



MEMORANDUM

Date: January 21, 2019
To: Ben Ortega, Hercules Development Partners
From: Rob Rees, P.E., Fehr & Peers
Subject: **Traffic Analysis for Hercules Bayfront Project Block M/P and O**

OK16-0149.03

Fehr & Peers completed a traffic analysis for the M/P and O development sites within the Hercules Bayfront Project. The analysis addressed traffic operations on John Muir Parkway through the project's site as well as the driveway operations to the individual development parcels. The following intersections were studied:

1. Loop Road at John Muir Parkway
2. Loop Road at Block Q/R Driveway
3. Loop Road at Block Q/R and M/P Driveways (shared street)
4. Loop Road at Block M/P Driveway
5. Loop Road at Block O Driveways
6. Block N Driveway at John Muir Parkway
7. BayFront Boulevard John Muir Parkway
8. Block K and L Driveways at John Muir Parkway

TRAFFIC OPERATIONS

Loop Road is a two-lane street with 13-foot travel lanes next to 8-foot parking lanes and begins at John Muir Parkway. John Muir Parkway is a single lane in each direction with bike lanes and on-street parking. The street layout and the relationship of the parcels (N, Q/R, M/P, O, K, and L) and driveways within the Village is shown on **Attachment A**.

The analysis included the AM and PM peak hours with anticipated cumulative development from the mixed-use project evaluated in the Hercules Bayfront Project Draft EIR as well as existing traffic using the John Muir Parkway-Bayfront Boulevard corridor today. **Attachment B** shows the cumulative vehicle trip assignment. The analysis used SimTraffic software, a micro-simulation program that simulates individual vehicle movements. Measures of Effectiveness considered how the vehicles interact and includes intersection levels of service and vehicle queues.



Table 1 presents the intersection analysis results at each intersection and driveway. The study intersections operate at Level of Service A for side street stop control during the peak hours of operation. The study intersections operate at acceptable levels no intersection recommendations required.

Table 2 presents the vehicle queue characteristics. On average over the AM and PM peak hours vehicle queues at each stop sign controlled approach would on average have no more than two cars. The intersections on John Muir Parkway are summarized below:

- *The left turn from John Muir Parkway to the Loop Road on average over the peak hours will have less than one car waiting to make the left turn.*
- *The left turn from John Muir Parkway to N Driveway on average over the peak hours will have up to one car waiting to make the left turn.*

TABLE 1
BAYFRONT BUILDOUT INTERSECTION LEVEL OF SERVICE

Intersection	Control ¹	AM Peak Hour		PM Peak Hour	
		Delay (Seconds) ²	LOS ³	Delay (Seconds) ²	LOS ³
1. Loop Road / John Muir Parkway	SSSC	3.1 (7.8)	A (A)	2.5 (10.4)	A (A)
2. Loop Road / Block Q/R Driveway	SSSC	2.5 (6.3)	A (A)	1.0 (5.7)	A (A)
3. Loop Road / Block Q/R and Block M/P Driveways (shared street)	SSSC	1.3 (4.5)	A (A)	0.8 (4.2)	A (A)
4. Loop Road / Block M/P Driveway	SSSC	3.2 (3.9)	A (A)	1.5 (3.8)	A (A)
5. Loop Road / O Driveways	SSSC	2.2 (3.1)	A (A)	1.3 (3.2)	A (A)
6. Block N Driveway / John Muir Parkway	SSSC	1.7 (3.4)	A (A)	2.1 (4.1)	A (A)
7. Bayfront Boulevard / John Muir Parkway	AWSC	4.4	A	4.4 (5.2)	A
8. Block K and L Driveways / John Muir Parkway	SSSC	3.1 (3.9)	A (A)	2.0 (4.0)	A (A)

1. SSSC = Side-Street Stop Controlled

2. Average intersection delay and LOS based on the 2010 HCM method. Average and worst-approach delays, respectively, are reported for side-street stop controlled intersections.

3. Estimated based on 2010 HCM delay thresholds.

Source: Fehr & Peers, 2019.



TABLE 2
BAYFRONT BUILDOUT INTERSECTION QUEUES

Intersection	Average Queue (feet)		Maximum Queue (feet)	
	AM Peak	PM Peak	AM Peak	PM Peak
1. Loop Road / John Muir Parkway				
Left-Turn from Loop Road	55	45	80	80
Left-Turn from John Muir Parkway	<25	<25	<25	60
2. Loop Road / Block Q/R Driveway				
Left-Turn from Loop Road	<25	<25	50	<25
3. Loop Road / Block Q/R and M/P Driveways (shared street)				
Left-Turn from Loop Road	<25	<25	<25	<25
4. Loop Road / Block M/P Driveway				
Left-Turn from Loop Road	<25	<25	<25	<25
5. Loop Road / O Driveways				
Left-Turn from Loop Road	<25	<25	<25	<25
6. Block N Driveway / John Muir Parkway				
Left-Turn from John Muir Parkway	30	<25	65	70
7. Bayfront Boulevard / John Muir Parkway				
Loop Road Approach	30	<25	50	40
Bayfront Blvd Approach	35	60	65	100
John Muir Parkway Approach	45	45	80	75
John Muir Parkway Approach	35	30	55	50
8. Block K and L Driveways / John Muir Parkway				
Left-Turn from John Muir Parkway	<25	<25	<25	<25
Source: Fehr & Peers, 2019.				



- *The John Muir Parkway approach* at the Bayfront Boulevard intersection on average over the peak hours would have one to two cars waiting at the all-way stop controlled intersection. While the *Bayfront Boulevard approach* on average would have two to three cars waiting at the all-way stop controlled intersection.

The micro-simulation analysis output also provides the maximum vehicle queues. The maximum queue is measured as the single event during each peak hour when the queue length is greatest and based on an observational review of the simulation these conditions would occur during a single 10 to 20 second interval during each peak hour.

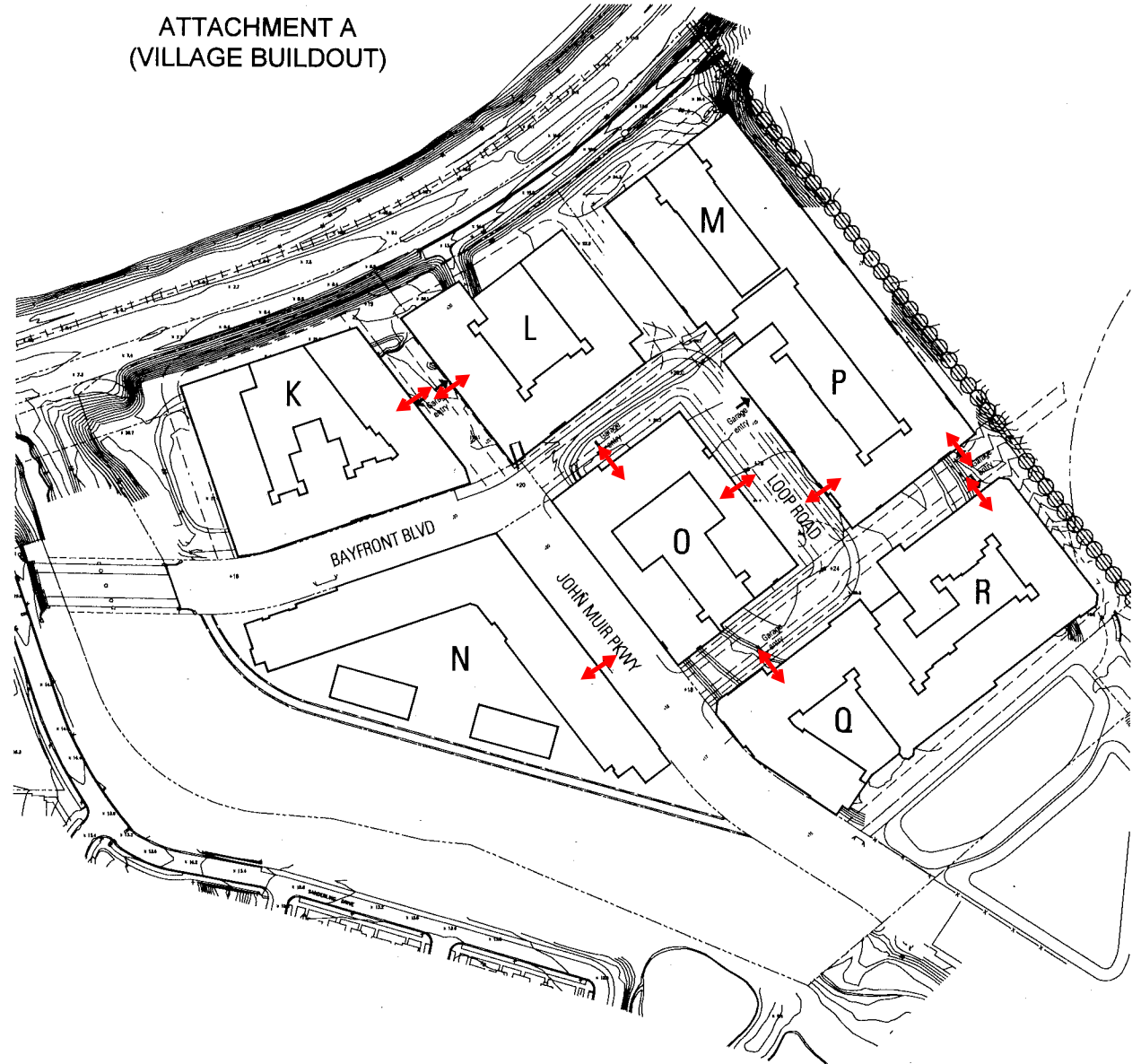
PARKING GARAGE ACCESS

There are two driveways serving Block M/P and two driveways serving Block O. All driveways will operate at Level of Service A and there would be no more than one car queued at each driveway waiting to enter or exit the garage.

Attachment A – Village Site Plan

Attachment B – Trip Generation Assignments

ATTACHMENT A (VILLAGE BUILDOUT)



↔ Approximate driveway locations

HERCULES PARCELS

HERCULES, CA

MASTERPLAN

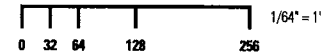
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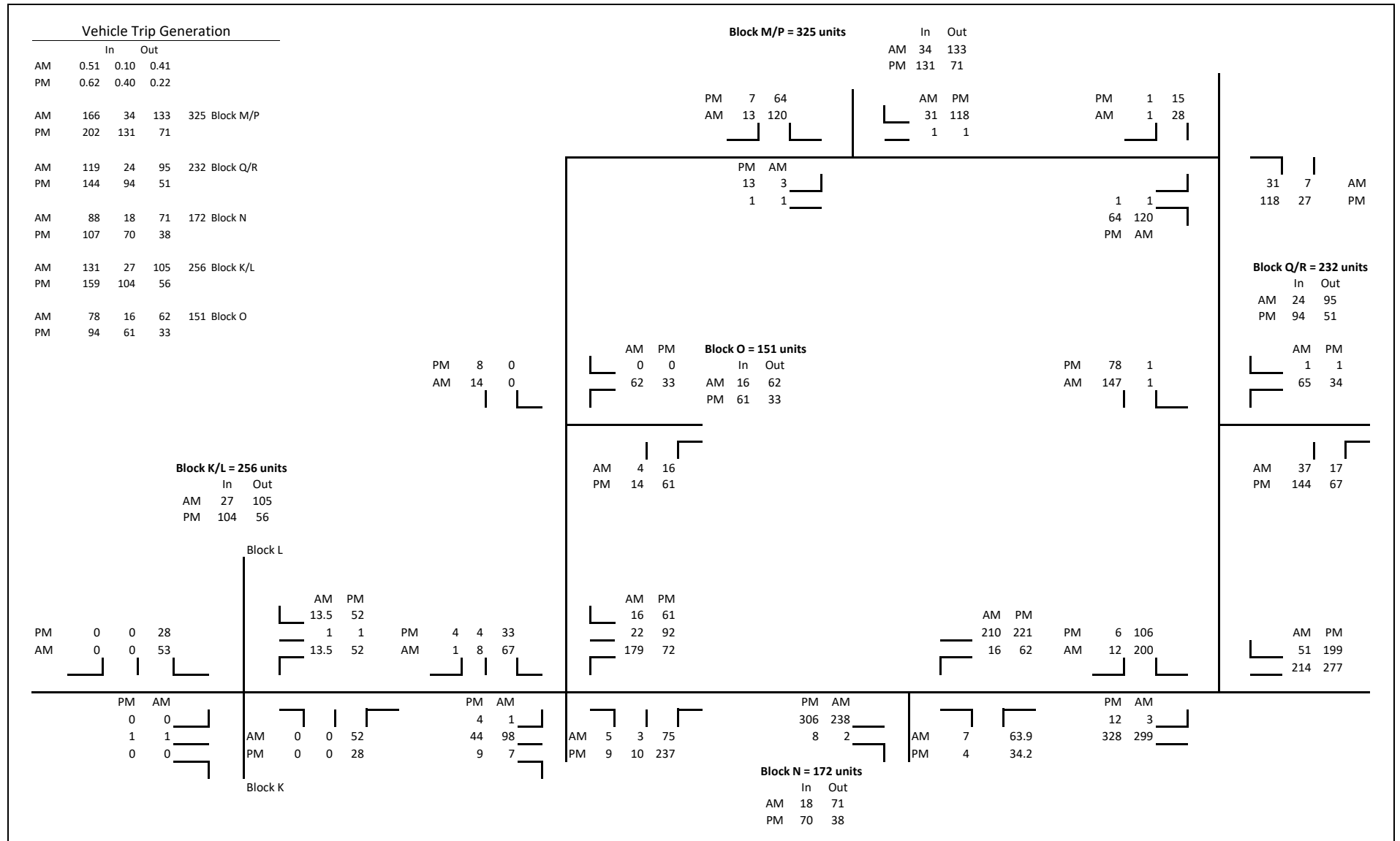
17034

09.17.18



1/64" = 1'

Attachment B (Village Buildout Vehicle Trip Assignment)





MEMORANDUM

Date: February 1, 2019

To: Ben Ortega, Hercules Development Partners

From: Rob Rees, P.E., Fehr & Peers

**Subject: Traffic Analysis for San Pablo Avenue at John Muir Parkway –
for a Hypothetical Density Transfer of 301 Units**

OK16-0149.02

Fehr & Peers completed an updated traffic operations analysis at the San Pablo Avenue / John Muir Parkway intersection with the revised buildout of the Hercules Bayfront Project including a hypothetical density transfer within the project. The density transfer would relocate a total of 301 residential units (246 residential units from the Bowl/Crescent sub-area and 55 units from the Bayfront Boulevard sub-area) to the Village sub-area. The purpose of this analysis is to quantify the change in San Pablo Avenue/John Muir Parkway intersection operations with the density transfer.

Year 2040 traffic forecasts from the Sycamore Crossing Project were used as the basis for the analysis because these forecasts are consistent with the development assumptions incorporated into the City's upcoming Circulation Element Update. The change in traffic associated with the hypothetical density transfer was then assigned through the San Pablo Avenue / John Muir Parkway intersection to establish traffic forecasts assuming the density transfer comes in later phases of development.

Traffic conditions at the signalized intersection was evaluated using methodologies documented in the *2010 Highway Capacity Manual* which calculates control delay at an intersection based on a variety of inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak hour factors. **Table 1** summarizes the intersection analysis results without and with the hypothetical density transfer.

A Project impact is considered significant if the Project's traffic would cause the operations at a signalized intersection along San Pablo Avenue to decline from LOS E or better to LOS F, based on the HCM method, with the addition of Project traffic. The hypothetical density transfer within the Hercules Bayfront Project would have a less-than-significant impact on the traffic operations at the San Pablo Avenue / John Muir Parkway intersection.



TABLE 1
BAYFRONT BUILDOUT INTERSECTION LEVEL OF SERVICE
(AM AND PM PEAK HOUR)

Intersection	Control ¹	AM Peak Hour		PM Peak Hour	
		Delay (Seconds) ²	LOS ³	Delay (Seconds) ²	LOS ³
Cumulative Without Density Transfer					
San Pablo Avenue / John Muir Parkway	Signal	51.8	D	77.1	E
Cumulative With Density Transfer					
San Pablo Avenue / John Muir Parkway	Signal	53.5	D	78.4	E
1. SSSC = Side-Street Stop Controlled; AWSC = All-Way Stop Controlled					
2. Average intersection delay and LOS based on the 2010 HCM method. Average and worst-approach delays, respectively, are reported for side-street stop controlled intersections. Average delay is reported for all-way stop controlled intersections.					
3. Estimated based on 2010 HCM delay thresholds.					
Source: Fehr & Peers, 2019					

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
Cumulative No Project AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	281	135	545	310	172	269	774	904	284	757	41
Future Volume (veh/h)	63	281	135	545	310	172	269	774	904	284	757	41
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	67	299	115	580	330	173	286	823	0	302	805	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	203	503	189	661	325	170	318	932	734	339	973	0
Arrive On Green	0.11	0.20	0.20	0.19	0.28	0.28	0.18	0.26	0.00	0.19	0.27	0.00
Sat Flow, veh/h	1810	2562	964	3510	1173	615	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	67	209	205	580	0	503	286	823	0	302	805	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1721	1755	0	1788	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	3.7	11.4	11.8	17.4	0.0	30.0	16.7	23.7	0.0	17.6	22.7	0.0
Cycle Q Clear(g_c), s	3.7	11.4	11.8	17.4	0.0	30.0	16.7	23.7	0.0	17.6	22.7	0.0
Prop In Lane	1.00		0.56	1.00		0.34	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	203	354	338	661	0	495	318	932	734	339	973	0
V/C Ratio(X)	0.33	0.59	0.61	0.88	0.00	1.02	0.90	0.88	0.00	0.89	0.83	0.00
Avail Cap(c_a), veh/h	502	482	460	973	0	495	502	987	777	502	987	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.3	39.5	39.7	42.7	0.0	39.1	43.6	38.6	0.0	42.9	37.2	0.0
Incr Delay (d2), s/veh	0.4	1.6	1.8	4.6	0.0	44.3	8.8	9.5	0.0	13.0	6.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	5.8	5.8	8.9	0.0	20.8	9.1	13.0	0.0	10.0	12.1	0.0
LnGrp Delay(d),s/veh	44.7	41.1	41.5	47.3	0.0	83.5	52.4	48.1	0.0	55.9	43.3	0.0
LnGrp LOS	D	D	D	D		F	D	D		E	D	
Approach Vol, veh/h		481			1083			1109			1107	
Approach Delay, s/veh		41.7			64.1			49.2			46.7	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.8	33.3	24.4	26.8	22.5	34.6	15.6	35.5				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	3.5	5.4	3.5	5.5				
Max Green Setting (Gmax), s	30.0	29.6	30.0	* 29	30.0	29.6	30.0	30.0				
Max Q Clear Time (g_c+I1), s	19.6	25.7	19.4	13.8	18.7	24.7	5.7	32.0				
Green Ext Time (p_c), s	0.6	2.2	1.0	2.3	0.3	2.7	0.1	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				51.8								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
Cumulative No Project PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	586	122	489	99	46	197	753	1291	415	566	53
Future Volume (veh/h)	34	586	122	489	99	46	197	753	1291	415	566	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	35	610	99	509	103	39	205	784	0	432	590	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	106	599	97	468	354	134	765	1511	1190	404	746	0
Arrive On Green	0.06	0.19	0.19	0.13	0.27	0.27	0.71	0.70	0.00	0.22	0.21	0.00
Sat Flow, veh/h	1810	3111	504	3510	1309	496	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	35	353	356	509	0	142	205	784	0	432	590	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1810	1755	0	1804	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	2.8	28.9	28.9	20.0	0.0	9.3	6.2	15.4	0.0	33.5	23.2	0.0
Cycle Q Clear(g_c), s	2.8	28.9	28.9	20.0	0.0	9.3	6.2	15.4	0.0	33.5	23.2	0.0
Prop In Lane	1.00		0.28	1.00		0.27	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	106	348	349	468	0	488	765	1511	1190	404	746	0
V/C Ratio(X)	0.33	1.02	1.02	1.09	0.00	0.29	0.27	0.52	0.00	1.07	0.79	0.00
Avail Cap(c_a), veh/h	139	348	349	468	0	488	765	1511	1190	404	1338	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	67.7	60.5	60.6	65.0	0.0	43.3	13.7	15.4	0.0	58.3	56.4	0.0
Incr Delay (d2), s/veh	0.7	52.4	53.3	67.3	0.0	0.7	0.0	0.1	0.0	64.3	8.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	19.5	19.6	14.1	0.0	4.7	3.0	7.6	0.0	23.9	12.5	0.0
LnGrp Delay(d),s/veh	68.4	113.0	113.9	132.3	0.0	44.0	13.7	15.5	0.0	122.6	64.8	0.0
LnGrp LOS	E	F	F	F		D	B	B		F	E	
Approach Vol, veh/h		744			651			989			1022	
Approach Delay, s/veh		111.3			113.1			15.2			89.2	
Approach LOS		F			F			B			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	37.0	68.6	24.0	34.4	69.2	36.4	12.3	46.1				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	5.4	* 5.4	3.5	5.5				
Max Green Setting (Gmax), s	33.5	49.6	20.0	* 29	27.5	* 56	11.5	37.5				
Max Q Clear Time (g_c+I1), s	35.5	17.4	22.0	30.9	8.2	25.2	4.8	11.3				
Green Ext Time (p_c), s	0.0	8.3	0.0	0.0	0.2	5.8	0.0	1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				77.1								
HCM 2010 LOS				E								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
Cumulative Plus Project AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	301	145	545	322	172	278	774	904	284	757	44
Future Volume (veh/h)	68	301	145	545	322	172	278	774	904	284	757	44
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	72	320	125	580	343	173	296	823	0	302	805	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	208	512	196	661	332	167	329	911	718	340	933	0
Arrive On Green	0.11	0.20	0.20	0.19	0.28	0.28	0.18	0.25	0.00	0.19	0.26	0.00
Sat Flow, veh/h	1810	2548	976	3510	1190	600	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	72	225	220	580	0	516	296	823	0	302	805	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1719	1755	0	1790	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	3.9	12.2	12.6	17.3	0.0	30.0	17.2	23.8	0.0	17.5	22.9	0.0
Cycle Q Clear(g_c), s	3.9	12.2	12.6	17.3	0.0	30.0	17.2	23.8	0.0	17.5	22.9	0.0
Prop In Lane	1.00		0.57	1.00		0.34	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	208	362	345	661	0	499	329	911	718	340	933	0
V/C Ratio(X)	0.35	0.62	0.64	0.88	0.00	1.03	0.90	0.90	0.00	0.89	0.86	0.00
Avail Cap(c_a), veh/h	504	485	462	946	0	499	529	942	742	529	942	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.9	39.3	39.4	42.5	0.0	38.8	43.1	39.0	0.0	42.6	38.1	0.0
Incr Delay (d2), s/veh	0.4	1.7	2.0	5.2	0.0	49.4	7.9	11.9	0.0	11.3	8.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	6.3	6.2	8.9	0.0	21.5	9.4	13.3	0.0	9.8	12.5	0.0
LnGrp Delay(d),s/veh	44.3	41.0	41.4	47.7	0.0	88.2	51.0	50.9	0.0	54.0	46.6	0.0
LnGrp LOS	D	D	D	D		F	D	D		D	D	
Approach Vol, veh/h		517			1096			1119			1107	
Approach Delay, s/veh		41.6			66.8			50.9			48.6	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.7	32.6	24.3	27.1	23.1	33.2	15.9	35.5				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	3.5	5.4	3.5	5.5				
Max Green Setting (Gmax), s	31.5	28.1	29.0	* 29	31.5	28.1	30.0	30.0				
Max Q Clear Time (g_c+I1), s	19.5	25.8	19.3	14.6	19.2	24.9	5.9	32.0				
Green Ext Time (p_c), s	0.7	1.4	1.0	2.4	0.3	1.8	0.1	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				53.5								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
Cumulative Plus Project PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	607	128	489	106	46	209	753	1291	415	566	57
Future Volume (veh/h)	36	607	128	489	106	46	209	753	1291	415	566	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	38	632	105	509	110	39	218	784	0	432	590	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	110	597	99	468	358	127	764	1487	1171	416	747	0
Arrive On Green	0.06	0.19	0.19	0.13	0.27	0.27	0.71	0.69	0.00	0.23	0.21	0.00
Sat Flow, veh/h	1810	3099	514	3510	1335	473	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	38	368	369	509	0	149	218	784	0	432	590	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1808	1755	0	1809	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	3.0	28.9	28.9	20.0	0.0	9.9	6.7	15.9	0.0	34.5	23.2	0.0
Cycle Q Clear(g_c), s	3.0	28.9	28.9	20.0	0.0	9.9	6.7	15.9	0.0	34.5	23.2	0.0
Prop In Lane	1.00		0.28	1.00		0.26	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	110	348	348	468	0	485	764	1487	1171	416	747	0
V/C Ratio(X)	0.34	1.06	1.06	1.09	0.00	0.31	0.29	0.53	0.00	1.04	0.79	0.00
Avail Cap(c_a), veh/h	139	348	348	468	0	485	764	1487	1171	416	1362	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	67.6	60.5	60.6	65.0	0.0	43.7	13.7	16.2	0.0	57.8	56.4	0.0
Incr Delay (d2), s/veh	0.7	64.1	65.0	67.3	0.0	0.8	0.0	0.1	0.0	54.3	8.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	20.6	20.7	14.1	0.0	5.0	3.3	7.8	0.0	23.5	12.5	0.0
LnGrp Delay(d),s/veh	68.2	124.7	125.5	132.3	0.0	44.5	13.8	16.4	0.0	112.0	64.7	0.0
LnGrp LOS	E	F	F	F		D	B	B		F	E	
Approach Vol, veh/h		775			658			1002			1022	
Approach Delay, s/veh		122.3			112.4			15.8			84.7	
Approach LOS		F			F			B			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	38.0	67.6	24.0	34.4	69.2	36.4	12.6	45.8				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	5.4	* 5.4	3.5	5.5				
Max Green Setting (Gmax), s	34.5	48.6	20.0	* 29	26.5	* 57	11.5	37.5				
Max Q Clear Time (g_c+I1), s	36.5	17.9	22.0	30.9	8.7	25.2	5.0	11.9				
Green Ext Time (p_c), s	0.0	8.1	0.0	0.0	0.3	5.8	0.0	1.5				
Intersection Summary												
HCM 2010 Ctrl Delay				78.4								
HCM 2010 LOS				E								
Notes												



MEMORANDUM

Date: February 25, 2019
To: Ben Ortega, Hercules Development Partners
From: Rob Rees, P.E., Fehr & Peers
Subject: **Parking Garage Circulation Review
Hercules Bayfront Project Block M/P and O**

OK16-0149.03

Fehr & Peers completed a review of the parking garage vehicle circulation for Blocks M/P and O within the Hercules Bayfront Project. The review focused on the plans provided by BAR Architects and attached to this memorandum.

The Hercules Municipal Code allows for up to 35% compact parking spaces within residential parking areas. The Block M/P includes a two-level parking garage with access at Level 1 and a ramp connecting to the lower level. In total, Block M/P contains 401 parking spaces of which 142 (or 35 percent) are compact spaces. While Block O is a split-level garage with each parking level having its own vehicle entry / exit to the street. Block O contains 151 parking spaces of which 48 (or 32 percent) are compact spaces.

Block O Parking Circulation

Block O, Parking Level P, includes a small area for public parking which is separated from resident parking by security gates. There is enough area for drivers to enter the garage and turn around to exit if a public parking space is unavailable. Parking Level 01 on Block O is for resident parking only.

The Block O parking drive aisles in both garages are 24 feet wide and there are no dead-end drive aisles so parking garage circulation is adequate for secure resident parking.

The Block O parking garage access from the street has ramps with grades of 19% for Parking Level 01 and 20% for Parking Level P. These ramps are steep but adequate for low turnover resident parking. Both ramps require a minimum 10-foot ramp transition at both ends of the ramp to reduce potential for car chassis to scrape the floor. These transitions should be equivalent to about one-half the maximum ramp grade. The Plans do not show a ramp transition for Parking Level P at the sidewalk end of the ramp.



The ramps accessing the Block O parking garages limit sight lines at the sidewalk level. The site plan shows that the parking garage entrances are set back from the pedestrian desire line along the sidewalk which improves sight lines between drivers and pedestrians. Even so additional treatments should be considered.

Recommendation: Ensure that the Block O ramps include a minimum 10-foot transition at both ends of the ramp equivalent to about one-half the maximum ramp grade.

Recommendation: Install a visual and audio warning device at the entrances to the Block O parking garages.

Block M/P Parking Circulation

Block P, Parking Level 1, includes an area for public parking which is separated from resident parking by security gates. The circulation within this public area is well designed with 24-foot wide drive aisles and no dead-end drive aisles so drivers can circulate through the public parking area and exit the garage if parking is unavailable.

The Block P, Parking Level 01 and Parking Level P, includes secure resident parking. The secure resident parking includes drive aisles that are 24 feet wide and there are no dead-end drive aisles so parking garage circulation is good for secure resident parking. The ramp that joins the two parking levels is 24 feet wide so two cars could use the ramp at the same time.

The Block P parking garage access from Bayfront Loop occurs on Parking Level 01 and is level with the street. There is a second access to Parking Level 01 off the Private Drive that is also level. Both access points can accommodate two cars at the same time. The building is set back on Bayfront Loop which allows for a wide sidewalk. Even so, sight lines between pedestrians and drivers are limited on Bayfront Loop.

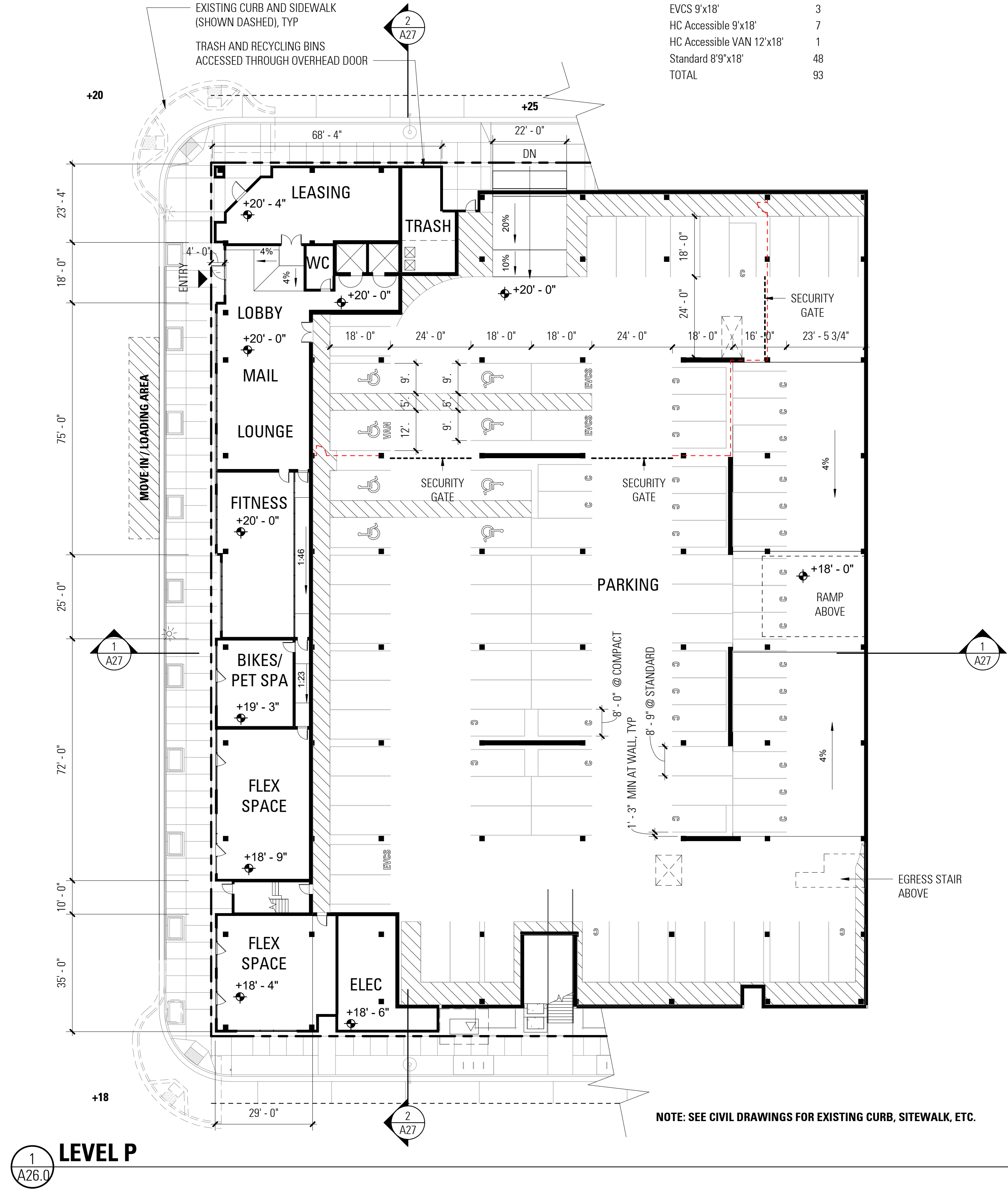
Recommendation: Install a visual and audio warning device at the entrances to the Block M/P parking garages.

Attachment A – Block O Parking Garage Site Plan (1 page)

Attachment B – Block M/P Parking Garage Site Plan (2 pages)

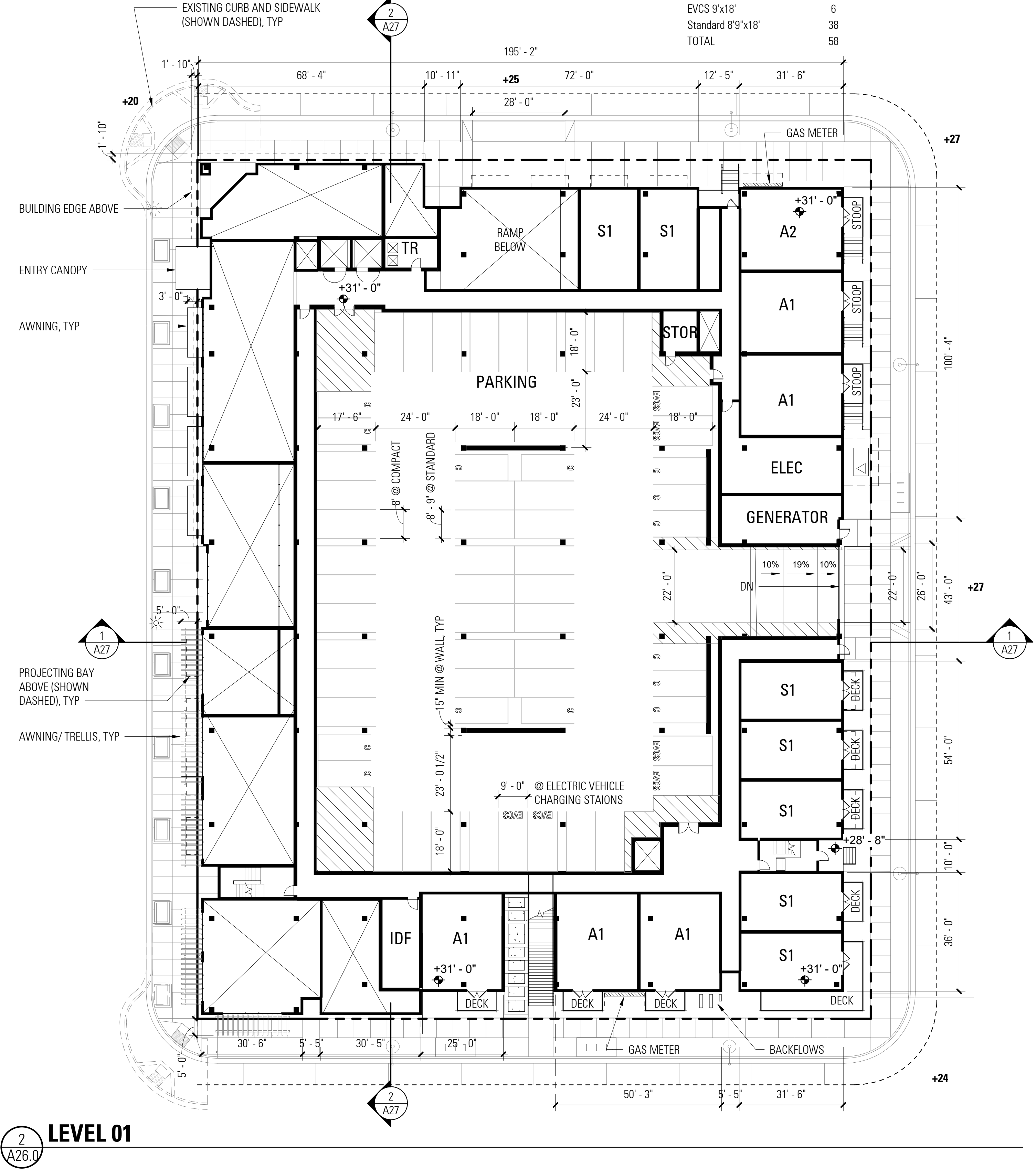
PARKING COUNT - LEVEL P

Compact 8'x16'	34
EVCS 9'x18'	3
HC Accessible 9'x18'	7
HC Accessible VAN 12'x18'	1
Standard 8'9"x18'	48
TOTAL	93

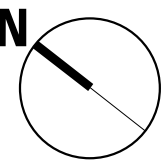


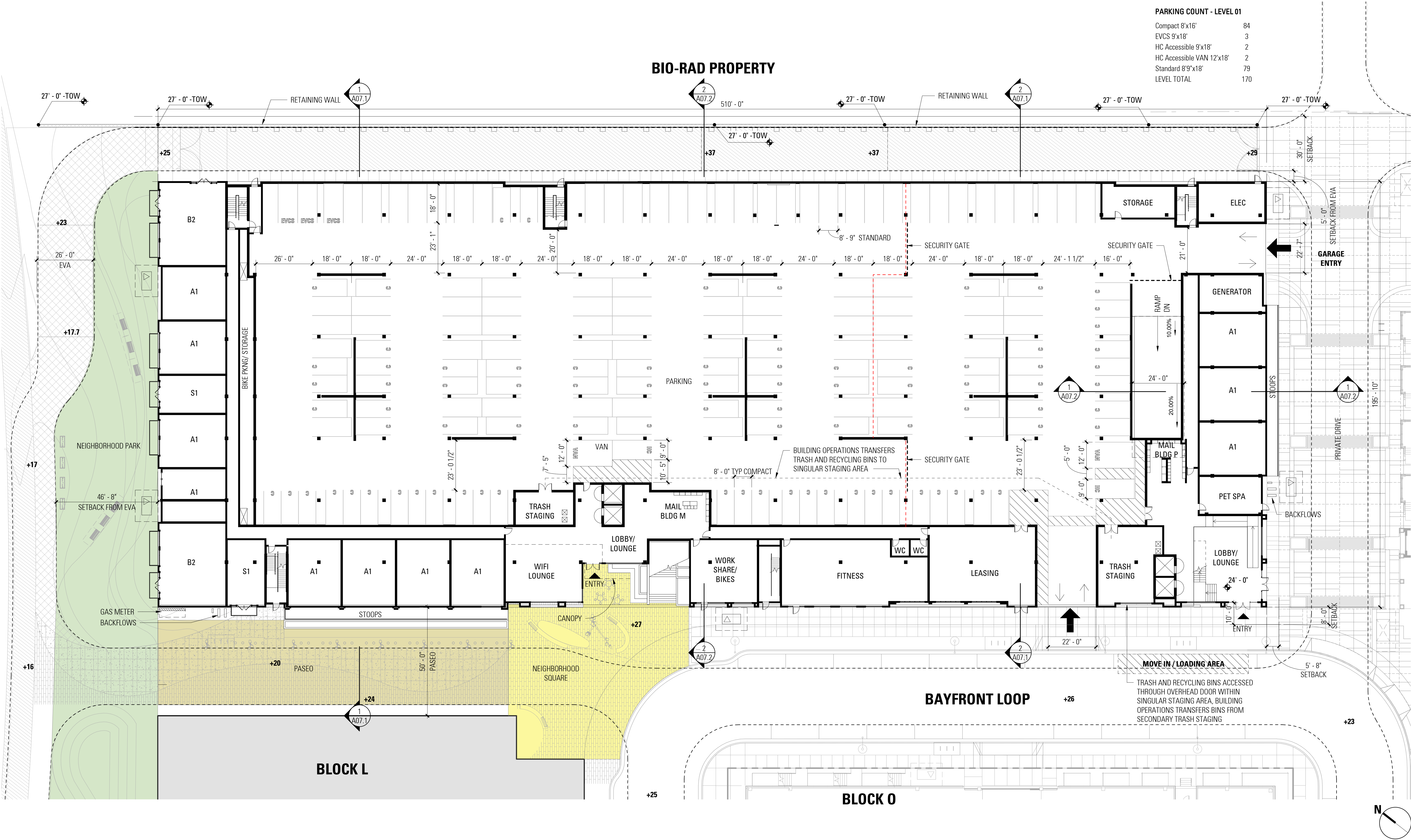
PARKING COUNT - LEVEL 01

Compact 8'x16'	14
EVCS 9'x18'	6
Standard 8'9"x18'	38
TOTAL	58



Compact 8'x16'	58
EVCS 9'x18'	18
HC Accessible 9'x18'	16
HC Accessible VAN 12'x18'	2
Standard 8'9"x18'	137
LEVEL TOTAL	231







MEMORANDUM

Date: February 26, 2019
To: Ben Ortega, Hercules Development Partners
From: Rob Rees, P.E., Fehr & Peers
Subject: **Traffic Analysis for San Pablo Avenue at John Muir Parkway –
for Blocks M, P, and O**

OK16-0149.02

Fehr & Peers completed an updated traffic operations analysis at the San Pablo Avenue / John Muir Parkway intersection with the Hercules Bayfront Project including Block M, P, and O. The purpose of this analysis is to quantify the San Pablo Avenue/John Muir Parkway intersection operations with traffic from near-term projects as well as traffic from Blocks M, P, and O which are in design review.

Near-term traffic forecasts from the Sycamore Crossing Project were used as the basis for the analysis because these forecasts are consistent with the near-term development assumptions provided by the City. The traffic associated with Blocks M, P, and O was then assigned through the San Pablo Avenue / John Muir Parkway intersection to establish traffic forecasts assuming the near-term development plus Blocks M, P, and O.

Traffic conditions at the signalized intersection was evaluated using methodologies documented in the *2010 Highway Capacity Manual* which calculates control delay at an intersection based on a variety of inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak hour factors.

As indicated on the attached work sheets, the San Pablo Avenue / John Muir Parkway intersection is anticipated to operate at LOS D with 52 seconds of delay during the AM peak hour and LOS F with 92 seconds of delay during the PM peak hour.

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	248	198	636	327	144	345	494	1069	354	579	52
Future Volume (veh/h)	71	248	198	636	327	144	345	494	1069	354	579	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	76	264	105	677	348	140	367	526	0	377	616	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	196	525	203	747	406	163	397	725	325	406	743	0
Arrive On Green	0.11	0.21	0.21	0.21	0.32	0.32	0.22	0.20	0.00	0.22	0.21	0.00
Sat Flow, veh/h	1810	2539	984	3510	1288	518	1810	3610	1615	1810	3705	0
Grp Volume(v), veh/h	76	186	183	677	0	488	367	526	0	377	616	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1718	1755	0	1806	1810	1805	1615	1810	1805	0
Q Serve(g_s), s	4.6	10.8	11.2	22.3	0.0	30.0	23.5	16.1	0.0	24.2	19.4	0.0
Cycle Q Clear(g_c), s	4.6	10.8	11.2	22.3	0.0	30.0	23.5	16.1	0.0	24.2	19.4	0.0
Prop In Lane	1.00		0.57	1.00		0.29	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	196	373	355	747	0	569	397	725	325	406	743	0
V/C Ratio(X)	0.39	0.50	0.52	0.91	0.00	0.86	0.93	0.73	0.00	0.93	0.83	0.00
Avail Cap(c_a), veh/h	221	516	492	919	0	770	588	1024	458	512	871	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.1	41.5	41.7	45.5	0.0	38.1	45.3	44.3	0.0	45.0	45.0	0.0
Incr Delay (d2), s/veh	0.5	1.0	1.2	9.8	0.0	10.0	12.6	2.1	0.0	18.9	6.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	5.5	5.5	11.8	0.0	16.5	13.1	8.2	0.0	14.2	10.3	0.0
LnGrp Delay(d),s/veh	49.6	42.6	42.9	55.3	0.0	48.0	57.9	46.4	0.0	64.0	51.5	0.0
LnGrp LOS	D	D	D	E		D	E	D		E	D	
Approach Vol, veh/h		445			1165			893			993	
Approach Delay, s/veh		43.9			52.2			51.1			56.2	
Approach LOS		D			D			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.1	29.2	29.2	30.0	29.5	29.8	16.4	42.9				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	3.5	5.4	3.5	5.5				
Max Green Setting (Gmax), s	33.5	33.6	31.0	* 34	38.5	28.6	14.5	50.5				
Max Q Clear Time (g_c+I1), s	26.2	18.1	24.3	13.2	25.5	21.4	6.6	32.0				
Green Ext Time (p_c), s	0.4	3.9	0.9	2.0	0.4	2.8	0.0	5.3				
Intersection Summary												
HCM 2010 Ctrl Delay				52.0								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Hercules Bayfront
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	570	203	617	140	129	335	873	1163	424	392	84
Future Volume (veh/h)	48	570	203	617	140	129	335	873	1163	424	392	84
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	50	594	187	643	146	98	349	909	0	442	408	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	1	1	2	0
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	121	539	169	679	347	233	589	1367	612	356	857	0
Arrive On Green	0.07	0.20	0.20	0.19	0.33	0.33	0.11	0.12	0.00	0.20	0.24	0.00
Sat Flow, veh/h	1810	2704	850	3510	1055	708	1810	3610	1615	1810	3705	0
Grp Volume(v), veh/h	50	396	385	643	0	244	349	909	0	442	408	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1749	1755	0	1764	1810	1805	1615	1810	1805	0
Q Serve(g_s), s	4.0	29.9	29.9	27.1	0.0	16.2	27.6	36.0	0.0	29.5	14.6	0.0
Cycle Q Clear(g_c), s	4.0	29.9	29.9	27.1	0.0	16.2	27.6	36.0	0.0	29.5	14.6	0.0
Prop In Lane	1.00		0.49	1.00		0.40	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	121	360	349	679	0	580	589	1367	612	356	857	0
V/C Ratio(X)	0.41	1.10	1.10	0.95	0.00	0.42	0.59	0.66	0.00	1.24	0.48	0.00
Avail Cap(c_a), veh/h	223	360	349	679	0	580	589	1367	612	356	857	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.53	0.53	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	67.1	60.0	60.1	59.7	0.0	39.2	57.5	56.5	0.0	60.2	49.2	0.0
Incr Delay (d2), s/veh	0.8	77.4	79.3	22.2	0.0	1.0	0.6	1.4	0.0	130.6	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	22.6	22.1	15.2	0.0	8.0	13.9	18.3	0.0	27.6	7.5	0.0
LnGrp Delay(d),s/veh	68.0	137.5	139.4	82.0	0.0	40.2	58.1	57.9	0.0	190.8	51.1	0.0
LnGrp LOS	E	F	F	F		D	E	E		F	D	
Approach Vol, veh/h	831				887				1258			
Approach Delay, s/veh	134.2				70.5				58.0			
Approach LOS	F				E				E			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	33.0	62.6	33.0	35.4	54.6	41.0	13.6	54.8				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	5.4	* 5.4	3.5	5.5				
Max Green Setting (Gmax), s	29.5	43.6	29.0	* 30	37.5	* 36	18.5	40.5				
Max Q Clear Time (g_c+I1), s	31.5	38.0	29.1	31.9	29.6	16.6	6.0	18.2				
Green Ext Time (p_c), s	0.0	3.3	0.0	0.0	0.3	3.2	0.0	2.6				
Intersection Summary												
HCM 2010 Ctrl Delay	92.0											
HCM 2010 LOS	F											
Notes												



MEMORANDUM

Date: March 27, 2019
To: Ben Ortega, Hercules Development Partners
From: Rob Rees, P.E., Fehr & Peers
Subject: **Traffic Analysis for San Pablo Avenue at John Muir Parkway –
for Block M, P, and O**

OK16-0149.02

Fehr & Peers completed an updated traffic operations analysis at the San Pablo Avenue / John Muir Parkway intersection with the cumulative buildout of Hercules including an evaluation with and without Block M, P, and O of the Bayfront Project. The purpose of this analysis is to quantify the change in San Pablo Avenue/John Muir Parkway intersection operations associated Block M, P, and O development.

Year 2040 traffic forecasts from the Sycamore Crossing Project were used as the basis for the analysis because these forecasts are consistent with the development assumptions incorporated into the City's Circulation Element Update. The change in traffic associated with the Block M, P, and O traffic assigned through the San Pablo Avenue / John Muir Parkway intersection was evaluated to establish traffic forecasts with and without the development.

Traffic conditions at the signalized intersection was evaluated using methodologies documented in the *2010 Highway Capacity Manual* which calculates control delay at an intersection based on a variety of inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak hour factors. **Table 1** summarizes the intersection analysis results without and with Block M, P, and O.

Block M, P, and O at cumulative conditions would contribute 5 seconds of delay to the intersection during the AM peak hour and 1.5 seconds of delay during the PM peak hour. This result is consistent with the 2011 environmental impact reports for the Bayfront Project and there are no new significant impacts.



TABLE 1
BAYFRONT CUMULATIVE BUILDOUT INTERSECTION LEVEL OF SERVICE
(AM AND PM PEAK HOUR)

Intersection	Control ¹	AM Peak Hour		PM Peak Hour	
		Delay (Seconds) ²	LOS ³	Delay (Seconds) ²	LOS ³
Cumulative Without Block M, P, and O					
San Pablo Avenue / John Muir Parkway	Signal	46.4	D	77.5	E
Cumulative With Block M, P, and O					
San Pablo Avenue / John Muir Parkway	Signal	51.4	D	79.0	E
1. SSSC = Side-Street Stop Controlled; AWSC = All-Way Stop Controlled					
2. Average intersection delay and LOS based on the 2010 HCM method. Average and worst-approach delays, respectively, are reported for side-street stop controlled intersections. Average delay is reported for all-way stop controlled intersections.					
3. Estimated based on 2010 HCM delay thresholds.					
Source: Fehr & Peers, 2019					

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Bayfront Blocks M, P, & O
Cumulative No Project AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	179	86	545	289	172	250	772	904	284	757	38
Future Volume (veh/h)	40	179	86	545	289	172	250	772	904	284	757	38
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	43	190	46	580	307	169	266	821	0	302	805	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	173	534	126	664	326	179	300	947	745	340	1027	0
Arrive On Green	0.10	0.18	0.18	0.19	0.28	0.28	0.17	0.26	0.00	0.19	0.28	0.00
Sat Flow, veh/h	1810	2894	684	3510	1151	633	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	43	117	119	580	0	476	266	821	0	302	805	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1773	1755	0	1784	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	2.3	5.9	6.2	16.8	0.0	27.3	15.0	22.7	0.0	17.0	21.5	0.0
Cycle Q Clear(g_c), s	2.3	5.9	6.2	16.8	0.0	27.3	15.0	22.7	0.0	17.0	21.5	0.0
Prop In Lane	1.00		0.39	1.00		0.36	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	173	333	327	664	0	505	300	947	745	340	1027	0
V/C Ratio(X)	0.25	0.35	0.36	0.87	0.00	0.94	0.89	0.87	0.00	0.89	0.78	0.00
Avail Cap(c_a), veh/h	519	499	490	1006	0	512	519	1021	804	519	1027	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.8	37.2	37.3	41.2	0.0	36.7	42.7	36.9	0.0	41.4	34.5	0.0
Incr Delay (d2), s/veh	0.3	0.6	0.7	3.8	0.0	26.5	4.5	8.0	0.0	11.7	4.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	3.0	3.1	8.5	0.0	17.2	7.9	12.3	0.0	9.6	11.3	0.0
LnGrp Delay(d),s/veh	44.1	37.8	38.0	45.0	0.0	63.2	47.2	44.8	0.0	53.1	38.7	0.0
LnGrp LOS	D	D	D	D		E	D	D		D	D	
Approach Vol, veh/h		279			1056			1087			1107	
Approach Delay, s/veh		38.9			53.2			45.4			42.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.2	32.8	23.8	24.8	20.8	35.2	13.5	35.1				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	3.5	5.4	3.5	5.5				
Max Green Setting (Gmax), s	30.0	29.6	30.0	* 29	30.0	29.6	30.0	30.0				
Max Q Clear Time (g_c+I1), s	19.0	24.7	18.8	8.2	17.0	23.5	4.3	29.3				
Green Ext Time (p_c), s	0.7	2.7	1.0	1.3	0.3	3.2	0.0	0.3				
Intersection Summary												
HCM 2010 Ctrl Delay				46.4								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Bayfront Blocks M, P, & O
Cumulative Plus Project AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	281	135	545	310	172	269	772	904	284	757	41
Future Volume (veh/h)	63	281	135	545	310	172	269	772	904	284	757	41
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	67	299	99	580	330	169	286	821	0	302	805	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	203	526	171	661	328	168	318	931	733	339	972	0
Arrive On Green	0.11	0.20	0.20	0.19	0.28	0.28	0.18	0.26	0.00	0.19	0.27	0.00
Sat Flow, veh/h	1810	2676	868	3510	1183	606	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	67	200	198	580	0	499	286	821	0	302	805	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1739	1755	0	1789	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	3.7	10.8	11.2	17.4	0.0	30.0	16.7	23.6	0.0	17.6	22.7	0.0
Cycle Q Clear(g_c), s	3.7	10.8	11.2	17.4	0.0	30.0	16.7	23.6	0.0	17.6	22.7	0.0
Prop In Lane	1.00		0.50	1.00		0.34	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	203	355	342	661	0	496	318	931	733	339	972	0
V/C Ratio(X)	0.33	0.56	0.58	0.88	0.00	1.01	0.90	0.88	0.00	0.89	0.83	0.00
Avail Cap(c_a), veh/h	502	482	465	973	0	496	502	988	778	502	988	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.3	39.3	39.4	42.7	0.0	39.1	43.6	38.6	0.0	42.9	37.2	0.0
Incr Delay (d2), s/veh	0.4	1.4	1.6	4.6	0.0	41.8	8.7	9.4	0.0	13.0	6.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	5.5	5.5	8.9	0.0	20.5	9.1	13.0	0.0	10.0	12.1	0.0
LnGrp Delay(d),s/veh	44.6	40.7	41.0	47.3	0.0	81.0	52.4	47.9	0.0	55.9	43.4	0.0
LnGrp LOS	D	D	D	D		F	D	D		E	D	
Approach Vol, veh/h		465			1079			1107			1107	
Approach Delay, s/veh		41.4			62.9			49.1			46.8	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.8	33.3	24.4	26.8	22.5	34.5	15.6	35.5				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	3.5	5.4	3.5	5.5				
Max Green Setting (Gmax), s	30.0	29.6	30.0	* 29	30.0	29.6	30.0	30.0				
Max Q Clear Time (g_c+I1), s	19.6	25.6	19.4	13.2	18.7	24.7	5.7	32.0				
Green Ext Time (p_c), s	0.6	2.3	1.0	2.2	0.3	2.7	0.1	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				51.4								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Bayfront Blocks M, P, & O
Cumulative No Project PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	515	107	489	52	46	103	753	1291	415	566	28
Future Volume (veh/h)	30	515	107	489	52	46	103	753	1291	415	566	28
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	31	536	100	509	54	37	107	784	0	432	590	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	101	577	107	468	283	194	606	1195	941	404	746	0
Arrive On Green	0.06	0.19	0.19	0.13	0.27	0.27	0.56	0.55	0.00	0.22	0.21	0.00
Sat Flow, veh/h	1810	3039	565	3510	1045	716	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	31	317	319	509	0	91	107	784	0	432	590	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1799	1755	0	1762	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	2.5	25.9	26.1	20.0	0.0	6.0	4.3	22.9	0.0	33.5	23.2	0.0
Cycle Q Clear(g_c), s	2.5	25.9	26.1	20.0	0.0	6.0	4.3	22.9	0.0	33.5	23.2	0.0
Prop In Lane	1.00		0.31	1.00		0.41	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	101	342	341	468	0	477	606	1195	941	404	746	0
V/C Ratio(X)	0.31	0.93	0.93	1.09	0.00	0.19	0.18	0.66	0.00	1.07	0.79	0.00
Avail Cap(c_a), veh/h	139	348	347	468	0	477	606	1195	941	404	1338	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	68.1	59.8	59.8	65.0	0.0	42.1	22.9	27.6	0.0	58.3	56.4	0.0
Incr Delay (d2), s/veh	0.6	30.1	31.4	67.3	0.0	0.4	0.0	0.3	0.0	64.3	8.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	15.8	16.0	14.1	0.0	3.0	2.2	11.3	0.0	23.9	12.5	0.0
LnGrp Delay(d),s/veh	68.7	89.9	91.3	132.3	0.0	42.5	22.9	27.8	0.0	122.6	64.8	0.0
LnGrp LOS	E	F	F	F		D	C	C		F	E	
Approach Vol, veh/h		667			600			891			1022	
Approach Delay, s/veh		89.6			118.7			27.2			89.2	
Approach LOS		F			F			C			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	37.0	55.0	24.0	34.0	55.6	36.4	11.8	46.1				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	5.4	* 5.4	3.5	5.5				
Max Green Setting (Gmax), s	33.5	49.6	20.0	* 29	27.5	* 56	11.5	37.5				
Max Q Clear Time (g_c+I1), s	35.5	24.9	22.0	28.1	6.3	25.2	4.5	8.0				
Green Ext Time (p_c), s	0.0	7.6	0.0	0.3	0.1	5.8	0.0	0.9				
Intersection Summary												
HCM 2010 Ctrl Delay				77.5								
HCM 2010 LOS				E								
Notes												

HCM 2010 Signalized Intersection Summary

1: San Pablo Ave & John Muir Pkwy

Bayfront Blocks M, P, & O
Cumulative Plus Project PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	586	122	489	99	46	197	753	1291	415	566	53
Future Volume (veh/h)	34	586	122	489	99	46	197	753	1291	415	566	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	35	610	116	509	103	37	205	784	0	432	590	0
Adj No. of Lanes	1	2	0	2	1	0	1	2	2	1	2	0
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	106	583	111	468	360	129	765	1511	1190	404	746	0
Arrive On Green	0.06	0.19	0.19	0.13	0.27	0.27	0.71	0.70	0.00	0.22	0.21	0.00
Sat Flow, veh/h	1810	3028	575	3510	1330	478	1810	3610	2842	1810	3705	0
Grp Volume(v), veh/h	35	363	363	509	0	140	205	784	0	432	590	0
Grp Sat Flow(s),veh/h/ln	1810	1805	1798	1755	0	1808	1810	1805	1421	1810	1805	0
Q Serve(g_s), s	2.8	28.9	28.9	20.0	0.0	9.2	6.2	15.4	0.0	33.5	23.2	0.0
Cycle Q Clear(g_c), s	2.8	28.9	28.9	20.0	0.0	9.2	6.2	15.4	0.0	33.5	23.2	0.0
Prop In Lane	1.00		0.32	1.00		0.26	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	106	348	346	468	0	489	765	1511	1190	404	746	0
V/C Ratio(X)	0.33	1.04	1.05	1.09	0.00	0.29	0.27	0.52	0.00	1.07	0.79	0.00
Avail Cap(c_a), veh/h	139	348	346	468	0	489	765	1511	1190	404	1338	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	67.7	60.5	60.6	65.0	0.0	43.3	13.7	15.4	0.0	58.3	56.4	0.0
Incr Delay (d2), s/veh	0.7	60.2	61.4	67.3	0.0	0.7	0.0	0.1	0.0	64.3	8.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	20.2	20.2	14.1	0.0	4.7	3.0	7.6	0.0	23.9	12.5	0.0
LnGrp Delay(d),s/veh	68.4	120.8	122.0	132.3	0.0	43.9	13.7	15.5	0.0	122.6	64.8	0.0
LnGrp LOS	E	F	F	F		D	B	B		F	E	
Approach Vol, veh/h		761			649			989			1022	
Approach Delay, s/veh		118.9			113.3			15.2			89.2	
Approach LOS		F			F			B			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	37.0	68.6	24.0	34.4	69.2	36.4	12.3	46.1				
Change Period (Y+Rc), s	3.5	5.4	4.0	* 5.5	5.4	* 5.4	3.5	5.5				
Max Green Setting (Gmax), s	33.5	49.6	20.0	* 29	27.5	* 56	11.5	37.5				
Max Q Clear Time (g_c+I1), s	35.5	17.4	22.0	30.9	8.2	25.2	4.8	11.2				
Green Ext Time (p_c), s	0.0	8.3	0.0	0.0	0.2	5.8	0.0	1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				79.0								
HCM 2010 LOS				E								
Notes												