



**APPENDIX F**  
**QUEUEING WORKSHEETS**

**Intersection Level Of Service Report**  
**Intersection 5: Cabrillo Park Drive at Xerox Centre**

Control Type:	Signalized	Delay (sec / veh):	8.4
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.417

**Intersection Setup**

Name	Cabrillo Park Drive		Cabrillo Park Drive		Xerox Centre	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

**Volumes**

Name	Cabrillo Park Drive		Cabrillo Park Drive		Xerox Centre	
Base Volume Input [veh/h]	96	796	740	192	69	53
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	96	796	740	192	69	53
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	199	185	48	17	13
Total Analysis Volume [veh/h]	96	796	740	192	69	53
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

**Intersection Settings**

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

**Phasing & Timing**

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	6	6	6	0	6	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	55	80	25	0	10	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0
Pedestrian Clearance [s]	0	0	14	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

**Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

**Lane Group Calculations**

Lane Group	L	C	C	C	L	R
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	6	76	66	66	6	6
g / C, Green / Cycle	0.07	0.85	0.73	0.73	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.05	0.22	0.25	0.27	0.04	0.03
s, saturation flow rate [veh/h]	1774	3547	1863	1736	1774	1583
c, Capacity [veh/h]	127	3003	1361	1269	115	102
d1, Uniform Delay [s]	41.04	1.37	4.36	4.46	40.99	40.76
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.83	0.22	0.69	0.82	5.00	4.02
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

**Lane Group Results**

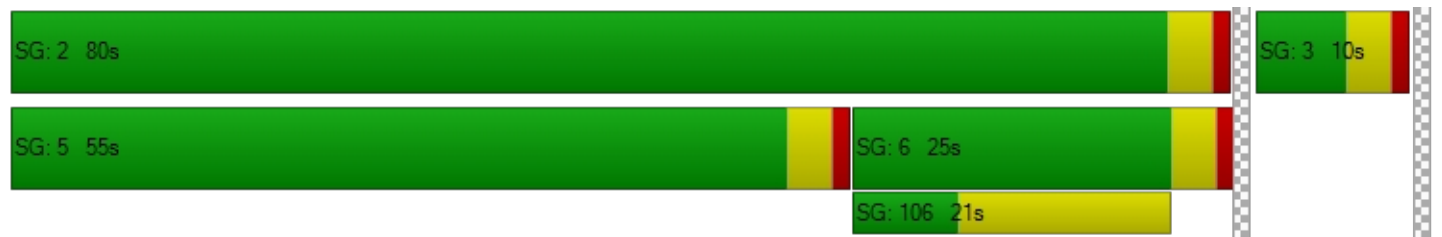
X, volume / capacity	0.76	0.27	0.34	0.37	0.60	0.52
d, Delay for Lane Group [s/veh]	49.86	1.58	5.04	5.29	46.00	44.78
Lane Group LOS	D	A	A	A	D	D
Critical Lane Group	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh]	2.38	0.57	2.64	2.73	1.63	1.24
50th-Percentile Queue Length [ft]	59.40	14.31	65.97	68.19	40.81	30.99
95th-Percentile Queue Length [veh]	4.28	1.03	4.75	4.91	2.94	2.23
95th-Percentile Queue Length [ft]	106.91	25.75	118.74	122.74	73.46	55.78

**Movement, Approach, & Intersection Results**

d_M, Delay for Movement [s/veh]	49.86	1.58	5.13	5.29	46.00	44.78
Movement LOS	D	A	A	A	D	D
d_A, Approach Delay [s/veh]	6.78		5.16		45.47	
Approach LOS	A		A		D	
d_I, Intersection Delay [s/veh]	8.43					
Intersection LOS	A					
Intersection V/C	0.417					

**Sequence**

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report**  
**Intersection 5: Cabrillo Park Drive at Xerox Centre**

Control Type:	Signalized	Delay (sec / veh):	9.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.556

**Intersection Setup**

Name	Cabrillo Park Drive		Cabrillo Park Drive		Xerox Centre	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	⇐		⇐		⇐⇐	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

**Volumes**

Name	Cabrillo Park Drive		Cabrillo Park Drive		Xerox Centre	
Base Volume Input [veh/h]	42	1256	712	104	186	169
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	1256	712	104	186	169
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	314	178	26	47	42
Total Analysis Volume [veh/h]	42	1256	712	104	186	169
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

**Intersection Settings**

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

**Phasing & Timing**

Control Type	Protected	Permissive	Permissive	Permissive	Split	Split
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	6	6	6	0	6	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	10	35	25	0	35	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0
Pedestrian Clearance [s]	0	0	14	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

**Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

**Lane Group Calculations**

Lane Group	L	C	C	C	L	R
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	52	45	45	10	10
g / C, Green / Cycle	0.05	0.74	0.64	0.64	0.14	0.14
(v / s)_i Volume / Saturation Flow Rate	0.02	0.35	0.22	0.23	0.10	0.11
s, saturation flow rate [veh/h]	1774	3547	1863	1783	1774	1583
c, Capacity [veh/h]	88	2631	1183	1132	256	228
d1, Uniform Delay [s]	32.44	3.62	5.98	6.06	28.69	28.75
k, delay calibration	0.11	0.50	0.50	0.50	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	3.97	0.62	0.80	0.89	3.92	4.67
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

**Lane Group Results**

X, volume / capacity	0.48	0.48	0.34	0.36	0.73	0.74
d, Delay for Lane Group [s/veh]	36.40	4.25	6.78	6.95	32.61	33.41
Lane Group LOS	D	A	A	A	C	C
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.77	2.30	2.45	2.50	3.14	2.90
50th-Percentile Queue Length [ft]	19.23	57.55	61.33	62.49	78.57	72.59
95th-Percentile Queue Length [veh]	1.38	4.14	4.42	4.50	5.66	5.23
95th-Percentile Queue Length [ft]	34.62	103.59	110.39	112.48	141.42	130.66



**Movement, Approach, & Intersection Results**

d_M, Delay for Movement [s/veh]	36.40	4.25	6.85	6.95	32.61	33.41
Movement LOS	D	A	A	A	C	C
d_A, Approach Delay [s/veh]	5.29		6.86		32.99	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	9.79					
Intersection LOS	A					
Intersection V/C	0.556					

**Sequence**

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

