



Technical Memorandum

Date: 07/01/2015

To: Andrew Thomas,
City Planner,
(510)-774-5361

Project No.: 012-036

From: Chris Kinzel,
Vice-President,
TJKM Transportation Consultants

Jurisdiction: Alameda

Subject: Technical Memorandum to the Proposed Hagstrom Residential Development TIS.

The purpose of this technical memorandum is to present the results of Cumulative 2035 Level of Service Analysis for all the study intersections, sight distance evaluations at the project driveways and the impacts on travel speeds on Buena Vista Avenue and Clement Avenue to determine if there would be an impact on future transit on the two corridors.

Introduction:

The proposed Hagstrom Residential Project in the city of Alameda is located east of the intersection of Willow Street and Clement Avenue. The project originally proposed to build 58 residential units, whereas the new site plan proposes 52 residential units. In an effort to analyze the worst case scenario, the evaluations in this technical memorandum are performed based on the original site plan (58 residential units). Figure 1 shows the new site plan with 52 residential units.

Cumulative (2035) Conditions:

Based on the City's request, TJKM analyzed all the study intersections for the Cumulative (2035) conditions. Cumulative 2035 plus Project conditions are based on forecasts of 2035 conditions, and the proposed project's contribution to those forecasted conditions. Forecasted traffic volumes for the intersections #7, 8, 9 and 10 were obtained from the Alameda Point Project DEIR (September 2013). For the study intersections from one thru six, the existing traffic volumes were projected to be grown by a 1.5 percent annual growth rate to obtain the 2035 forecasted traffic volumes. The annual growth rate of 1.5 percent was determined based on the average growth per year between the existing traffic volumes and 2035 forecasted traffic volumes for the intersections seven thru ten. Table 1 shows the comparison of the traffic volumes at all the study intersections under Cumulative (2035) conditions and Cumulative (2035) plus Project Conditions.

Exhibit 4
Item 7-A, 7-13-15
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Table 1: Traffic Volume Comparison – Cumulative (2035) Conditions and Cumulative (2035) plus Project Conditions

ID	Intersection	2035 Conditions Volumes		Cumulative plus Project (2035) Volumes		Change in Volumes (Percent)	
		A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour
1	Willow Street / Clement Avenue	875	1,057	882	1,065	0.80%	0.73%
2	Willow Street / Eagle Avenue	139	139	148	150	6.49%	8.13%
3	Willow Street / Buena Vista Avenue	1,048	1,014	1,055	1,023	0.67%	0.87%
4	Buena Vista Ave / Mulberry Street	902	897	913	912	1.22%	1.67%
5	Oak Street / Clement Ave	1,452	1,531	1,461	1,542	0.62%	0.71%
6	Oak Street / Buena Vista Ave	1,349	1,498	1,360	1,513	0.82%	0.98%
7	Park Street / Blanding Avenue ¹	4,781	5,211	4,798	5,233	0.36%	0.42%
8	Park Street / Clement Avenue ¹	3,860	3,929	3,869	3,940	0.23%	0.28%
9	Blanding Avenue / Tilden Way ¹	3,905	4,179	3,908	4,183	0.08%	0.10%
10	Constitution Way / Atlantic Avenue ¹	2,127	2,801	2,130	2,805	0.14%	0.14%

¹2035 Conditions Traffic Volumes Source: Alameda Point Project DEIR (September 2013)

The proposed project is expected to generate less than a three-percent increase in peak hour volumes with the exception of the intersection of Willow Street and Eagle Avenue. A Level of Service (LOS) analysis was performed at the intersection of Willow Street and Eagle Avenue for Cumulative plus Project Conditions to determine whether the intersection operates at City's acceptable LOS standards with the addition of the trips expected to be generated by the proposed development. Table 2 summarizes the LOS and delay results for the intersection of Willow Street and Eagle Avenue under Cumulative (2035) Conditions and Cumulative plus Project Conditions.

Table 2: Intersection Level of Service – Cumulative Conditions and Cumulative plus Project Conditions

ID	Intersection	Control	Cumulative (2035) Conditions				Cumulative plus Project Conditions			
			A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Willow Street / Eagle Avenue	Two-way Stop	9.7	A	9.4	A	9.8	A	9.5	A

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle.

2) Unsignalized one- and two-way stop controlled intersections – Delay / LOS is for critical minor stop-controlled approach.

The results indicate that the subject intersection operates at LOS A during both the peak hour hours under Cumulative plus Project Conditions. Therefore, though the project is expected to generate more than a three-percent increase in peak hour volumes, the intersection is expected to operate within the City of Alameda's acceptable LOS standards. Hence, the additional trips generated by the project at this location is expected to create a less-than significant impact. Analysis sheets are included in Appendix A.

Sight Distance Evaluation:

The proposed project would be accessed via two driveways: Driveway 1 is proposed to be built on Clement Avenue and driveway 2 is proposed to be built on Eagle Avenue. Figures 1 illustrates the proposed location of the driveways. Sight distance for vehicles that would turn left or right from the project onto Clement Avenue and Eagle Avenue may be limited. Therefore, the following recommendations are proposed at the project driveways.

Driveway 1

The intersection of Clement Avenue and Willow Street is approximately 90 feet west of the driveway 1. In order to improve visibility for motorists exiting the project site, TJKM recommends providing painted red curb to the west of the driveway and at least 50 feet of painted red curb to the east of the driveway.

Driveway 2

This driveway is proposed to be located at the intersection of Mulberry Street and Eagle Avenue. To improve the visibility for motorists exiting the project site, TJKM recommends providing painted red curb for at least 50 feet to the west of the driveway.

Transit LOS:

The proposed project is expected to add traffic on Buena Vista Avenue and Clement Avenue, which might serve as future transit corridors. The transit route arterial speed data for this street segment is obtained from the arterial LOS report generated by the peak hour Synchro model, using the HCM 2000 methodology for Urban Street (arterial) LOS. The arterial speed is calculated using the distances between the intersections and the travel time along the roadway segments. With the addition of project trips to Buena Vista Avenue and Clement Avenue, the speeds along the study segment are expected to decrease by less than 10 percent. Therefore, the project trips are expected to result in less-than-significant impacts on transit route arterial speed along the study segments. Table 3 summarizes the arterial speed data for the Baseline Conditions and Baseline plus Project Conditions. Analysis sheets are included in Appendix B.

Table 3: Future Transit Route Arterial Speeds - Baseline Conditions and Baseline plus Project Conditions

ID	Corridor	Direction	Baseline Conditions Speed (mph)				Baseline plus Project Conditions Speed (mph)				Change in Arterial Speed	
			A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour		P.M. Peak Hour		A.M. Peak Hour	P.M. Peak Hour
			LOS	Arterial Speed	LOS	Arterial Speed	LOS	Arterial Speed	LOS	Arterial Speed		
1	Buena Vista Avenue	EB	B	21.6	B	20.3	B	21.6	B	20.3	No Change	No Change
		WB	D	12.5	D	10.2	D	12.5	D	10.1	No Change	1.0%
2	Buena Vista Avenue	EB	F	1.3	F	4.9	F	1.2	F	4.7	8.3%	4.3%
		WB	D	10.5	D	11.3	D	10.5	D	11.3	No Change	No Change

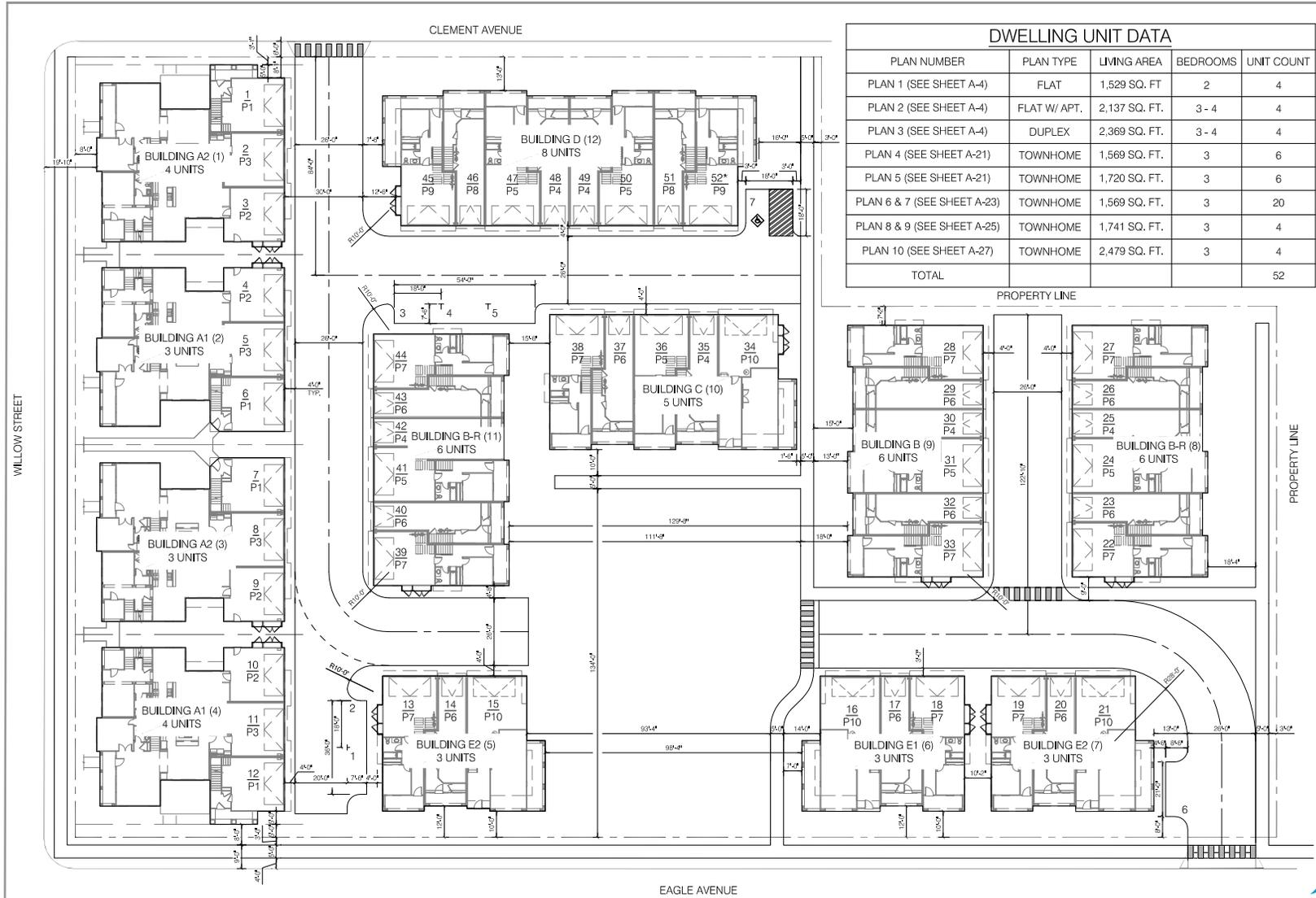
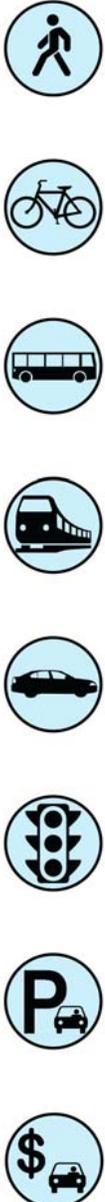
Notes: **Bold** indicates decrease in speed

Conclusions:

Based on the above evaluations, the following conclusions and recommendations are derived:

1. Project traffic is not expected to create any significant impacts at the study intersections under the 2035 Cumulative plus Project Conditions.
2. In order to improve the visibility for the motorists exiting the project site, TJKM recommends the following:
 - a. Driveway 1 – Painted red curb to the west of the driveway and painted red curb for at least 50 feet to the east of the driveway.
 - b. Driveway 2 – Painted red curb for at least 50 feet to the east of the driveway.
3. Project traffic is not expected to create any significant impacts on travel speeds on the following future transit corridors: Buena Vista Avenue and Clement Avenue.

Site Plan



DWELLING UNIT DATA				
PLAN NUMBER	PLAN TYPE	LIVING AREA	BEDROOMS	UNIT COUNT
PLAN 1 (SEE SHEET A-4)	FLAT	1,529 SQ. FT.	2	4
PLAN 2 (SEE SHEET A-4)	FLAT W/ APT.	2,137 SQ. FT.	3 - 4	4
PLAN 3 (SEE SHEET A-4)	DUPLEX	2,369 SQ. FT.	3 - 4	4
PLAN 4 (SEE SHEET A-21)	TOWNHOME	1,569 SQ. FT.	3	6
PLAN 5 (SEE SHEET A-21)	TOWNHOME	1,720 SQ. FT.	3	6
PLAN 6 & 7 (SEE SHEET A-23)	TOWNHOME	1,569 SQ. FT.	3	20
PLAN 8 & 9 (SEE SHEET A-25)	TOWNHOME	1,741 SQ. FT.	3	4
PLAN 10 (SEE SHEET A-27)	TOWNHOME	2,479 SQ. FT.	3	4
TOTAL				52

Source: Hunt, Hale, Jones



Figure 1



APPENDIX A

HCM Unsignalized Intersection Capacity Analysis

2: Willow St & Eagle Ave/Eagle Avenue

Cumulative Conditions
Timing Plan: AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	11	4	4	3	4	4	1	77	7	3	19	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.39	0.39	0.39	0.50	0.50	0.50	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	28	10	10	6	8	8	1	103	9	4	25	4
Pedestrians		1						1			4	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	162	151	29	162	148	111	30			112		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162	151	29	162	148	111	30			112		
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 %	96	99	99	99	99	99	100			100		
cM capacity (veh/h)	783	737	1044	784	740	939	1581			1478		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	49	22	113	33
Volume Left	28	6	1	4
Volume Right	10	8	9	4
cSH	816	815	1581	1478
Volume to Capacity	0.06	0.03	0.00	0.00
Queue Length 95th (ft)	5	2	0	0
Control Delay (s)	9.7	9.5	0.1	0.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.7	9.5	0.1	0.9
Approach LOS	A	A		

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization	15.9%		ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

2: Willow St & Eagle Ave

Cumulative Conditions
Timing Plan: PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	1	3	4	0	3	7	42	4	5	53	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.56	0.56	0.56	0.63	0.63	0.63	0.89	0.89	0.89	0.83	0.83	0.83
Hourly flow rate (vph)	14	2	5	6	0	5	8	47	4	6	64	11
Pedestrians					2							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	151	151	69	155	154	51	75			54		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	151	151	69	155	154	51	75			54		
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 %	98	100	99	99	100	100	99			100		
cM capacity (veh/h)	806	733	994	798	730	1015	1525			1549		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	11	60	81								
Volume Left	14	6	8	6								
Volume Right	5	5	4	11								
cSH	838	879	1525	1549								
Volume to Capacity	0.03	0.01	0.01	0.00								
Queue Length 95th (ft)	2	1	0	0								
Control Delay (s)	9.4	9.2	1.0	0.6								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.4	9.2	1.0	0.6								
Approach LOS	A	A										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			15.1%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
2: Willow St & Eagle Ave/Eagle Avenue

Cumulative plus Project Conditions
Timing Plan: AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	11	4	4	6	4	6	1	77	8	3	22	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.39	0.39	0.39	0.50	0.50	0.50	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	28	10	10	12	8	12	1	103	11	4	29	4
Pedestrians		1						1			4	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	171	156	33	166	153	112	34			113		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	171	156	33	166	153	112	34			113		
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 %	96	99	99	98	99	99	100			100		
cM capacity (veh/h)	770	732	1038	778	736	938	1576			1476		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	49	32	115	37
Volume Left	28	12	1	4
Volume Right	10	12	11	4
cSH	805	819	1576	1476
Volume to Capacity	0.06	0.04	0.00	0.00
Queue Length 95th (ft)	5	3	0	0
Control Delay (s)	9.8	9.6	0.1	0.8
Lane LOS	A	A	A	A
Approach Delay (s)	9.8	9.6	0.1	0.8
Approach LOS	A	A		

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization	16.0%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
2: Willow St & Eagle Ave

Cumulative plus Project Conditions
Timing Plan: PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	1	3	6	0	3	7	44	8	7	54	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.56	0.56	0.56	0.63	0.63	0.63	0.89	0.89	0.89	0.83	0.83	0.83
Hourly flow rate (vph)	14	2	5	10	0	5	8	49	9	8	65	11
Pedestrians					2							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	162	164	70	165	164	56	76			60		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162	164	70	165	164	56	76			60		
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 %	98	100	99	99	100	100	99			99		
cM capacity (veh/h)	792	720	992	785	719	1009	1523			1540		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	14	66	84								
Volume Left	14	10	8	8								
Volume Right	5	5	9	11								
cSH	827	847	1523	1540								
Volume to Capacity	0.03	0.02	0.01	0.01								
Queue Length 95th (ft)	2	1	0	0								
Control Delay (s)	9.5	9.3	0.9	0.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.5	9.3	0.9	0.8								
Approach LOS	A	A										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			15.0%		ICU Level of Service					A		
Analysis Period (min)			15									



APPENDIX B

Arterial Level of Service: EB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	71.1	6.4	77.5	0.46	21.6	B
Total	IV		71.1	6.4	77.5	0.46	21.6	B

Arterial Level of Service: WB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	19.5	6.1	25.6	0.09	12.5	D
Total	IV		19.5	6.1	25.6	0.09	12.5	D

Arterial Level of Service: EB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	26.8	306.7	333.5	0.12	1.3	F
Total	IV		26.8	306.7	333.5	0.12	1.3	F

Arterial Level of Service: WB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	24.7	13.9	38.6	0.11	10.5	D
Total	IV		24.7	13.9	38.6	0.11	10.5	D

Arterial Level of Service: EB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	69.6	11.1	80.7	0.46	20.3	B
Total	IV		69.6	11.1	80.7	0.46	20.3	B

Arterial Level of Service: WB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	16.5	10.0	26.5	0.08	10.2	D
Total	IV		16.5	10.0	26.5	0.08	10.2	D

Arterial Level of Service: EB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	26.8	62.6	89.4	0.12	4.9	F
Total	IV		26.8	62.6	89.4	0.12	4.9	F

Arterial Level of Service: WB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	24.7	11.1	35.8	0.11	11.3	D
Total	IV		24.7	11.1	35.8	0.11	11.3	D

Arterial Level of Service: EB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	71.1	6.5	77.6	0.46	21.6	B
Total	IV		71.1	6.5	77.6	0.46	21.6	B

Arterial Level of Service: WB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	19.5	6.1	25.6	0.09	12.5	D
Total	IV		19.5	6.1	25.6	0.09	12.5	D

Arterial Level of Service: EB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	26.8	326.2	353.0	0.12	1.2	F
Total	IV		26.8	326.2	353.0	0.12	1.2	F

Arterial Level of Service: WB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	24.7	13.9	38.6	0.11	10.5	D
Total	IV		24.7	13.9	38.6	0.11	10.5	D

Arterial Level of Service: EB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	69.6	11.2	80.8	0.46	20.3	B
Total	IV		69.6	11.2	80.8	0.46	20.3	B

Arterial Level of Service: WB Buena Vista Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Oak St	IV	25	16.5	10.2	26.7	0.08	10.1	D
Total	IV		16.5	10.2	26.7	0.08	10.1	D

Arterial Level of Service: EB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	26.8	66.1	92.9	0.12	4.7	F
Total	IV		26.8	66.1	92.9	0.12	4.7	F

Arterial Level of Service: WB Clement Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Park St	IV	25	24.7	11.1	35.8	0.11	11.3	D
Total	IV		24.7	11.1	35.8	0.11	11.3	D