-WAY ANALYSIS

PM Peak Hour Volumes - Summer

Exhibit 3

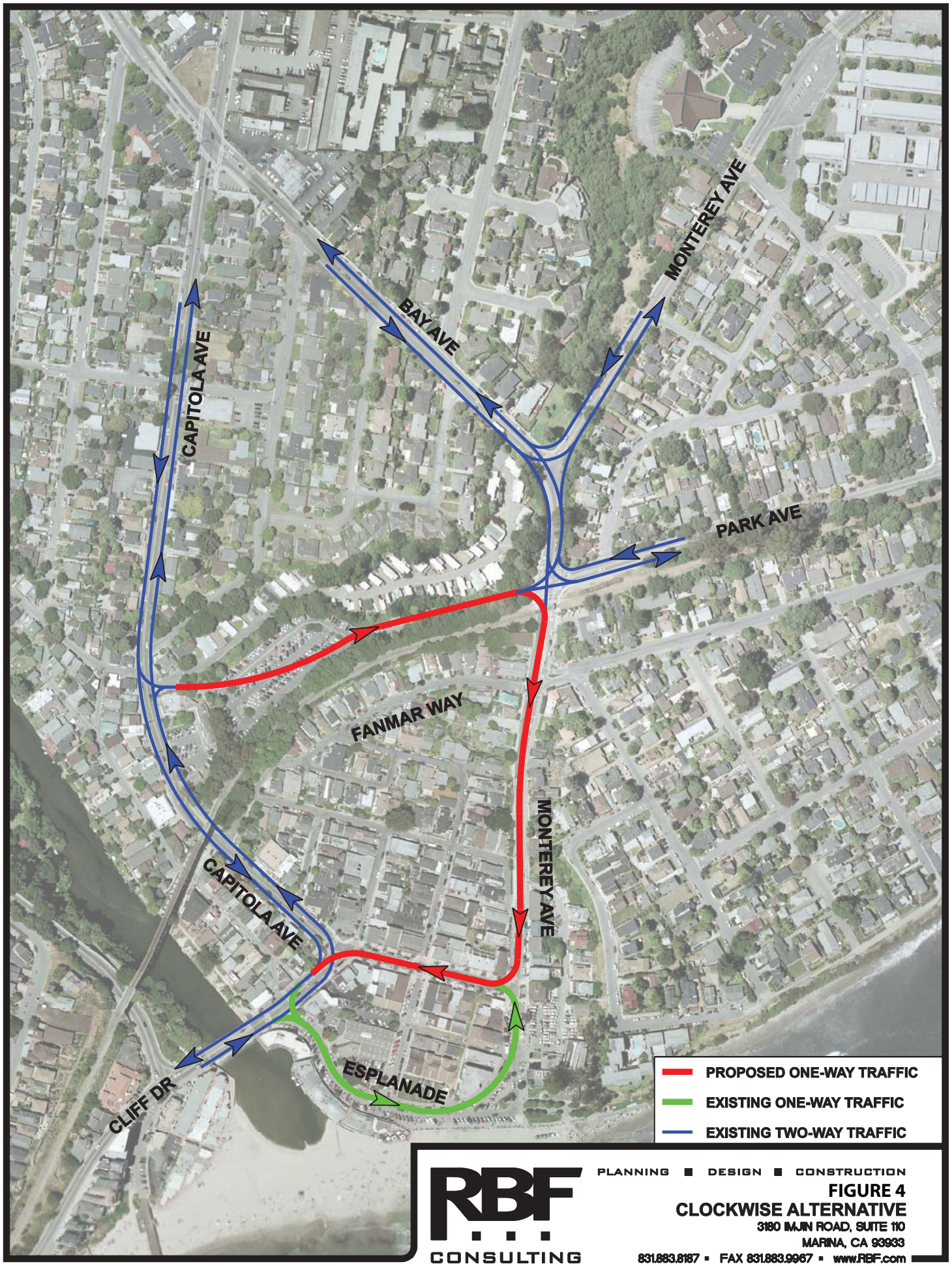


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FIGURE 4
CLOCKWISE ALTERNATIVE

3180 IMJIN ROAD, SUITE 110
MARINA, CA 93933
831.883.8187 ▪ FAX 831.883.9967 ▪ www.RBF.com

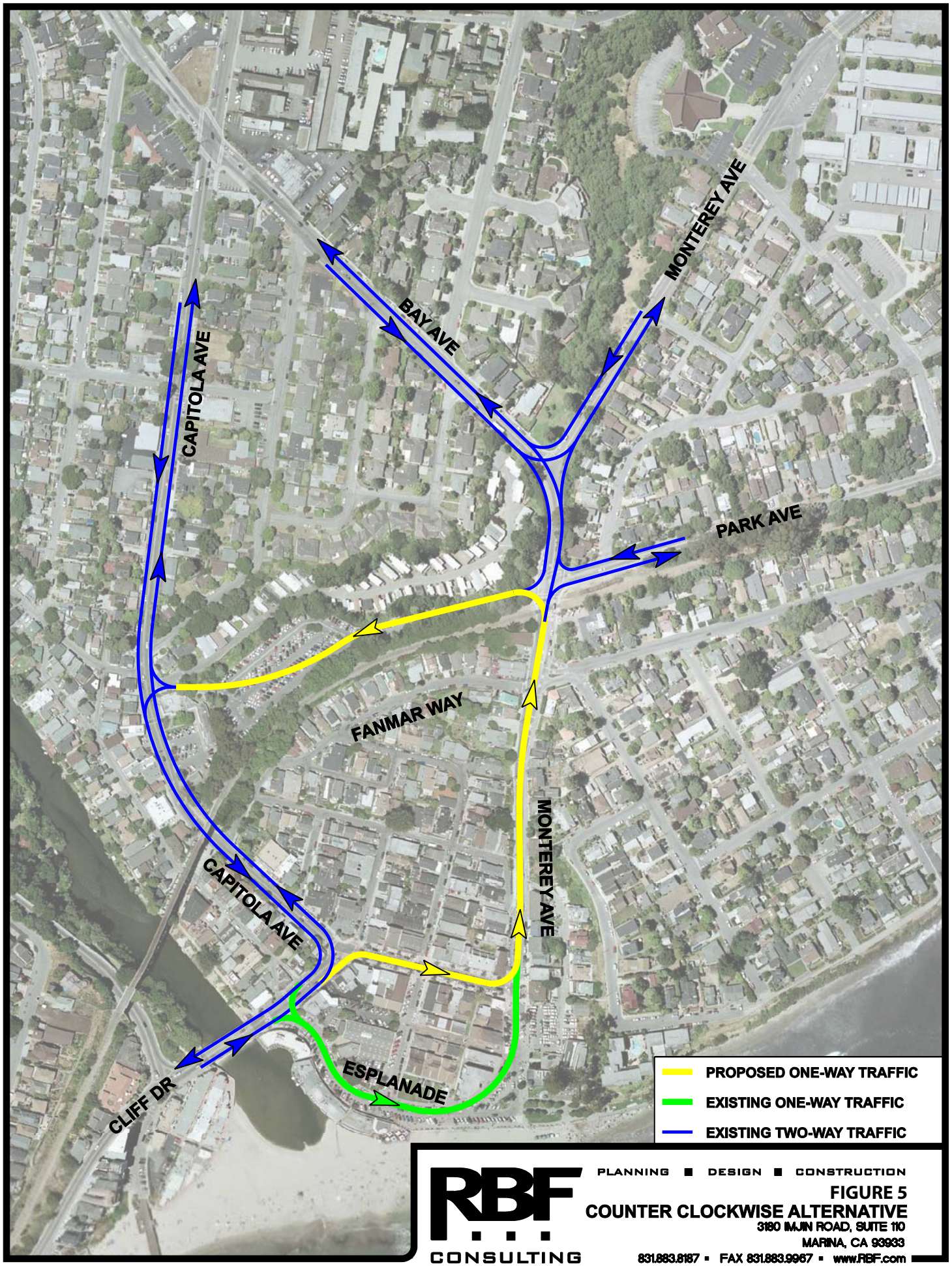

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FIGURE 5
COUNTER CLOCKWISE ALTERNATIVE

3180 IMJIN ROAD, SUITE 110
MARINA, CA 93933
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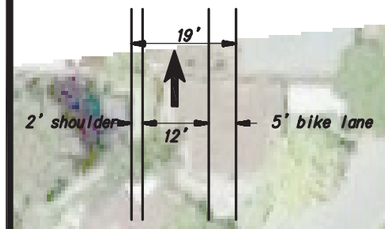
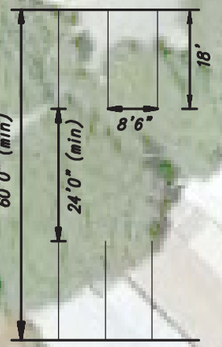
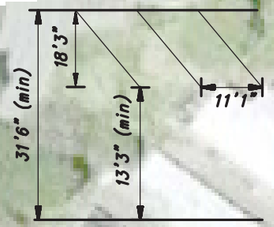
Roadway



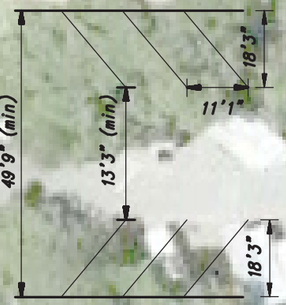
Typical Parking Dimensions at a 90° angle - double loaded



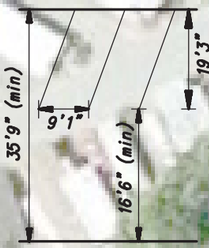
Typical Parking Dimensions at a 50° angle - single loaded



Typical Parking Dimensions at a 50° angle - double loaded



Typical Parking Dimensions at a 70° angle - single loaded



NTS

SW SH ROADWAY BL SH PARKING (VP)

6' 2' 12' 5' VARIES 18.25'

37.25' (min)

SECTION A-A

SW SH ROADWAY BL SH PARKING (VP) SW

6' 2' 12' 5' VARIES 18.25' 6'

37.25' (min)

SECTION B-B

SH ROADWAY BL

2' 12' 5'

SECTION C-C

NUMBERS	TYPE
1-3	70° SINGLE LOADED
4-24	50° DOUBLE LOADED
25-38	90° DOUBLE LOADED
39-79	70° SINGLE LOADED
80-95	90° DOUBLE LOADED
96-148	70° DOUBLE LOADED
149-155	90° DOUBLE LOADED

LEGEND

SW	SIDEWALK
SH	SHOULDER
BL	BIKE LANE
(VP)	VEHICLE PROJECTION
ADA	AMERICAN DIABILITIES ACT
NTS	NOT TO SCALE

NOTE:
CONCEPT ONLY NOT FOR DESIGN

REGULAR SPACES: 150
ADA SPACES: 5
TOTAL: 155

DATE: 080130
SHEET 1 OF 1

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FIGURE 6 - PACIFIC COVE LOT LAYOUT

500 YGNACIO VALLEY ROAD, SUITE 270
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APPENDIX A1

LEVEL OF SERVICE DESCRIPTIONS
SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE (LOS) DESCRIPTION
SIGNALIZED INTERSECTIONS

The capacity of an urban street is related primarily to the signal timing and the geometric characteristics of the facility as well as to the composition of traffic on the facility. Geometrics are a fixed characteristic of a facility. Thus, while traffic composition may vary somewhat over time, the capacity of a facility is generally a stable value that can be significantly improved only by initiating geometric improvements. A traffic signal essentially allocates time among conflicting traffic movements that seek to use the same space. The way in which time is allocated significantly affects the operation and the capacity of the intersection and its approaches.

The methodology for signalized intersection is designed to consider individual intersection approaches and individual lane groups within approaches. A lane group consists of one or more lanes on an intersection approach. The outputs from application of the method described in the HCM 2000 are reported on the basis of each lane. For a given lane group at a signalized intersection, three indications are displayed: green, yellow and red. The red indication may include a short period during which all indications are red, referred to as an all-red interval and the yellow indication forms the change and clearance interval between two green phases.

The methodology for analyzing the capacity and level of service must consider a wide variety of prevailing conditions, including the amount and distribution of traffic movements, traffic composition, geometric characteristics, and details of intersection signalization. The methodology addresses the capacity, LOS, and other performance measures for lane groups and the intersection approaches and the LOS for the intersection as a whole.

Capacity is evaluated in terms of the ratio of demand flow rate to capacity (v/c ratio), whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle). The methodology does not take into account the potential impact of downstream congestion on intersection operation, nor does the methodology detect and adjust for the impacts of turn-pocket overflows on through traffic and intersection operation.

LEVEL OF SERVICE (LOS) CRITERIA FOR SIGNALIZED INTERSECTIONS

(Reference Highway Capacity Manual 2000)

Level of Service	Control Delay (seconds / vehicle)
A	<10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

APPENDIX A2

UNSIGNALIZED INTERSECTIONS
TWO-WAY STOP CONTROL

LEVEL OF SERVICE (LOS) DESCRIPTION
UNSIGNALIZED INTERSECTIONS WITH TWO-WAY STOP CONTROL (TWSC)

TWSC intersections are widely used and stop signs are used to control vehicle movements at such intersections. At TWSC intersections, the stop-controlled approaches are referred to as the minor street approaches; they can be either public streets or private driveways. The intersection approaches that are not controlled by stop signs are referred to as the major street approaches. A three-leg intersection is considered to be a standard type of TWSC intersection if the single minor street approach (i.e. the stem of the T configuration) is controlled by a stop sign. Three-leg intersections where two of the three approaches are controlled by stop signs are a special form of unsignalized intersection control.

At TWSC intersections, drivers on the controlled approaches are required to select gaps in the major street flow through which to execute crossing or turning maneuvers on the basis of judgement. In the presence of a queue, each driver on the controlled approach must use some time to move into the front-of-queue position and prepare to evaluate gaps in the major street flow. Capacity analysis at TWSC intersections depends on a clear description and understanding of the interaction of drivers on the minor or stop-controlled approach with drivers on the major street. Both gap acceptance and empirical models have been developed to describe this interaction.

Thus, the capacity of the controlled legs is based on three factors:

- the distribution of gaps in the major street traffic stream,;
- driver judgement in selecting gaps through which to execute the desired maneuvers; and
- the follow-up time required by each driver in a queue.

The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, in the absence of incident, control, traffic or geometric delay. Average control delay for any particular minor movement is a function of the capacity of the approach and the degree of saturation and referred to as level of service.

LEVEL OF SERVICE (LOS) CRITERIA FOR TWSC INTERSECTIONS

(Reference Highway Capacity Manual 2000)

Level of Service	Control Delay (seconds / vehicle)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

APPENDIX A3

LEVEL OF SERVICES DESCRIPTION
UNSIGNALIZED INTERSECTIONS
ALL-WAY STOP CONTROL

APPENDIX

LEVEL OF SERVICE (LOS) DESCRIPTION
UNSIGNALIZED INTERSECTIONS WITH ALL-WAY STOP CONTROL (AWSC)

AWSC intersections require every vehicle to stop at the intersection before proceeding. Since each driver must stop, the judgement as to whether to proceed into the intersection is a function of traffic conditions on the other approaches. While giving priority to the driver on the right is a recognized rule in some areas, it is not a good descriptor of actual intersection operations. What happens is the development of a consensus of right-of-way that alternates between the drivers on the intersection approaches, a consensus that depends primarily on the intersection geometry and the arrival patterns at the stop line.

If no traffic is present on the other approaches, a driver can proceed immediately after the stop is made. If there is traffic on one or more of the other approaches, a driver proceeds only after determining that there are no vehicles currently in the intersection and that it is the driver's turn to proceed. Since no traffic signal controls the stream movement or allocates the right-of-way to each conflicting stream, the rate of departure is controlled by the interaction between the traffic streams themselves.

For AWSC intersections, the average control delay (in seconds per vehicle) is used as the primary measure of performance. Control delay is the increased time of travel for a vehicle approaching and passing through an AWSC intersection, compared with a free-flow vehicle if it were not required to slow down or stop at the intersection.

The criteria for AWSC intersections have different threshold values than do those for signalized intersections, primarily because drivers expect different levels of performance from different kinds of traffic control devices (i.e traffic signals, two way stop or all way stop, etc.). The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection and a higher level of control delay is acceptable at a signalized intersection for the same LOS.

For AWSC analysis using the HCM 2000 method, the LOS shown reflects the weighted average of the delay on each of the approaches.

LEVEL OF SERVICE (LOS) CRITERIA FOR AWSC INTERSECTIONS
(Reference Highway Capacity Manual 2000)

Level of Service	Control Delay (seconds / vehicle)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

APPENDIX B

INTERSECTION LEVEL OF SERVICE CALCULATIONS
EXISTING CONDITIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	4	10	260	3	52	2	162	492	120	103	3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	6	4	11	280	3	56	2	174	529	129	111	3

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	22	283	56	176	529	240	3
Volume Left (vph)	6	280	0	2	0	129	0
Volume Right (vph)	11	0	56	0	529	0	3
Hadj (s)	-0.21	0.53	-0.67	0.04	-0.67	0.14	-0.57
Departure Headway (s)	7.7	7.5	6.3	6.3	5.6	6.9	3.2
Degree Utilization, x	0.05	0.59	0.10	0.31	0.82	0.46	0.00
Capacity (veh/h)	424	458	537	557	631	492	1121
Control Delay (s)	11.0	19.6	8.8	10.9	27.9	15.6	6.2
Approach Delay (s)	11.0	17.8		23.6		15.5	
Approach LOS	B	C		C		C	

Intersection Summary				
Delay	20.4			
HCM Level of Service	C			
Intersection Capacity Utilization	55.9%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	495	0	75	123	0	350
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	521	0	79	129	0	368

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	521	208	368
Volume Left (vph)	521	79	0
Volume Right (vph)	0	0	368
Hadj (s)	0.23	0.11	-0.57
Departure Headway (s)	5.7	6.3	5.4
Degree Utilization, x	0.83	0.36	0.55
Capacity (veh/h)	604	522	630
Control Delay (s)	30.8	12.8	14.7
Approach Delay (s)	30.8	12.8	14.7
Approach LOS	D	B	B

Intersection Summary			
Delay	22.0		
HCM Level of Service	C		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Sign Control	Stop		Stop			Stop			Stop	
Volume (vph)	367	26	19	282	215	1	462	5	32	13
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	382	27	20	294	224	1	481	5	33	14

Direction, Lane #	WB 1	SE 1	NE 1	NE 2	SW 1
Volume Total (vph)	409	314	225	481	52
Volume Left (vph)	382	0	224	0	5
Volume Right (vph)	0	294	0	481	14
Hadj (s)	0.22	-0.53	0.53	-0.67	-0.10
Departure Headway (s)	6.8	6.3	7.5	6.3	7.8
Degree Utilization, x	0.77	0.55	0.47	0.84	0.11
Capacity (veh/h)	511	538	471	563	399
Control Delay (s)	28.7	16.7	15.7	32.4	11.8
Approach Delay (s)	28.7	16.7	27.1		11.8
Approach LOS	D	C	D		B

Intersection Summary				
Delay	24.8			
HCM Level of Service	C			
Intersection Capacity Utilization	69.0%	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%			0%	
Volume (veh/h)	1	1	10	1	0	0	14	227	9	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	11	1	0	0	15	239	9	2	335	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	616	621	338	627	619	244	342			248		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	616	621	338	627	619	244	342			248		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	99			100		
cM capacity (veh/h)	399	398	704	385	399	795	1217			1317		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	1	263	344
Volume Left	1	1	15	2
Volume Right	11	0	9	7
cSH	624	385	1217	1317
Volume to Capacity	0.02	0.00	0.01	0.00
Queue Length 95th (ft)	2	0	1	0
Control Delay (s)	10.9	14.4	0.6	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	10.9	14.4	0.6	0.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	138	107	7	34	88	31	20	244	170	47	218	37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	142	110	7	35	91	32	21	252	175	48	225	38

Direction, Lane #	NB 1	NB 2	SB 1	SE 1	SE 2	NW 1	NW 2
Volume Total (vph)	253	7	158	272	175	48	263
Volume Left (vph)	142	0	35	21	0	48	0
Volume Right (vph)	0	7	32	0	175	0	38
Hadj (s)	0.32	-0.67	-0.04	0.07	-0.67	0.53	-0.07
Departure Headway (s)	7.3	6.3	7.1	6.7	5.9	7.3	6.7
Degree Utilization, x	0.51	0.01	0.31	0.50	0.29	0.10	0.49
Capacity (veh/h)	463	527	461	515	576	462	501
Control Delay (s)	16.5	8.2	13.3	15.1	10.1	9.9	14.8
Approach Delay (s)	16.3		13.3	13.1		14.0	
Approach LOS	C		B	B		B	

Intersection Summary				
Delay	14.1			
HCM Level of Service	B			
Intersection Capacity Utilization	57.7%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	4	10	260	3	52	2	162	492	120	103	3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	7	5	12	308	4	62	2	192	582	142	122	4

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	24	311	62	194	582	264	4
Volume Left (vph)	7	308	0	2	0	142	0
Volume Right (vph)	12	0	62	0	582	0	4
Hadj (s)	-0.21	0.53	-0.67	0.04	-0.67	0.14	-0.57
Departure Headway (s)	8.2	7.8	6.6	6.6	5.9	7.2	3.2
Degree Utilization, x	0.05	0.67	0.11	0.35	0.95	0.53	0.00
Capacity (veh/h)	407	454	535	537	601	483	1121
Control Delay (s)	11.6	24.2	9.2	11.9	47.2	17.9	6.2
Approach Delay (s)	11.6	21.7		38.4		17.7	
Approach LOS	B	C		E		C	

Intersection Summary				
Delay	29.8			
HCM Level of Service	D			
Intersection Capacity Utilization	60.1%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	495	0	75	123	0	350
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	573	0	87	142	0	405

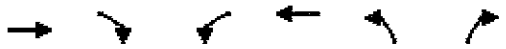
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	573	229	405
Volume Left (vph)	573	87	0
Volume Right (vph)	0	0	405
Hadj (s)	0.23	0.11	-0.57
Departure Headway (s)	6.0	6.7	5.7
Degree Utilization, x	0.96	0.43	0.64
Capacity (veh/h)	589	528	619
Control Delay (s)	51.2	14.6	18.5
Approach Delay (s)	51.2	14.6	18.5
Approach LOS	F	B	C

Intersection Summary			
Delay	33.2		
HCM Level of Service	D		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	SBL	SBR	SBR2	SEL	SER	NEL2	NEL	NER
Lane Configurations										
Sign Control	Stop		Stop			Stop			Stop	
Volume (vph)	367	26	5	32	13	19	282	215	1	462
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	421	30	6	37	15	22	323	246	1	529

Direction, Lane #	WB 1	SB 1	SE 1	NE 1	NE 2
Volume Total (vph)	30	52	345	248	529
Volume Left (vph)	0	0	0	246	0
Volume Right (vph)	0	15	323	0	529
Hadj (s)	0.03	-0.14	-0.53	0.53	-0.67
Departure Headway (s)	6.3	5.8	5.1	6.1	4.9
Degree Utilization, x	0.05	0.08	0.49	0.42	0.73
Capacity (veh/h)	514	566	668	575	709
Control Delay (s)	9.6	9.3	13.0	12.4	18.7
Approach Delay (s)	Err	Err	13.0	16.7	
Approach LOS	F	F	B	C	

Intersection Summary			
Delay	Err		
HCM Level of Service	F		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
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)	761	112	63	664	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	930	137	77	812	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			1067		1964	999
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1067		1964	999
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		100	100
cM capacity (veh/h)			653		61	296

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	1067	77	812
Volume Left	0	77	0
Volume Right	137	0	0
cSH	1700	653	1700
Volume to Capacity	0.63	0.12	0.48
Queue Length 95th (ft)	0	10	0
Control Delay (s)	0.0	11.2	0.0
Lane LOS		B	
Approach Delay (s)	0.0	1.0	
Approach LOS			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	1	10	1	0	0	14	227	9	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	12	1	0	0	16	263	10	2	368	8
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	677	683	372	690	681	268	376			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	677	683	372	690	681	268	376			273		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	100	99			100		
cM capacity (veh/h)	362	366	674	348	367	771	1182			1290		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	14	1	289	379
Volume Left	1	1	16	2
Volume Right	12	0	10	8
cSH	590	348	1182	1290
Volume to Capacity	0.02	0.00	0.01	0.00
Queue Length 95th (ft)	2	0	1	0
Control Delay (s)	11.2	15.4	0.6	0.1
Lane LOS	B	C	A	A
Approach Delay (s)	11.2	15.4	0.6	0.1
Approach LOS	B	C		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	138	107	7	34	88	31	20	244	170	47	218	37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	174	135	9	43	111	39	25	307	214	59	274	47

Direction, Lane #	NB 1	NB 2	SB 1	SE 1	SE 2	NW 1	NW 2
Volume Total (vph)	308	9	192	332	214	59	321
Volume Left (vph)	174	0	43	25	0	59	0
Volume Right (vph)	0	9	39	0	214	0	47
Hadj (s)	0.32	-0.67	-0.04	0.07	-0.67	0.53	-0.07
Departure Headway (s)	8.1	7.1	8.1	7.5	6.8	8.2	7.6
Degree Utilization, x	0.69	0.02	0.43	0.69	0.40	0.13	0.68
Capacity (veh/h)	424	474	403	462	511	417	451
Control Delay (s)	26.4	9.0	17.0	24.7	13.1	11.3	23.7
Approach Delay (s)	25.9		17.0	20.1		21.8	
Approach LOS	D		C	C		C	

Intersection Summary				
Delay	21.4			
HCM Level of Service	C			
Intersection Capacity Utilization	74.2%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.98			1.00			1.00	0.97		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.87			1.00			1.00	0.85		0.97	
Flt Protected		1.00			0.96			0.95	1.00		0.99	
Satd. Flow (prot)		1433			1602			1597	1387		1601	
Flt Permitted		1.00			0.50			0.68	1.00		0.97	
Satd. Flow (perm)		1433			836			1147	1387		1553	
Volume (vph)	0	19	282	367	26	0	215	1	462	5	32	13
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%
Adj. Flow (vph)	0	22	323	421	30	0	246	1	529	6	37	15
RTOR Reduction (vph)	0	180	0	0	0	0	0	0	351	0	10	0
Lane Group Flow (vph)	0	165	0	0	451	0	0	247	178	0	48	0
Confl. Bikes (#/hr)			4			12			6			1
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type				Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases				8			2		2	6		
Actuated Green, G (s)		16.2			16.2			12.3	12.3		12.3	
Effective Green, g (s)		16.2			16.2			12.3	12.3		12.3	
Actuated g/C Ratio		0.44			0.44			0.34	0.34		0.34	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		636			371			387	467		523	
v/s Ratio Prot		0.12										
v/s Ratio Perm					c0.54			c0.22	0.13		0.03	
v/c Ratio		0.26			1.22			0.64	0.38		0.09	
Uniform Delay, d1		6.4			10.2			10.2	9.2		8.3	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.2			119.3			3.4	0.5		0.1	
Delay (s)		6.6			129.4			13.7	9.7		8.4	
Level of Service		A			F			B	A		A	
Approach Delay (s)		6.6			129.4			11.0			8.4	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	42.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	36.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C

INTERSECTION LEVEL OF SERVICE CALCULATIONS
CLOCKWISE CIRCULATION

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	162	476	31	260	3	52	0	0	0	120	103	3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	174	512	33	280	3	56	0	0	0	129	111	3

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total (vph)	719	283	56	240	3
Volume Left (vph)	174	280	0	129	0
Volume Right (vph)	33	0	56	0	3
Hadj (s)	0.05	0.53	-0.67	0.14	-0.57
Departure Headway (s)	5.5	6.7	5.5	6.6	3.2
Degree Utilization, x	1.10	0.52	0.08	0.44	0.00
Capacity (veh/h)	658	530	639	533	1121
Control Delay (s)	87.3	15.6	7.8	14.6	6.2
Approach Delay (s)	87.3	14.3		14.5	
Approach LOS	F	B		B	

Intersection Summary				
Delay	54.7			
HCM Level of Service	F			
Intersection Capacity Utilization	65.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	0	75	0	0	394
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	79	0	0	415

Direction, Lane #	NB 1	SB 1
Volume Total (vph)	79	415
Volume Left (vph)	79	0
Volume Right (vph)	0	415
Hadj (s)	0.23	-0.57
Departure Headway (s)	4.5	3.4
Degree Utilization, x	0.10	0.39
Capacity (veh/h)	786	1048
Control Delay (s)	7.9	8.6
Approach Delay (s)	7.9	8.6
Approach LOS	A	A

Intersection Summary			
Delay	8.5		
HCM Level of Service	A		
Intersection Capacity Utilization	35.2%	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			Stop			Stop	
Volume (vph)	0	0	301	367	102	0	773	1	0	0	32	18
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	0	314	382	106	0	805	1	0	0	33	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	314	489	805	1	52
Volume Left (vph)	0	382	805	0	0
Volume Right (vph)	314	0	0	0	19
Hadj (s)	-0.57	0.19	0.53	0.03	-0.18
Departure Headway (s)	6.6	6.9	7.8	7.3	8.3
Degree Utilization, x	0.58	0.93	1.75	0.00	0.12
Capacity (veh/h)	525	489	465	485	403
Control Delay (s)	18.2	50.5	365.8	9.1	12.4
Approach Delay (s)	18.2	50.5	365.4		12.4
Approach LOS	C	F	F		B

Intersection Summary				
Delay	196.1			
HCM Level of Service	F			
Intersection Capacity Utilization	81.8%	ICU Level of Service	D	
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)	773	15	50	664	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	859	17	56	738	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			876		1716	867
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			876		1716	867
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		100	100
cM capacity (veh/h)			771		92	352

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	876	56	738
Volume Left	0	56	0
Volume Right	17	0	0
cSH	1700	771	1700
Volume to Capacity	0.52	0.07	0.43
Queue Length 95th (ft)	0	6	0
Control Delay (s)	0.0	10.0	0.0
Lane LOS		B	
Approach Delay (s)	0.0	0.7	
Approach LOS			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	44.9%	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%			0%	
Volume (veh/h)	1	1	10	20	1	20	14	227	647	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	11	21	1	21	15	239	681	2	335	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	973	1292	338	963	955	579	342			920		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	973	1292	338	963	955	579	342			920		
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	99	99	91	100	96	99			100		
cM capacity (veh/h)	219	161	704	228	254	515	1217			742		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	43	935	344
Volume Left	1	21	15	2
Volume Right	11	21	681	7
cSH	480	314	1217	742
Volume to Capacity	0.03	0.14	0.01	0.00
Queue Length 95th (ft)	2	12	1	0
Control Delay (s)	12.7	18.3	0.3	0.1
Lane LOS	B	C	A	A
Approach Delay (s)	12.7	18.3	0.3	0.1
Approach LOS	B	C		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	122	169	49	136	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	128	178	52	143	204
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	694	204			229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	694	204			229	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	85			89	
cM capacity (veh/h)	365	837			1339	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	165	229	347
Volume Left	37	0	143
Volume Right	128	52	0
cSH	650	1700	1339
Volume to Capacity	0.25	0.13	0.11
Queue Length 95th (ft)	25	0	9
Control Delay (s)	12.4	0.0	3.9
Lane LOS	B		A
Approach Delay (s)	12.4	0.0	3.9
Approach LOS	B		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	49.1%	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			Stop			Stop	
Volume (vph)	20	244	170	47	218	37	138	107	7	34	88	31
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	21	252	175	48	225	38	142	110	7	35	91	32

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	272	175	48	263	253	7	158
Volume Left (vph)	21	0	48	0	142	0	35
Volume Right (vph)	0	175	0	38	0	7	32
Hadj (s)	0.07	-0.67	0.53	-0.07	0.32	-0.67	-0.04
Departure Headway (s)	6.7	5.9	7.3	6.7	7.3	6.3	7.1
Degree Utilization, x	0.50	0.29	0.10	0.49	0.51	0.01	0.31
Capacity (veh/h)	515	576	462	501	463	527	461
Control Delay (s)	15.1	10.1	9.9	14.8	16.5	8.2	13.3
Approach Delay (s)	13.1		14.0		16.3		13.3
Approach LOS	B		B		C		B

Intersection Summary			
Delay	14.1		
HCM Level of Service	B		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	176	490	40	263	0	52	0	0	0	120	106	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	208	580	47	311	0	62	0	0	0	142	125	0

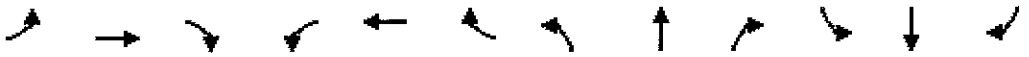
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total (vph)	835	311	62	267	0
Volume Left (vph)	208	311	0	142	0
Volume Right (vph)	47	0	62	0	0
Hadj (s)	0.05	0.53	-0.67	0.14	0.00
Departure Headway (s)	5.7	6.8	5.6	6.7	3.2
Degree Utilization, x	1.32	0.59	0.10	0.49	0.00
Capacity (veh/h)	636	509	623	528	1121
Control Delay (s)	172.6	17.9	8.0	16.0	6.2
Approach Delay (s)	172.6	16.3		16.0	
Approach LOS	F	C		C	

Intersection Summary			
Delay	104.8		
HCM Level of Service	F		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	0	75	0	0	394
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	87	0	0	456

Direction, Lane #	NB 1	SB 1
Volume Total (vph)	87	456
Volume Left (vph)	87	0
Volume Right (vph)	0	456
Hadj (s)	0.23	-0.57
Departure Headway (s)	4.5	3.4
Degree Utilization, x	0.11	0.43
Capacity (veh/h)	779	1045
Control Delay (s)	8.0	9.0
Approach Delay (s)	8.0	9.0
Approach LOS	A	A

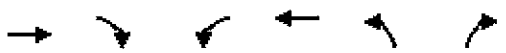
Intersection Summary			
Delay	8.9		
HCM Level of Service	A		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	301	367	102	0	773	1	0	0	32	18
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	0	345	421	117	0	886	1	0	0	37	21

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	345	537	886	1	57
Volume Left (vph)	0	421	886	0	0
Volume Right (vph)	345	0	0	0	21
Hadj (s)	-0.57	0.19	0.53	0.03	-0.18
Departure Headway (s)	6.8	7.0	7.9	7.4	8.5
Degree Utilization, x	0.65	1.05	1.95	0.00	0.14
Capacity (veh/h)	522	510	461	477	394
Control Delay (s)	21.3	78.5	452.6	9.2	12.9
Approach Delay (s)	21.3	78.5	452.0		12.9
Approach LOS	C	F	F		B

Intersection Summary			
Delay	247.0		
HCM Level of Service	F		
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
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)	773	15	50	664	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	945	18	61	812	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			963		1888	954
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			963		1888	954
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		100	100
cM capacity (veh/h)			715		71	314

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	963	61	812
Volume Left	0	61	0
Volume Right	18	0	0
cSH	1700	715	1700
Volume to Capacity	0.57	0.09	0.48
Queue Length 95th (ft)	0	7	0
Control Delay (s)	0.0	10.5	0.0
Lane LOS		B	
Approach Delay (s)	0.0	0.7	
Approach LOS			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	49.1%	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%			0%	
Volume (veh/h)	1	1	10	0	0	0	14	227	647	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	12	0	0	0	16	263	749	2	368	8
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	1047	1421	372	1059	1051	637	376			1012		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1047	1421	372	1059	1051	637	376			1012		
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 %	99	99	98	100	100	100	99			100		
cM capacity (veh/h)	204	134	674	195	223	477	1182			685		

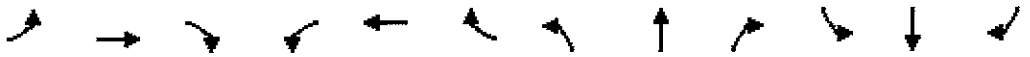
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	14	0	1028	379
Volume Left	1	0	16	2
Volume Right	12	0	749	8
cSH	441	1700	1182	685
Volume to Capacity	0.03	0.00	0.01	0.00
Queue Length 95th (ft)	2	0	1	0
Control Delay (s)	13.4	0.0	0.4	0.1
Lane LOS	B	A	A	A
Approach Delay (s)	13.4	0.0	0.4	0.1
Approach LOS	B	A		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	122	169	49	136	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	41	141	196	57	157	225
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	764	224			252	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	224			252	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	83			88	
cM capacity (veh/h)	327	815			1313	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	182	252	382
Volume Left	41	0	157
Volume Right	141	57	0
cSH	612	1700	1313
Volume to Capacity	0.30	0.15	0.12
Queue Length 95th (ft)	31	0	10
Control Delay (s)	13.3	0.0	4.0
Lane LOS	B		A
Approach Delay (s)	13.3	0.0	4.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	244	170	47	218	37	138	107	7	34	88	31
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	307	214	59	274	47	174	135	9	43	111	39

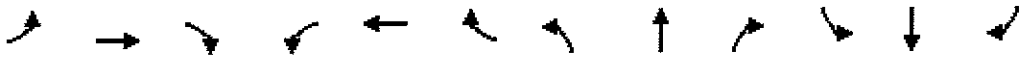
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	332	214	59	321	308	9	192
Volume Left (vph)	25	0	59	0	174	0	43
Volume Right (vph)	0	214	0	47	0	9	39
Hadj (s)	0.07	-0.67	0.53	-0.07	0.32	-0.67	-0.04
Departure Headway (s)	7.5	6.8	8.2	7.6	8.1	7.1	8.1
Degree Utilization, x	0.69	0.40	0.13	0.68	0.69	0.02	0.43
Capacity (veh/h)	462	511	417	451	424	474	403
Control Delay (s)	24.7	13.1	11.3	23.7	26.4	9.0	17.0
Approach Delay (s)	20.1		21.8		25.9		17.0
Approach LOS	C		C		D		C

Intersection Summary			
Delay	21.4		
HCM Level of Service	C		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	162	476	31	263	0	52	0	0	0	120	106	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	174	512	33	283	0	56	0	0	0	129	114	0

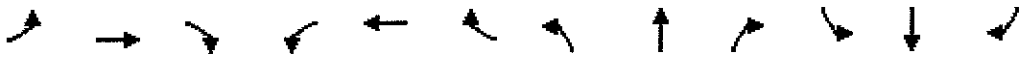
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	174	545	283	56	243
Volume Left (vph)	174	0	283	0	129
Volume Right (vph)	0	33	0	56	0
Hadj (s)	0.53	-0.01	0.53	-0.67	0.14
Departure Headway (s)	6.4	5.9	6.9	5.7	6.5
Degree Utilization, x	0.31	0.89	0.54	0.09	0.44
Capacity (veh/h)	543	605	498	614	535
Control Delay (s)	11.1	37.6	16.6	8.0	14.5
Approach Delay (s)	31.2		15.2		14.5
Approach LOS	D		C		B

Intersection Summary				
Delay	23.9			
HCM Level of Service	C			
Intersection Capacity Utilization	63.7%	ICU Level of Service	B	
Analysis Period (min)	15			



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				4.0	
Lane Util. Factor			1.00	1.00	1.00		1.00				1.00	
Frpb, ped/bikes			1.00	1.00	1.00		1.00				1.00	
Flpb, ped/bikes			1.00	1.00	1.00		1.00				1.00	
Frt			0.86	1.00	1.00		1.00				1.00	
Flt Protected			1.00	0.95	1.00		0.95				1.00	
Satd. Flow (prot)			1450	1593	1676		1593				1676	
Flt Permitted			1.00	0.95	1.00		0.75				1.00	
Satd. Flow (perm)			1450	1593	1676		1259				1676	
Volume (vph)	0	0	301	367	102	0	773	0	0	0	10	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	314	382	106	0	805	0	0	0	10	0
RTOR Reduction (vph)	0	0	232	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	82	382	106	0	805	0	0	0	10	0
Confl. Bikes (#/hr)			4			12			6			1
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type			custom	Perm			D.Pm			Perm		
Protected Phases			2		6						4	
Permitted Phases			2	6			4			4		
Actuated Green, G (s)			22.0	22.0	22.0		54.0				54.0	
Effective Green, g (s)			22.0	22.0	22.0		54.0				54.0	
Actuated g/C Ratio			0.26	0.26	0.26		0.64				0.64	
Clearance Time (s)			4.0	4.0	4.0		4.0				4.0	
Vehicle Extension (s)			3.0	3.0	3.0		3.0				3.0	
Lane Grp Cap (vph)			380	417	439		809				1077	
v/s Ratio Prot			0.06		0.06						0.01	
v/s Ratio Perm				c0.24			c0.64					
v/c Ratio			0.22	0.92	0.24		1.00				0.01	
Uniform Delay, d1			24.3	30.1	24.4		14.9				5.4	
Progression Factor			1.00	1.00	1.00		1.00				1.00	
Incremental Delay, d2			1.3	24.5	0.3		30.5				0.0	
Delay (s)			25.6	54.6	24.7		45.3				5.4	
Level of Service			C	D	C		D				A	
Approach Delay (s)		25.6			48.1			45.3			5.4	
Approach LOS		C			D			D			A	

Intersection Summary			
HCM Average Control Delay	42.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



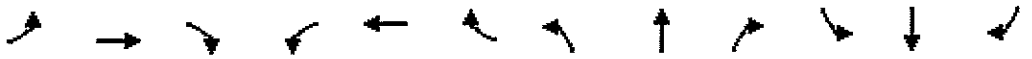
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0		4.0		4.0	4.0			4.0	
Lane Util. Factor			1.00		1.00		1.00	1.00			1.00	
Frpb, ped/bikes			0.98		1.00		1.00	1.00			0.99	
Flpb, ped/bikes			1.00		1.00		1.00	1.00			1.00	
Frt			0.86		1.00		1.00	1.00			0.95	
Flt Protected			1.00		0.96		0.95	1.00			1.00	
Satd. Flow (prot)			1416		1613		1593	1676			1582	
Flt Permitted			1.00		0.96		0.72	1.00			1.00	
Satd. Flow (perm)			1416		1613		1206	1676			1582	
Volume (vph)	0	0	301	367	102	0	773	1	0	0	32	18
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%
Adj. Flow (vph)	0	0	345	421	117	0	886	1	0	0	37	21
RTOR Reduction (vph)	0	0	211	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	134	0	538	0	886	1	0	0	46	0
Confl. Bikes (#/hr)			4			12			6			1
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type			custom	Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases			4	8			2					
Actuated Green, G (s)			15.2		15.2		16.0	16.0			16.0	
Effective Green, g (s)			15.2		15.2		16.0	16.0			16.0	
Actuated g/C Ratio			0.39		0.39		0.41	0.41			0.41	
Clearance Time (s)			4.0		4.0		4.0	4.0			4.0	
Vehicle Extension (s)			3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)			549		625		492	684			646	
v/s Ratio Prot								0.00			0.03	
v/s Ratio Perm			0.09		0.33		c0.73					
v/c Ratio			0.24		0.86		1.80	0.00			0.07	
Uniform Delay, d1			8.1		11.0		11.6	6.9			7.1	
Progression Factor			1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2			0.2		11.7		368.4	0.0			0.0	
Delay (s)			8.3		22.7		380.0	6.9			7.1	
Level of Service			A		C		F	A			A	
Approach Delay (s)		8.3			22.7			379.6			7.1	
Approach LOS		A			C			F			A	

Intersection Summary			
HCM Average Control Delay	192.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX D

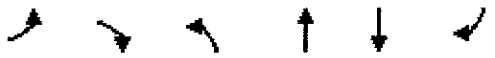
INTERSECTION LEVEL OF SERVICE CALCULATIONS
COUNTER-CLOCKWISE CIRCULATION



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	4	0	0	263	52	3	169	492	120	0	106
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	6	4	0	0	283	56	3	182	529	129	0	106

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	11	283	56	185	529	129	106
Volume Left (vph)	6	0	0	3	0	129	0
Volume Right (vph)	0	0	56	0	529	0	106
Hadj (s)	0.15	0.03	-0.67	0.04	-0.67	0.23	-0.57
Departure Headway (s)	7.4	6.6	5.9	5.9	5.2	6.7	3.2
Degree Utilization, x	0.02	0.52	0.09	0.30	0.76	0.24	0.09
Capacity (veh/h)	445	517	569	593	677	507	1121
Control Delay (s)	10.5	15.3	8.3	10.2	21.5	11.8	6.5
Approach Delay (s)	10.5	14.1		18.6		9.4	
Approach LOS	B	B		C		A	

Intersection Summary				
Delay	15.7			
HCM Level of Service	C			
Intersection Capacity Utilization	50.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	539	0	0	198	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	567	0	0	208	0	0

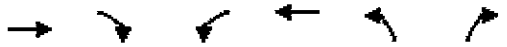
Direction, Lane #	EB 1	NB 1
Volume Total (vph)	567	208
Volume Left (vph)	567	0
Volume Right (vph)	0	0
Hadj (s)	0.23	0.03
Departure Headway (s)	4.7	5.4
Degree Utilization, x	0.75	0.31
Capacity (veh/h)	745	611
Control Delay (s)	20.3	10.8
Approach Delay (s)	20.3	10.8
Approach LOS	C	B

Intersection Summary			
Delay	17.7		
HCM Level of Service	C		
Intersection Capacity Utilization	46.9%	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			Stop			Stop	
Volume (vph)	0	77	630	0	0	0	215	1	462	0	32	18
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	80	656	0	0	0	224	1	481	0	33	19

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	736	225	481	52
Volume Left (vph)	0	224	0	0
Volume Right (vph)	656	0	481	19
Hadj (s)	-0.50	0.53	-0.67	0.18
Departure Headway (s)	5.2	7.0	5.8	6.7
Degree Utilization, x	1.06	0.44	0.78	0.10
Capacity (veh/h)	692	508	609	520
Control Delay (s)	72.1	14.2	25.1	10.5
Approach Delay (s)	72.1	21.6		10.5
Approach LOS	F	C		B

Intersection Summary				
Delay		46.1		
HCM Level of Service		E		
Intersection Capacity Utilization	84.9%		ICU Level of Service	E
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)	677	112	63	664	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	752	124	70	738	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			877		1692	814
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			877		1692	814
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		100	100
cM capacity (veh/h)			770		93	378

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	877	70	738
Volume Left	0	70	0
Volume Right	124	0	0
cSH	1700	770	1700
Volume to Capacity	0.52	0.09	0.43
Queue Length 95th (ft)	0	7	0
Control Delay (s)	0.0	10.1	0.0
Lane LOS		B	
Approach Delay (s)	0.0	0.9	
Approach LOS			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	52.6%	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%			0%	
Volume (veh/h)	1	1	10	372	7	10	14	227	14	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	11	392	7	11	15	239	15	2	335	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	633	626	338	629	622	246	342			254		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	633	626	338	629	622	246	342			254		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	0	98	99	99			100		
cM capacity (veh/h)	378	395	704	384	397	792	1217			1311		

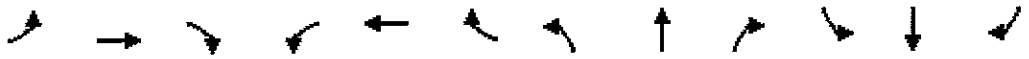
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	409	268	344
Volume Left	1	392	15	2
Volume Right	11	11	15	7
cSH	619	389	1217	1311
Volume to Capacity	0.02	1.05	0.01	0.00
Queue Length 95th (ft)	2	343	1	0
Control Delay (s)	10.9	93.2	0.5	0.1
Lane LOS	B	F	A	A
Approach Delay (s)	10.9	93.2	0.5	0.1
Approach LOS	B	F		

Intersection Summary			
Average Delay	37.2		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	122	169	49	136	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	128	178	52	143	204
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	694	204			229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	694	204			229	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	85			89	
cM capacity (veh/h)	365	837			1339	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	165	229	347
Volume Left	37	0	143
Volume Right	128	52	0
cSH	650	1700	1339
Volume to Capacity	0.25	0.13	0.11
Queue Length 95th (ft)	25	0	9
Control Delay (s)	12.4	0.0	3.9
Lane LOS	B		A
Approach Delay (s)	12.4	0.0	3.9
Approach LOS	B		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	49.1%	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			Stop			Stop	
Volume (vph)	20	244	170	47	218	37	138	107	7	34	88	31
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	21	252	175	48	225	38	142	110	7	35	91	32

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	272	175	48	263	253	7	158
Volume Left (vph)	21	0	48	0	142	0	35
Volume Right (vph)	0	175	0	38	0	7	32
Hadj (s)	0.07	-0.67	0.53	-0.07	0.32	-0.67	-0.04
Departure Headway (s)	6.7	5.9	7.3	6.7	7.3	6.3	7.1
Degree Utilization, x	0.50	0.29	0.10	0.49	0.51	0.01	0.31
Capacity (veh/h)	515	576	462	501	463	527	461
Control Delay (s)	15.1	10.1	9.9	14.8	16.5	8.2	13.3
Approach Delay (s)	13.1		14.0		16.3		13.3
Approach LOS	B		B		C		B

Intersection Summary				
Delay	14.1			
HCM Level of Service	B			
Intersection Capacity Utilization	57.7%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	4	0	0	263	52	3	169	492	120	0	106
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.00
Hourly flow rate (vph)	7	5	0	0	311	62	4	200	582	142	0	117

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	12	311	62	203	582	142	117
Volume Left (vph)	7	0	0	4	0	142	0
Volume Right (vph)	0	0	62	0	582	0	117
Hadj (s)	0.15	0.03	-0.67	0.04	-0.67	0.23	-0.57
Departure Headway (s)	7.7	6.8	6.1	6.1	5.4	7.0	3.2
Degree Utilization, x	0.03	0.59	0.10	0.34	0.87	0.27	0.10
Capacity (veh/h)	435	504	561	577	660	496	1121
Control Delay (s)	10.9	18.0	8.6	11.0	32.0	12.6	6.6
Approach Delay (s)	10.9	16.4		26.6		9.9	
Approach LOS	B	C		D		A	

Intersection Summary				
Delay	20.8			
HCM Level of Service	C			
Intersection Capacity Utilization	54.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	539	0	0	198	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	624	0	0	229	0	0

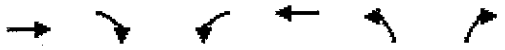
Direction, Lane #	EB 1	NB 1
Volume Total (vph)	624	229
Volume Left (vph)	624	0
Volume Right (vph)	0	0
Hadj (s)	0.23	0.03
Departure Headway (s)	4.8	5.5
Degree Utilization, x	0.83	0.35
Capacity (veh/h)	736	615
Control Delay (s)	27.1	11.5
Approach Delay (s)	27.1	11.5
Approach LOS	D	B

Intersection Summary			
Delay	22.9		
HCM Level of Service	C		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	77	630	0	0	0	215	1	462	0	32	18
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	88	722	0	0	0	246	1	529	0	37	21

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	810	248	529	57
Volume Left (vph)	0	246	0	0
Volume Right (vph)	722	0	529	21
Hadj (s)	-0.50	0.53	-0.67	0.18
Departure Headway (s)	5.3	7.0	5.8	6.8
Degree Utilization, x	1.19	0.48	0.86	0.11
Capacity (veh/h)	670	508	611	516
Control Delay (s)	117.9	15.2	33.0	10.6
Approach Delay (s)	117.9	27.3		10.6
Approach LOS	F	D		B

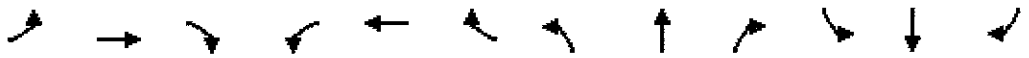
Intersection Summary				
Delay			71.4	
HCM Level of Service			F	
Intersection Capacity Utilization		92.0%	ICU Level of Service	F
Analysis Period (min)			15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	677	112	63	664	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	827	137	77	812	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			964		1861	896
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			964		1861	896
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		100	100
cM capacity (veh/h)			714		72	339

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	964	77	812
Volume Left	0	77	0
Volume Right	137	0	0
cSH	1700	714	1700
Volume to Capacity	0.57	0.11	0.48
Queue Length 95th (ft)	0	9	0
Control Delay (s)	0.0	10.7	0.0
Lane LOS		B	
Approach Delay (s)	0.0	0.9	
Approach LOS			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
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%			0%	
Volume (veh/h)	1	1	10	372	7	10	14	265	0	2	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	12	431	8	12	16	307	0	2	368	8
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	732	716	372	728	720	307	376			307		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	732	716	372	728	720	307	376			307		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	0	98	98	99			100		
cM capacity (veh/h)	322	350	674	328	348	733	1182			1254		

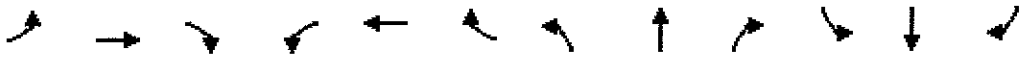
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	14	450	323	379
Volume Left	1	431	16	2
Volume Right	12	12	0	8
cSH	577	333	1182	1254
Volume to Capacity	0.02	1.35	0.01	0.00
Queue Length 95th (ft)	2	556	1	0
Control Delay (s)	11.4	208.2	0.5	0.1
Lane LOS	B	F	A	A
Approach Delay (s)	11.4	208.2	0.5	0.1
Approach LOS	B	F		

Intersection Summary			
Average Delay	80.8		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	122	169	49	136	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	41	141	196	57	157	225
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	764	224			252	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	224			252	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	83			88	
cM capacity (veh/h)	327	815			1313	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	182	252	382
Volume Left	41	0	157
Volume Right	141	57	0
cSH	612	1700	1313
Volume to Capacity	0.30	0.15	0.12
Queue Length 95th (ft)	31	0	10
Control Delay (s)	13.3	0.0	4.0
Lane LOS	B		A
Approach Delay (s)	13.3	0.0	4.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		



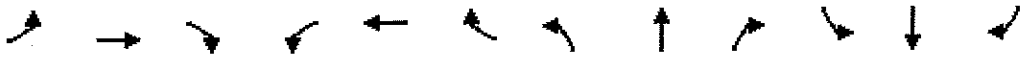
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	244	170	47	218	37	138	107	7	34	88	31
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	307	214	59	274	47	174	135	9	43	111	39

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	332	214	59	321	308	9	192
Volume Left (vph)	25	0	59	0	174	0	43
Volume Right (vph)	0	214	0	47	0	9	39
Hadj (s)	0.07	-0.67	0.53	-0.07	0.32	-0.67	-0.04
Departure Headway (s)	7.5	6.8	8.2	7.6	8.1	7.1	8.1
Degree Utilization, x	0.69	0.40	0.13	0.68	0.69	0.02	0.43
Capacity (veh/h)	462	511	417	451	424	474	403
Control Delay (s)	24.7	13.1	11.3	23.7	26.4	9.0	17.0
Approach Delay (s)	20.1		21.8		25.9		17.0
Approach LOS	C		C		D		C

Intersection Summary			
Delay	21.4		
HCM Level of Service	C		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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		1.00					1.00		1.00		1.00	
Frpb, ped/bikes		0.98					1.00		0.98		1.00	
Flpb, ped/bikes		1.00					1.00		1.00		1.00	
Frt		0.88					1.00		0.85		1.00	
Flt Protected		1.00					0.95		1.00		1.00	
Satd. Flow (prot)		1442					1593		1390		1676	
Flt Permitted		1.00					0.75		1.00		1.00	
Satd. Flow (perm)		1442					1259		1390		1676	
Volume (vph)	0	77	630	0	0	0	215	0	462	0	10	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	80	656	0	0	0	224	0	481	0	10	0
RTOR Reduction (vph)	0	458	0	0	0	0	0	0	239	0	0	0
Lane Group Flow (vph)	0	278	0	0	0	0	224	0	242	0	10	0
Confl. Bikes (#/hr)			4			12			6			1
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type							custom		custom			
Protected Phases		4									6	
Permitted Phases							2		2			
Actuated Green, G (s)		12.4					20.7		20.7		20.7	
Effective Green, g (s)		12.4					20.7		20.7		20.7	
Actuated g/C Ratio		0.30					0.50		0.50		0.50	
Clearance Time (s)		4.0					4.0		4.0		4.0	
Vehicle Extension (s)		3.0					3.0		3.0		3.0	
Lane Grp Cap (vph)		435					634		700		844	
v/s Ratio Prot		c0.19									0.01	
v/s Ratio Perm							c0.18		0.17			
v/c Ratio		0.64					0.35		0.35		0.01	
Uniform Delay, d1		12.4					6.2		6.1		5.1	
Progression Factor		1.00					1.00		1.00		1.00	
Incremental Delay, d2		3.1					1.5		1.4		0.0	
Delay (s)		15.5					7.7		7.5		5.1	
Level of Service		B					A		A		A	
Approach Delay (s)		15.5			0.0			7.6			5.1	
Approach LOS		B			A			A			A	

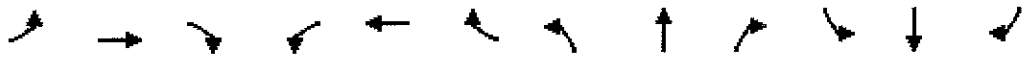
Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	41.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	0	10	372	7	10	14	227	0	0	318	7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	0	11	392	7	11	15	239	0	0	335	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	12	409	254	342
Volume Left (vph)	1	392	15	0
Volume Right (vph)	11	11	0	7
Hadj (s)	-0.49	0.21	0.05	0.02
Departure Headway (s)	6.0	5.8	5.9	5.7
Degree Utilization, x	0.02	0.66	0.41	0.54
Capacity (veh/h)	464	409	567	599
Control Delay (s)	9.2	19.5	12.9	15.2
Approach Delay (s)	9.2	19.5	12.9	15.2
Approach LOS	A	C	B	C

Intersection Summary				
Delay			16.3	
HCM Level of Service			C	
Intersection Capacity Utilization		58.3%	ICU Level of Service	B
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	0	10	376	7	18	14	241	14	2	325	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	0	12	435	8	21	16	279	16	2	376	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	14	464	311	379
Volume Left (vph)	2	435	16	2
Volume Right (vph)	12	21	16	0
Hadj (s)	-0.43	0.19	0.01	0.04
Departure Headway (s)	6.9	6.2	6.3	6.2
Degree Utilization, x	0.03	0.80	0.54	0.65
Capacity (veh/h)	412	562	536	548
Control Delay (s)	10.1	29.6	16.5	19.9
Approach Delay (s)	10.1	29.6	16.5	19.9
Approach LOS	B	D	C	C

Intersection Summary			
Delay	22.7		
HCM Level of Service	C		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

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		1.00						1.00	1.00			
Frpb, ped/bikes		0.98						1.00	0.97			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		0.88						1.00	0.85			
Flt Protected		1.00						0.95	1.00			
Satd. Flow (prot)		1444						1597	1388			
Flt Permitted		1.00						0.95	1.00			
Satd. Flow (perm)		1444						1597	1388			
Volume (vph)	0	77	630	0	0	0	215	1	462	0	0	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor (vph)	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%	110%
Adj. Flow (vph)	0	88	722	0	0	0	246	1	529	0	0	0
RTOR Reduction (vph)	0	437	0	0	0	0	0	0	334	0	0	0
Lane Group Flow (vph)	0	373	0	0	0	0	0	247	195	0	0	0
Confl. Bikes (#/hr)			4			12			6			1
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type							Perm		Perm			
Protected Phases		4						2				
Permitted Phases							2		2			
Actuated Green, G (s)		13.4						12.5	12.5			
Effective Green, g (s)		13.4						12.5	12.5			
Actuated g/C Ratio		0.40						0.37	0.37			
Clearance Time (s)		4.0						4.0	4.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		571						589	512			
v/s Ratio Prot		c0.26										
v/s Ratio Perm								0.15	0.14			
v/c Ratio		0.65						0.42	0.38			
Uniform Delay, d1		8.4						8.0	7.9			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		2.7						0.5	0.5			
Delay (s)		11.1						8.5	8.3			
Level of Service		B						A	A			
Approach Delay (s)		11.1			0.0			8.4			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	33.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E

SIGNAL WARRANT WORKSHEETS

EXISTING CONDITIONS PEAK HOUR VOLUME WARRANT
URBAN CONDITIONS

Peak Hour: **PM**

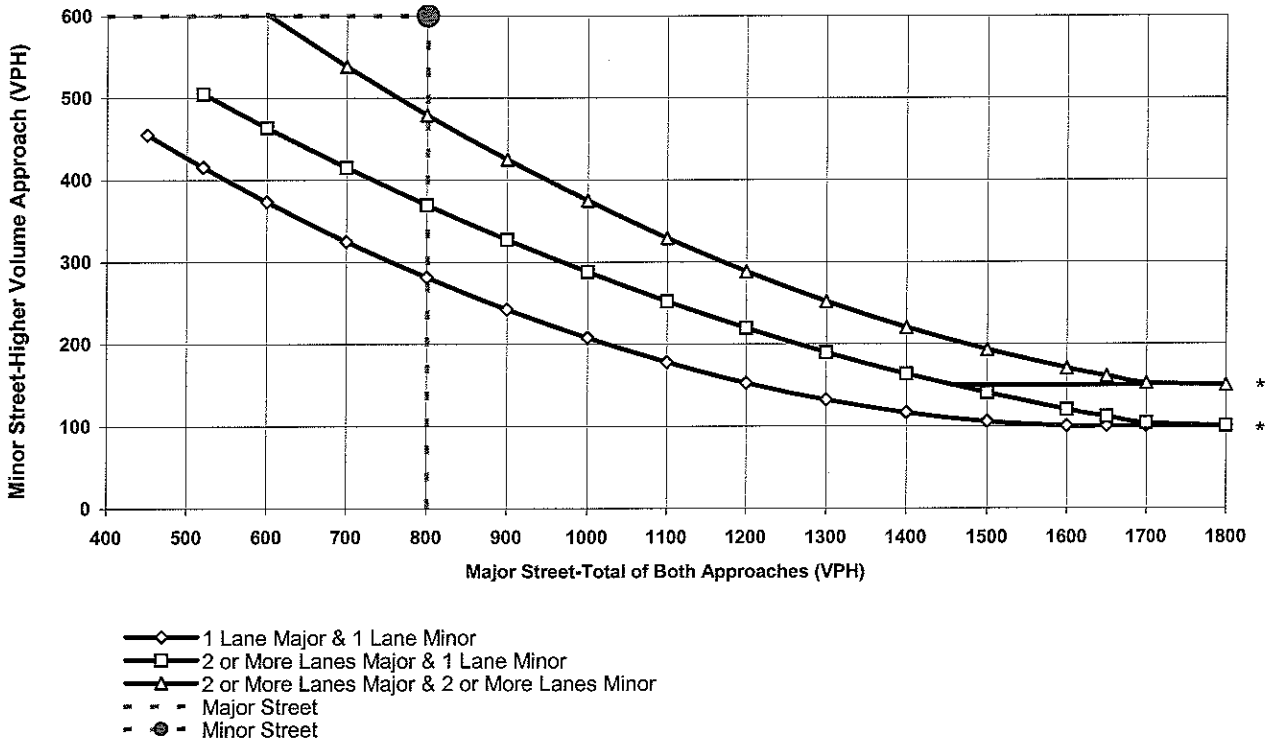
Major Street: **Stockton (NS)**

Minor Street: **Capitola (EW)**

Total of Both Approaches (VPH):	**801**	Higher Volume Approach (VPH):	**778**
Number of Approach Lanes:	**1**	Number of Approach Lanes:	**1**

SIGNAL WARRANT SATISFIED

Figure 4C-3. Peak Hour Warrant (Urban)



* 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.

Source: MUTCD 2004 California Supplement

Existing Conditions
Peak Hour Volume Warrant
Stockton Ave. / Capitola Ave.