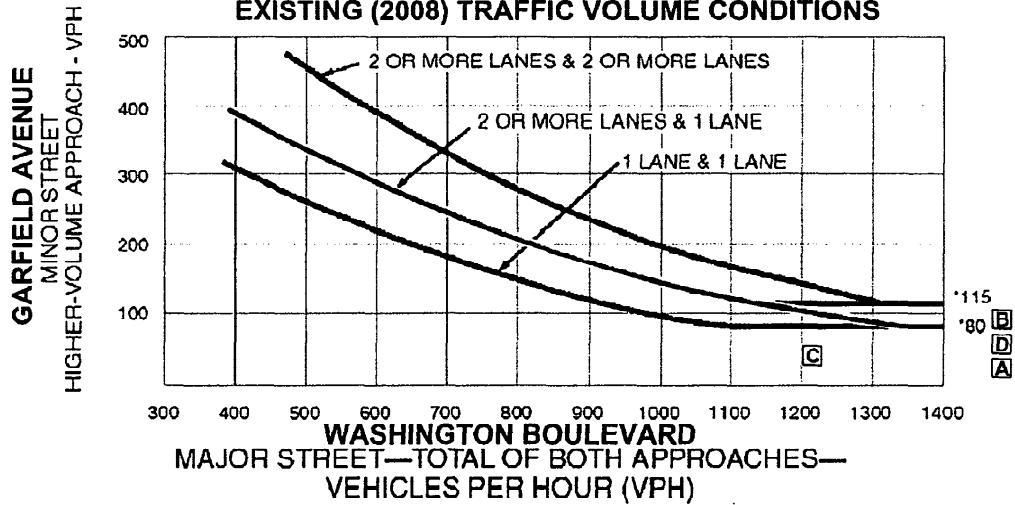


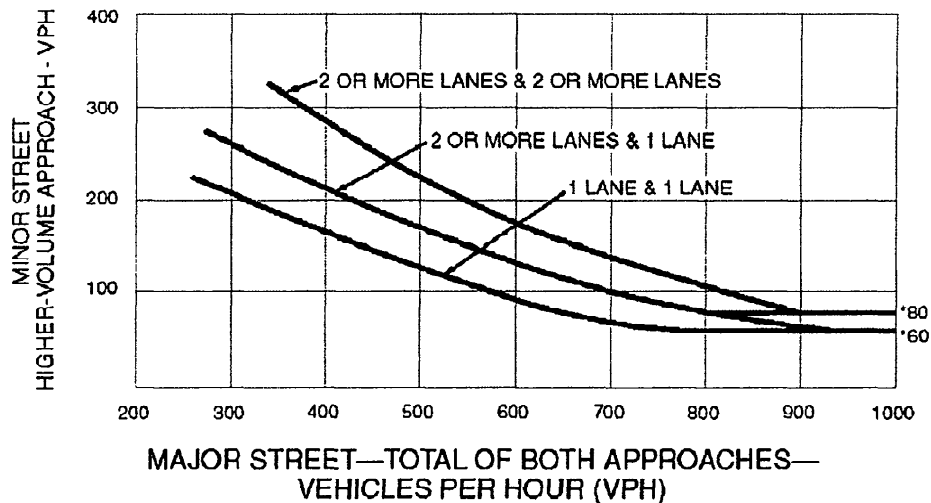
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume
WASHINGTON BLVD. & GARFIELD AVE.
EXISTING (2008) TRAFFIC VOLUME CONDITIONS



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

- A 7 - 8 AM (1501, 65)
- B 8 - 9 AM (1501, 85)
- C 2 - 3 PM (1222, 56)
- D 3 - 4 PM (1504, 72)

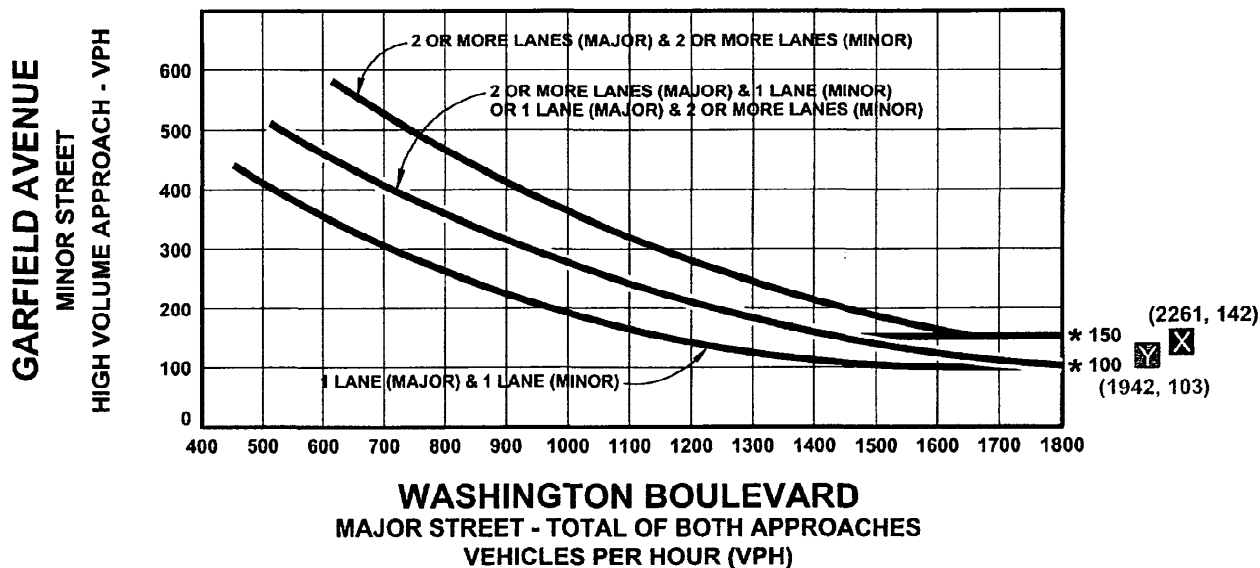
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)
 (COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-3. Warrant 3, Peak Hour

**WASHINGTON BLVD. & GARFIELD AVE.
FUTURE (2022) WITH PROJECT TRAFFIC VOLUMES CONDITIONS**



* NOTE:

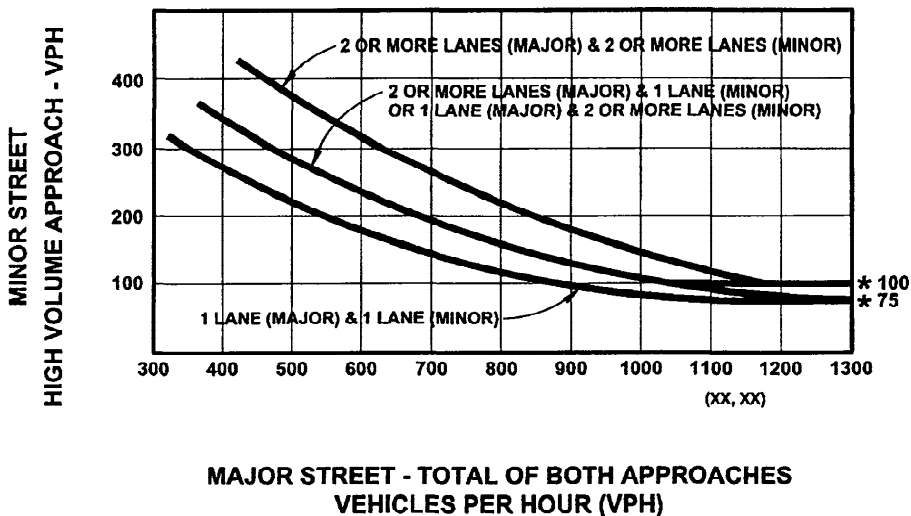
150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

- ☒ A.M. PEAK HOUR (2261, 142)
- ☒ P.M. PEAK HOUR (1942, 103)

NOTE: TRAFFIC VOLUMES WILL SATISFY TRAFFIC SIGNAL WARRANT.

Figure 4C-4. Warrant 3, Peak Hour (70%) Factor

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70km/h OR ABOVE 40 mph On Major Street)



* NOTE:

100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

APPENDIX F

ICU AND HCM CALCULATION WORKSHEETS

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	JL
Agency/Co.	Crain & Associates
Date Performed	1/25/2008
Analysis Time Period	AM Peak Hour

Site Information

Intersection	1
Jurisdiction	City of Pasadena
Analysis Year	2008

Project ID Existing Traffic Conditions

East/West Street: Howard St.	North/South Street: Marengo Ave.
------------------------------	----------------------------------

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	43	0	27
%Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	65	11	22	142	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			70		76		164	
% Heavy Vehicles			0		0		0	
No. Lanes	0		1		1		1	
Geometry Group			1		1		1	
Duration, T	1.00							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			0.6		0.0		0.1	
Prop. Right-Turns			0.4		0.1		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
hLT-adj			0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj			1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed			-0.1		-0.1		0.0	

Departure Headway and Service Time

hd, initial value (s)			3.20		3.20		3.20	
x, initial			0.06		0.07		0.15	
hd, final value (s)			4.31		4.14		4.17	
x, final value			0.08		0.09		0.19	
Move-up time, m (s)			2.0		2.0		2.0	
Service Time, t _s (s)			2.3		2.1		2.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			320		326		414	
Delay (s/veh)			7.71		7.54		8.14	
LOS			A		A		A	
Approach: Delay (s/veh)			7.71		7.54		8.14	
LOS			A		A		A	
Intersection Delay (s/veh)	7.90							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	JL	Intersection	1
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	AM Peak Hour		

Project ID *Future Without Project Traffic Conditions*

East/West Street: *Howard St.* North/South Street: *Marengo Ave.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	53	0	33
%Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	80	14	27	175	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			86		94		202	
% Heavy Vehicles			0		0		0	
No. Lanes	0		1		1		1	
Geometry Group			1		1		1	
Duration, T	1.00							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns		0.6		0.0		0.1	
Prop. Right-Turns		0.4		0.1		0.0	
Prop. Heavy Vehicle		0.0		0.0		0.0	
nLT-adj		0.2	0.2	0.2	0.2	0.2	0.2
nRT-adj		-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
nHV-adj		1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed		-0.1		-0.1		0.0	

Departure Headway and Service Time

hd, initial value (s)		3.20		3.20		3.20	
x, initial		0.08		0.08		0.18	
hd, final value (s)		4.44		4.23		4.23	
x, final value		0.11		0.11		0.24	
Move-up time, m (s)		2.0		2.0		2.0	
Service Time, t _s (s)		2.4		2.2		2.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			336		344		452	
Delay (s/veh)			7.97		7.75		8.55	
LOS			A		A		A	
Approach: Delay (s/veh)			7.97		7.75		8.55	
LOS			A		A		A	
Intersection Delay (s/veh)	8.22							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	JL	Intersection	1
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	AM Peak Hour		

Project ID *Future With Project Traffic Conditions*

East/West Street: *Howard St.* North/South Street: *Marengo Ave.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	53	0	34
% Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	80	14	29	175	0
% Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			87		94		204	
% Heavy Vehicles			0		0		0	
No. Lanes	0			1		1		1
Geometry Group				1		1		1
Duration, T					1.00			

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			0.6		0.0		0.1	
Prop. Right-Turns			0.4		0.1		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
hLT-adj			0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj			1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed			-0.1		-0.1		0.0	

Departure Headway and Service Time

hd, initial value (s)			3.20		3.20		3.20	
x, initial			0.08		0.08		0.18	
hd, final value (s)			4.44		4.23		4.24	
x, final value			0.11		0.11		0.24	
Move-up time, m (s)				2.0		2.0		2.0
Service Time, t _s (s)			2.4		2.2		2.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			337		344		454	
Delay (s/veh)			7.98		7.76		8.57	
LOS			A		A		A	
Approach: Delay (s/veh)				7.98		7.76		8.57
LOS				A		A		A
Intersection Delay (s/veh)					8.24			
Intersection LOS					A			

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	JL	Intersection	1
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/25/2008	Analysis Year	2008
Analysis Time Period	School PM Peak Hour		

Project ID Existing Traffic Conditions	
East/West Street: Howard St.	North/South Street: Marengo Ave.

Volume Adjustments and Site Characteristics						
Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	28	0	22
%Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	65	29	16	86	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			50		94		102	
% Heavy Vehicles			0		0		0	
No. Lanes	0		1		1		1	
Geometry Group			1		1		1	
Duration, T	1.00							

Saturation Headway Adjustment Worksheet							
Prop. Left-Turns			0.6		0.0		0.2
Prop. Right-Turns			0.4		0.3		0.0
Prop. Heavy Vehicle			0.0		0.0		0.0
hLT-adj			0.2	0.2	0.2	0.2	0.2
hRT-adj			-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj			1.7	1.7	1.7	1.7	1.7
hadj, computed			-0.2		-0.2		0.0

Departure Headway and Service Time								
hd, initial value (s)			3.20		3.20		3.20	
x, initial			0.04		0.08		0.09	
hd, final value (s)			4.16		3.93		4.13	
x, final value			0.06		0.10		0.12	
Move-up time, m (s)			2.0		2.0		2.0	
Service Time, t _g (s)			2.2		1.9		2.1	

Capacity and Level of Service								
	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			300		344		352	
Delay (s/veh)			7.42		7.38		7.68	
LOS			A		A		A	
Approach: Delay (s/veh)			7.42		7.38		7.68	
LOS			A		A		A	
Intersection Delay (s/veh)	7.51							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	JL	Intersection	7
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	School PM Peak Hour		

Project ID *Futures Without Project Traffic Conditions*

East/West Street: *Howard St.* North/South Street: *Marengo Ave.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	34	0	27
%Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	80	36	20	106	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			61		116		126	
% Heavy Vehicles			0		0		0	
No. Lanes	0		1		1		1	
Geometry Group			1		1		1	
Duration, T	1.00							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			0.6		0.0		0.2	
Prop. Right-Turns			0.4		0.3		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
hLT-adj			0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj			1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed			-0.2		-0.2		0.0	

Departure Headway and Service Time

hd, initial value (s)			3.20		3.20		3.20	
x, initial			0.05		0.10		0.11	
hd, final value (s)			4.26		3.98		4.18	
x, final value			0.07		0.13		0.15	
Move-up time, m (s)			2.0		2.0		2.0	
Service Time, t _s (s)			2.3		2.0		2.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			311		366		376	
Delay (s/veh)			7.59		7.57		7.90	
LOS			A		A		A	
Approach: Delay (s/veh)			7.59		7.57		7.90	
LOS			A		A		A	
Intersection Delay (s/veh)	7.71							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	JL	Intersection	1
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	School PM Peak Hour		

Project ID *Future With Project Traffic Conditions*

East/West Street: *Howard St.*

North/South Street: *Marengo Ave.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	0	0	34	0	28
% Thrus Left Lane						

Approach	Northbound			Southbound		
	L	T	R	L	T	R
Movement						
Volume (veh/h)	0	80	36	21	106	0
% Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LTR		TR		LT	
PHF			1.00		1.00		1.00	
Flow Rate (veh/h)			62		116		127	
% Heavy Vehicles			0		0		0	
No. Lanes	0		1		1		1	
Geometry Group			1		1		1	
Duration, T	1.00							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			0.5		0.0		0.2	
Prop. Right-Turns			0.5		0.3		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
hLT-adj			0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj			1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed			-0.2		-0.2		0.0	

Departure Headway and Service Time

hd, initial value (s)			3.20		3.20		3.20	
x, initial			0.06		0.10		0.11	
hd, final value (s)			4.26		3.98		4.19	
x, final value			0.07		0.13		0.15	
Move-up time, m (s)			2.0		2.0		2.0	
Service Time, t _g (s)			2.3		2.0		2.2	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)			312		366		377	
Delay (s/veh)			7.59		7.57		7.91	
LOS			A		A		A	
Approach: Delay (s/veh)			7.59		7.57		7.91	
LOS			A		A		A	
Intersection Delay (s/veh)	7.72							
Intersection LOS	A							

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JL	Intersection	2
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2008
Analysis Time Period	AM Peak Hour		

Project Description <i>Existing Traffic Conditions</i>	
East/West Street: <i>Howard St.</i>	North/South Street: <i>Garfield Ave.</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>1.00</i>

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	22	11	53	52	21
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	5	22	11	53	52	21
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	<i>Undivided</i>					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LTR</i>			<i>LTR</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	11	15	33	6	33	8
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	11	15	33	6	33	8
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		<i>LTR</i>			<i>LTR</i>	

Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>	<i>LTR</i>		<i>LTR</i>			<i>LTR</i>	
v (veh/h)	5	53		59			47	
C (m) (veh/h)	1540	1592		839			706	
v/c	0.00	0.03		0.07			0.07	
95% queue length	0.01	0.10		0.23			0.21	
Control Delay (s/veh)	7.3	7.3		9.6			10.5	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--		9.6			10.5	
Approach LOS	--	--		A			B	

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information					
Analyst	JL		Intersection	2				
Agency/Co.	Crain & Associates		Jurisdiction	City of Pasadena				
Date Performed	1/31/2008		Analysis Year	2022				
Analysis Time Period	AM Peak Hour							
Project Description <i>Future Without Project Traffic Conditions</i>								
East/West Street: <i>Howard St.</i>			North/South Street: <i>Garfield Ave.</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>1.00</i>					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	6	27	14	65	64	26		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	6	27	14	65	64	26		
Percent Heavy Vehicles	0	--	--	0	--	--		
Median Type	<i>Undivided</i>							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	<i>LTR</i>			<i>LTR</i>				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	14	18	41	7	41	10		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	14	18	41	7	41	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		<i>N</i>			<i>N</i>			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		<i>LTR</i>			<i>LTR</i>			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>	<i>LTR</i>		<i>LTR</i>			<i>LTR</i>	
v (veh/h)	6	65		73			58	
C (m) (veh/h)	1518	1581		799			659	
v/c	0.00	0.04		0.09			0.09	
95% queue length	0.01	0.13		0.30			0.29	
Control Delay (s/veh)	7.4	7.4		10.0			11.0	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--		10.0			11.0	
Approach LOS	--	--		A			B	

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information					
Analyst	JL		Intersection	2				
Agency/Co.	Crain & Associates		Jurisdiction	City of Pasadena				
Date Performed	1/31/2008		Analysis Year	2022				
Analysis Time Period	AM Peak Hour							
Project Description <i>Future With Project Traffic Conditions</i>								
East/West Street: <i>Howard St.</i>			North/South Street: <i>Garfield Ave.</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>1.00</i>					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	6	27	16	77	65	27		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	6	27	16	77	65	27		
Percent Heavy Vehicles	0	--	--	0	--	--		
Median Type	<i>Undivided</i>							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	<i>LTR</i>			<i>LTR</i>				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	14	18	43	7	42	10		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	14	18	43	7	42	10		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		<i>N</i>			<i>N</i>			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		<i>LTR</i>			<i>LTR</i>			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>	<i>LTR</i>		<i>LTR</i>			<i>LTR</i>	
v (veh/h)	6	77		75			59	
C (m) (veh/h)	1515	1579		783			633	
v/c	0.00	0.05		0.10			0.09	
95% queue length	0.01	0.15		0.32			0.31	
Control Delay (s/veh)	7.4	7.4		10.1			11.3	
LOS	<i>A</i>	<i>A</i>		<i>B</i>			<i>B</i>	
Approach Delay (s/veh)	--	--		10.1			11.3	
Approach LOS	--	--		<i>B</i>			<i>B</i>	

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information					
Analyst	JL		Intersection	2				
Agency/Co.	Crain & Associates		Jurisdiction	City of Pasadena				
Date Performed	1/25/2008		Analysis Year	2008				
Analysis Time Period	School PM Peak Hour							
Project Description <i>Existing Traffic Conditions</i>								
East/West Street: <i>Howard St.</i>			North/South Street: <i>Garfield Ave.</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>1.00</i>					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	8	32	10	25	30	35		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	8	32	10	25	30	35		
Percent Heavy Vehicles	0	--	--	0	--	--		
Median Type	<i>Undivided</i>							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	<i>LTR</i>			<i>LTR</i>				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	3	20	27	14	25	8		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	3	20	27	14	25	8		
Percent Heavy Vehicles	0	0	0	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		<i>N</i>			<i>N</i>			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		<i>LTR</i>			<i>LTR</i>			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>	<i>LTR</i>		<i>LTR</i>			<i>LTR</i>	
v (veh/h)	8	25		50			47	
C (m) (veh/h)	1550	1580		863			768	
v/c	0.01	0.02		0.06			0.06	
95% queue length	0.02	0.05		0.18			0.20	
Control Delay (s/veh)	7.3	7.3		9.4			10.0	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--		9.4			10.0	
Approach LOS	--	--		A			A	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JL	Intersection	2
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	School PM Peak Hour		

Project Description <i>Future Without Project Traffic Conditions</i>	
East/West Street: <i>Howard St.</i>	North/South Street: <i>Garfield Ave.</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>1.00</i>

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	10	39	12	31	37	43
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	10	39	12	31	37	43
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	<i>Undivided</i>					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	25	33	17	31	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	4	25	33	17	31	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	10	31		62			58	
C (m) (veh/h)	1531	1568		829			729	
v/c	0.01	0.02		0.07			0.08	
95% queue length	0.02	0.06		0.24			0.26	
Control Delay (s/veh)	7.4	7.3		9.7			10.4	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--		9.7			10.4	
Approach LOS	--	--		A			B	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JL	Intersection	2
Agency/Co.	Crain & Associates	Jurisdiction	City of Pasadena
Date Performed	1/31/2008	Analysis Year	2022
Analysis Time Period	School PM Peak Hour		

Project Description <i>Future With Project Traffic Conditions</i>	
East/West Street: <i>Howard St.</i>	North/South Street: <i>Garfield Ave.</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>1.00</i>

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	10	39	13	40	38	44
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	10	39	13	40	38	44
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	<i>Undivided</i>					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LTR</i>			<i>LTR</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	25	35	17	32	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	4	25	35	17	32	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		<i>LTR</i>			<i>LTR</i>	

Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>	<i>LTR</i>		<i>LTR</i>			<i>LTR</i>	
v (veh/h)	10	40		64			59	
C (m) (veh/h)	1528	1567		818			705	
v/c	0.01	0.03		0.08			0.08	
95% queue length	0.02	0.08		0.25			0.27	
Control Delay (s/veh)	7.4	7.4		9.8			10.6	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--		9.8			10.6	
Approach LOS	--	--		A			B	

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: EXISTING (2008)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	0	0	0
EASTBOUND	13	0	154	0
NORTHBOUND	56	331	0	0
SOUTHBOUND	0	579	29	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	1	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	1700	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.098
NORTHBOUND	0.033	N/A	0.195	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	0.358	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.098
NORTH-SOUTH CRITICAL V/C RATIO 0.391
CLEARANCE INTERVAL 0.100

ICU VALUE 0.589

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: FUTURE (2022) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH	LEFT	THROUGH	RIGHT TURNS	
			MIN ON GREEN	MAX ON RED
WESTBOUND	0	0	0	0
EASTBOUND	16	0	190	0
NORTHBOUND	69	408	0	0
SOUTHBOUND	0	713	36	0

** NUMBER OF LANES **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R	
						SHARED	LANES
WESTBOUND	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	1	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R	
						SHARED	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	1700	N/A	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R	
						SHARED	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.121
NORTHBOUND	0.041	N/A	0.240	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	0.441	N/A	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.121
NORTH-SOUTH CRITICAL V/C RATIO 0.481
CLEARANCE INTERVAL 0.100

ICU VALUE 0.702

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: FUTURE (2022) WITH PROJECT

** INPUT VOLUMES **

APPROACH				** RIGHT TURNS **	
	LEFT	THROUGH		MIN ON GREEN	MAX ON RED
WESTBOUND	0	0		0	0
EASTBOUND	18	0		216	0
NORTHBOUND	74	408		0	0
SOUTHBOUND	0	713		39	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	1	1	1
NORTHBOUND	1	0	1	0	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	1700	N/A	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.138
NORTHBOUND	0.044	N/A	0.240	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	0.442	N/A	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.138
NORTH-SOUTH CRITICAL V/C RATIO 0.486
CLEARANCE INTERVAL 0.100

ICU VALUE 0.724

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: SCHOOL PM PEAK HOUR
CASE: EXISTING (2008)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	0	0	0
EASTBOUND	19	0	117	0
NORTHBOUND	56	437	0	0
SOUTHBOUND	0	371	15	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	1	1	1
NORTHBOUND	1	0	1	0	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	1700	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.080
NORTHBOUND	0.033	N/A	0.257	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	0.227	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.080
NORTH-SOUTH CRITICAL V/C RATIO 0.260
CLEARANCE INTERVAL 0.100

ICU VALUE 0.440

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
 DATE: 1/31/2008 INITIALS: CB PERIOD: SCHOOL PM PEAK HOUR
 CASE: FUTURE (2022) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	0	0	0
EASTBOUND	23	0	144	0
NORTHBOUND	69	540	0	0
SOUTHBOUND	0	460	18	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	0	1	1
NORTHBOUND	1	0	1	0	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	1700	N/A	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.098
NORTHBOUND	0.041	N/A	0.318	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	0.281	N/A	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.098
 NORTH-SOUTH CRITICAL V/C RATIO 0.322
 CLEARANCE INTERVAL 0.100

ICU VALUE 0.520

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Howard St. & Los Robles Ave.
 DATE: 1/31/2008 INITIALS: CB PERIOD: SCHOOL PM PEAK HOUR
 CASE: FUTURE (2022) WITH PROJECT

** INPUT VOLUMES **

APPROACH	LEFT	THROUGH	RIGHT TURNS	
			MIN ON GREEN	MAX ON RED
WESTBOUND	0	0	0	0
EASTBOUND	25	0	164	0
NORTHBOUND	72	540	0	0
SOUTHBOUND	0	460	20	0

** NUMBER OF LANES **

APPROACH	LEFT ONLY	LEFT		THROUGH		RIGHT		L/T/R SHARED	TOTAL LANES
		SHARED	ONLY	SHARED	ONLY	SHARED	ONLY		
WESTBOUND	0	0	0	0	0	0	0	0	0
EASTBOUND	0	0	0	0	0	0	1	1	1
NORTHBOUND	1	0	1	0	0	0	0	0	2
SOUTHBOUND	0	0	0	1	0	0	0	0	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT ONLY	LEFT		THROUGH		RIGHT		L/T/R SHARED
		SHARED	ONLY	SHARED	ONLY	SHARED	ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1700
NORTHBOUND	1700	N/A	1700	N/A	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	1700	N/A	N/A	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT ONLY	LEFT		THROUGH		RIGHT		L/T/R SHARED
		SHARED	ONLY	SHARED	ONLY	SHARED	ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.111
NORTHBOUND	0.042	N/A	0.318	N/A	N/A	N/A	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	0.282	N/A	N/A	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.111
 NORTH-SOUTH CRITICAL V/C RATIO 0.325
 CLEARANCE INTERVAL 0.100

ICU VALUE 0.536

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1700.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Washington Blvd. & Marengo Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: EXISTING (2008)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	991	33	0
EASTBOUND	21	613	0	0
NORTHBOUND	21	25	0	26
SOUTHBOUND	68	0	105	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	1	1	0	0	2	
EASTBOUND	1	0	2	0	0	0	3	
NORTHBOUND	1	0	1	0	1	0	3	
SOUTHBOUND	0	0	0	0	0	1	1	

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	1600	1600	N/A	N/A	N/A
EASTBOUND	1600	N/A	3200	N/A	N/A	N/A	N/A
NORTHBOUND	1600	N/A	1600	N/A	1600	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1600

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	0.320	0.320	N/A	N/A	N/A
EASTBOUND	0.013	N/A	0.191	N/A	N/A	N/A	N/A
NORTHBOUND	0.013	N/A	0.016	N/A	0.000	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.108

EAST-WEST CRITICAL V/C RATIO 0.333
NORTH-SOUTH CRITICAL V/C RATIO 0.124
CLEARANCE INTERVAL 0.100

ICU VALUE 0.557

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

Northbound and Southbound approaches have opposed signal phases.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Washington Blvd. & Marengo Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: FUTURE (2022) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH	**			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	1225	41	0
EASTBOUND	26	757	0	0
NORTHBOUND	26	31	0	32
SOUTHBOUND	84	0	129	0

** NUMBER OF LANES **

APPROACH	**					L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	0	0	1	1	0	0	2
EASTBOUND	1	0	2	0	0	0	3
NORTHBOUND	1	0	1	0	1	0	3
SOUTHBOUND	0	0	0	0	0	1	1

** ASSIGNED CAPACITIES **

APPROACH	**					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	N/A	N/A	1600	1600	N/A	N/A
EASTBOUND	1600	N/A	3200	N/A	N/A	N/A
NORTHBOUND	1600	N/A	1600	N/A	1600	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	1600

** ASSIGNED V/C RATIOS **

APPROACH	**					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	N/A	N/A	0.396	0.396	N/A	N/A
EASTBOUND	0.016	N/A	0.236	N/A	N/A	N/A
NORTHBOUND	0.016	N/A	0.019	N/A	0.000	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	0.133

EAST-WEST CRITICAL V/C RATIO 0.412
NORTH-SOUTH CRITICAL V/C RATIO 0.153
CLEARANCE INTERVAL 0.100

ICU VALUE 0.664

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

Northbound and Southbound approaches have opposed signal phases.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Washington Blvd. & Marengo Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: AM PEAK HOUR
CASE: FUTURE (2022) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	1235	41	0
EASTBOUND	26	765	0	0
NORTHBOUND	26	31	0	36
SOUTHBOUND	84	0	129	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	1	1	0	0	0	2
EASTBOUND	1	0	2	0	0	0	0	3
NORTHBOUND	1	0	1	0	1	0	0	3
SOUTHBOUND	0	0	0	0	0	1	1	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	1600	1600	N/A	N/A	N/A
EASTBOUND	1600	N/A	3200	N/A	N/A	N/A	N/A
NORTHBOUND	1600	N/A	1600	N/A	1600	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1600

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	0.399	0.399	N/A	N/A	N/A
EASTBOUND	0.016	N/A	0.239	N/A	N/A	N/A	N/A
NORTHBOUND	0.016	N/A	0.019	N/A	0.000	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.133

EAST-WEST CRITICAL V/C RATIO 0.415
NORTH-SOUTH CRITICAL V/C RATIO 0.153
CLEARANCE INTERVAL 0.100

ICU VALUE 0.668

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

Northbound and Southbound approaches have opposed signal phases.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Washington Blvd. & Marengo Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: SCHOOL PM PEAK HOUR
CASE: EXISTING (2008)

** INPUT VOLUMES **

APPROACH	LEFT	THROUGH	RIGHT TURNS	
			MIN ON GREEN	MAX ON RED
WESTBOUND	0	649	50	0
EASTBOUND	43	683	0	0
NORTHBOUND	30	25	4	25
SOUTHBOUND	65	0	74	0

** NUMBER OF LANES **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R	
						SHARED	LANES
WESTBOUND	0	0	1	1	0	0	2
EASTBOUND	1	0	2	0	0	0	3
NORTHBOUND	1	0	1	0	1	0	3
SOUTHBOUND	0	0	0	0	0	1	1

** ASSIGNED CAPACITIES **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R
						SHARED
WESTBOUND	N/A	N/A	1600	1600	N/A	N/A
EASTBOUND	1600	N/A	3200	N/A	N/A	N/A
NORTHBOUND	1600	N/A	1600	N/A	1600	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	1600

** ASSIGNED V/C RATIOS **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R
						SHARED
WESTBOUND	N/A	N/A	0.219	0.219	N/A	N/A
EASTBOUND	0.027	N/A	0.214	N/A	N/A	N/A
NORTHBOUND	0.019	N/A	0.016	N/A	0.002	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	0.087

EAST-WEST CRITICAL V/C RATIO 0.246
NORTH-SOUTH CRITICAL V/C RATIO 0.106
CLEARANCE INTERVAL 0.100

ICU VALUE 0.451

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

Northbound and Southbound approaches have opposed signal phases.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Washington Blvd. & Marengo Ave.
DATE: 1/31/2008 INITIALS: CB PERIOD: SCHOOL PM PEAK HOUR
CASE: FUTURE (2022) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	0	815	62	0
EASTBOUND	53	862	0	0
NORTHBOUND	37	31	6	30
SOUTHBOUND	80	0	91	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	1	1	0	0	2	
EASTBOUND	1	0	2	0	0	0	3	
NORTHBOUND	1	0	1	0	1	0	3	
SOUTHBOUND	0	0	0	0	0	1	1	

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	1600	1600	N/A	N/A	N/A
EASTBOUND	1600	N/A	3200	N/A	N/A	N/A	N/A
NORTHBOUND	1600	N/A	1600	N/A	1600	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1600

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	0.274	0.274	N/A	N/A	N/A
EASTBOUND	0.033	N/A	0.269	N/A	N/A	N/A	N/A
NORTHBOUND	0.023	N/A	0.019	N/A	0.004	N/A	N/A
SOUTHBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.107

EAST-WEST CRITICAL V/C RATIO 0.307
NORTH-SOUTH CRITICAL V/C RATIO 0.130
CLEARANCE INTERVAL 0.100

ICU VALUE 0.537

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

Northbound and Southbound approaches have opposed signal phases.