



## BODEGA & ROBINSON TRAFFIC ANALYSIS UPDATE MEMO

DATE: November 11, 2022

TO: Lauren Alexander | Pacific West Communities, Inc.

FROM: Christian Thompson | DKS Associates

SUBJECT: Bodega & Robinson Traffic Analysis Update Memo

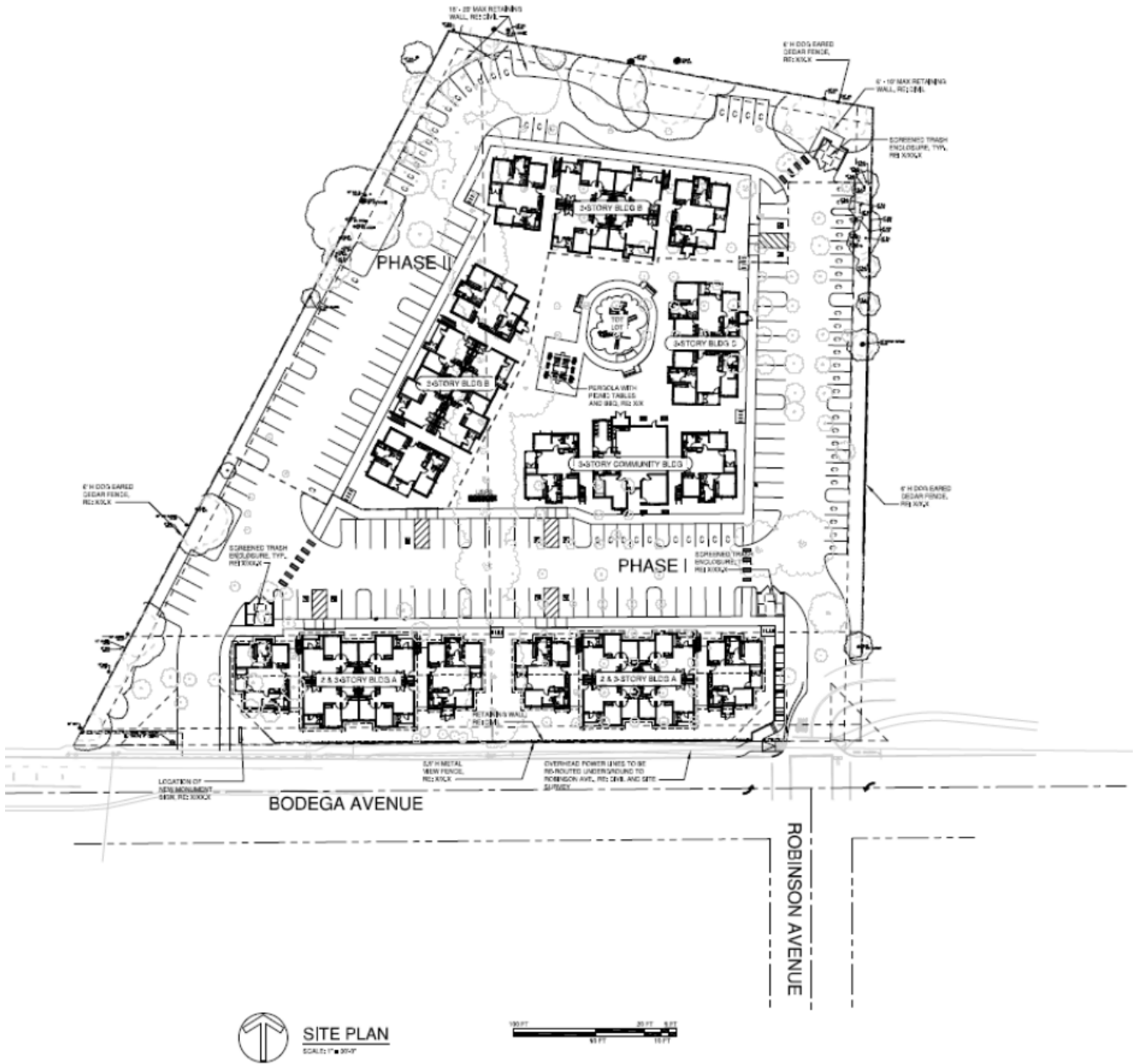
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The purpose of this memo is to present additional analysis per comments from the City of Sebastopol, CA (the City) in support of the previously completed Transportation Impact Analysis (TIA) for the Woodmark Apartments at 7760 & 7716 Bodega Avenue project.<sup>1</sup> This memo documents an adjustment of the trip distribution per City comments to provide updated traffic analysis results, additional queuing analysis, and an updated signal warrant analysis. An excerpt of the City's comments can be found in Appendix D.

The Woodmark Apartments project consists of 84 apartment units with an approximately 2,470 square foot community area. The site plan is shown in Figure 1.

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<sup>1</sup> Draft Transportation Impact Analysis Report, Woodmark Apartments at 7760 & 7716 Bodega Avenue, TJKM, October 2, 2020.



**FIGURE 1: WOODMARK APARTMENTS SITE PLAN**

**UPDATED TRAFFIC ANALYSIS**

Per City comment 52, the project’s western access on the north side of Bodega Avenue will be restricted to right-in right-out only. All outbound traffic toward the east must be routed through the eastern driveway near Robinson Road and the existing Bear Meadows community. This change was made by editing the trip distribution paths for the previous study’s Scenario 2. Rather than exiting

the western driveway and making a U-turn, outbound trips will use the eastern driveway and make a southbound left turn onto Bodega Avenue at Robinson Road.

These changes were applied to an updated Synchro model that matches the previous study, and the HCM 2010 results for both intersection analysis and queuing are shown below in Table 1 and Table 2, respectively. Since the only changes occur at the intersection of Bodega Avenue & Robinson Road and the adjacent eastern site driveway, this updated analysis only shows results for these intersections. Full Synchro reports are shown in Appendix B for the updated Existing + Project and Cumulative + Project scenarios.

Results for other study intersections remain the same as were shown in the previously completed TIA, and the previous TIA's results for Bodega Avenue & Robinson Road are included in Appendix A for the Existing and Cumulative scenarios.

**TABLE 1: UPDATED HCM 2010 TRAFFIC ANALYSIS RESULTS**

#	INTERSECTION	PEAK HOUR (1)	EXISTING		EXISTING + PROJECT		CUMULATIVE		CUMULATIVE + PROJECT	
			AVG DELAY (2)	LOS (3)	AVG DELAY (2)	LOS (3)	AVG DELAY (2)	LOS (3)	AVG DELAY (2)	LOS (3)
3	Bodega Avenue & Robinson Road	AM	23.6	C	24.1	C	29.0	D	29.5	D
		PM	24.3	C	25.5	D	29.4	D	30.8	D
8	Bodega Avenue & Eastern Driveway/Bear Meadows Driveway	AM			8.4	A			8.4	A
		PM			8.4	A			8.4	A

Notes:

1 AM = morning peak hour, PM = evening peak hour.

2 Total control delay for the worst movement is presented for side-street stop-controlled intersections.

3 LOS = Level of Service

As shown, the intersections operate at LOS D or better. Queuing results are shown below, which were reported with HCM 2010 to match the previously competed TIA methodology. HCM 2010 queuing is reported in vehicle units, so for the purposes of this analysis 1 vehicle is assumed to be 25 feet of queue length and is reported as such in the table below.

**TABLE 2: UPDATED HCM 2010 QUEUING RESULTS**

#	INTERSECTION	MOVEMENT	STORAGE (FEET)	95TH PERCENTILE QUEUE LENGTH (FEET)				
				EXISTING	EXISTING + PROJECT	CUMULATIVE	CUMULATIVE + PROJECT	
3	Bodega Avenue & Robinson Road	AM	NBLTR	200	30	30	35	45
			EBL	80	0	0	0	0
			WBL	60	0	0	0	0
			SBLTR	50	0	15	0	13
		PM	NBLTR	200	23	25	25	28
			EBL	80	0	0	0	0
			WBL	60	0	0	0	0
			SBLTR	50	0	8	3	10
8	Bodega Avenue & Eastern Driveway/Bear Meadows Driveway	AM	NBLTR	50		0		0
			EBLR	50		3		3
		PM	NBLTR	50		0		0
			EBLR	50		0		0

As shown, the intersections remain at LOS D or better even under the Cumulative + Project scenario. The queuing results also show that the 95th percentile queues are within the storage limits for all movements in all scenarios. This analysis shows that delays to the existing Bear Meadows community will not be significant.

## UPDATED SIGNAL WARRANT

Using the same set of corrected volumes for the Existing + Project and the Cumulative + Project scenarios as shown above, the signal warrant analysis was updated to account for the right-in right-out western access and rerouted trips. The results show that a signal is not warranted per the California MUTCD Warrant 3 (peak hour warrant). As shown in Appendix C, the 70% factor warrant was utilized because the City of Sebastopol population is less than 10,000 people.<sup>2</sup>

The AM peak hour for the Cumulative + Project scenario comes near to meeting the minimum warrant threshold. The side street volume does not meet the minimum threshold for considering a signal. Since the higher side street volume is the south leg of Robinson Road, traffic approach from the south would have to increase in order to meet the minimum warrant threshold.

## PEDESTRIAN CROSSING TREATMENT ANALYSIS

This section discusses the potential improvements for the intersection of Bodega Avenue & Robinson Road, particularly in regard to the pedestrian crossing across Bodega Avenue. The intersection currently has marked crosswalks across both legs of Bodega Avenue, which is 3 lanes wide at the intersection. Parking is not allowed along any of the 4 legs at this intersection, and site distance appears to be generally adequate considering the 35-mph posted speed limit.

Given the relatively low amount of side street volume, a traffic signal is not recommended as a near-term improvement. To the west at Bodega Avenue & Nelson Way there exists a high intensity activated crosswalk (HAWK) signal, but a HAWK signal is not typically appropriate for shorter crosswalks such as the one across Bodega Avenue at Robinson Road (at Nelson Way, the crossing distance is approximately 65 feet while at Robinson Road the distance is approximately 45 feet).

For this intersection, a Rectangular Rapid Flashing Beacon (RRFB) crossing treatment is likely the most appropriate improvement. As already mentioned in the City's comments, markings, signage, and ADA-compliant ramps are also needed to improve the safety of pedestrians crossing at this intersection.

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<sup>2</sup> <https://ci.sebastopol.ca.us/Our-Community/Current-Snapshot>

## CONCLUSIONS

The following points can be concluded by the analysis presented in this memo:

- The updated traffic and queuing analysis shows the impact to the neighboring Bear Meadows development will not be significant. No changes to the eastern access configuration are needed.
- The updated signal warrant analysis shows that the intersection of Bodega Avenue & Robinson Road does not meet the minimum volume warrant thresholds for a traffic signal.
- To improve pedestrian safety crossing Bodega Avenue at Robinson Road, RRFB crossings are recommended as the most appropriate intersection improvement.

**APPENDIX A: PREVIOUSLY COMPLETED TIA SYNCHRO REPORTS (SELECTED PAGES)**

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	0	425	56	6	382	3	40	1	18	0	0	5
Future Vol, veh/h	0	425	56	6	382	3	40	1	18	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	91	91	91	74	74	74	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	512	67	7	420	3	54	1	24	0	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	423	0	0	579	0	0	986	983	546	994	1015	422
Stage 1	-	-	-	-	-	-	546	546	-	436	436	-
Stage 2	-	-	-	-	-	-	440	437	-	558	579	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1136	-	-	995	-	-	227	249	538	224	238	632
Stage 1	-	-	-	-	-	-	522	518	-	599	580	-
Stage 2	-	-	-	-	-	-	596	579	-	514	501	-
Platoon blocked, %		-	-	-	-	-						
Mov Cap-1 Maneuver	1136	-	-	995	-	-	223	247	538	212	236	632
Mov Cap-2 Maneuver	-	-	-	-	-	-	223	247	-	212	236	-
Stage 1	-	-	-	-	-	-	522	518	-	599	576	-
Stage 2	-	-	-	-	-	-	584	575	-	489	501	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			23.6			10.8		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	272	1136	-	-	995	-	-	632
HCM Lane V/C Ratio	0.293	-	-	-	0.007	-	-	0.013
HCM Control Delay (s)	23.6	0	-	-	8.6	-	-	10.8
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1.2	0	-	-	0	-	-	0

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	1	362	35	12	489	6	30	0	11	1	1	2
Future Vol, veh/h	1	362	35	12	489	6	30	0	11	1	1	2
Conflicting Peds, #/hr	0	0	6	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	89	89	89	68	68	68	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	436	42	13	549	7	44	0	16	1	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	560	0	0	484	0	0	1045	1051	463	1050	1069	557
Stage 1	-	-	-	-	-	-	465	465	-	583	583	-
Stage 2	-	-	-	-	-	-	580	586	-	467	486	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1011	-	-	1079	-	-	207	227	599	205	221	530
Stage 1	-	-	-	-	-	-	578	563	-	498	499	-
Stage 2	-	-	-	-	-	-	500	497	-	576	551	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1007	-	-	1073	-	-	202	222	596	197	216	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	202	222	-	197	216	-
Stage 1	-	-	-	-	-	-	574	559	-	496	491	-
Stage 2	-	-	-	-	-	-	491	489	-	560	547	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			24.3			17.3		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	246	1007	-	-	1073	-	-	296
HCM Lane V/C Ratio	0.245	0.001	-	-	0.013	-	-	0.014
HCM Control Delay (s)	24.3	8.6	-	-	8.4	-	-	17.3
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0	-	-	0



HCM 2010 TWSC  
3: Robinson Rd/Driveway & Bodega Ave

Cumulative Conditions  
Timing Plan: A.M. Peak

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	0	513	68	7	461	4	48	1	22	0	0	6
Future Vol, veh/h	0	513	68	7	461	4	48	1	22	0	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	558	74	8	501	4	52	1	24	0	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	505	0	0	632	0	0	1118	1116	595	1127	1151	503
Stage 1	-	-	-	-	-	-	595	595	-	519	519	-
Stage 2	-	-	-	-	-	-	523	521	-	608	632	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1060	-	-	951	-	-	184	208	504	182	198	569
Stage 1	-	-	-	-	-	-	491	492	-	540	533	-
Stage 2	-	-	-	-	-	-	537	532	-	483	474	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1060	-	-	951	-	-	181	206	504	172	196	569
Mov Cap-2 Maneuver	-	-	-	-	-	-	181	206	-	172	196	-
Stage 1	-	-	-	-	-	-	491	492	-	540	529	-
Stage 2	-	-	-	-	-	-	526	528	-	459	474	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			29			11.4		
HCM LOS							D			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	226	1060	-	-	951	-	-	569
HCM Lane V/C Ratio	0.341	-	-	-	0.008	-	-	0.011
HCM Control Delay (s)	29	0	-	-	8.8	-	-	11.4
HCM Lane LOS	D	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1.4	0	-	-	0	-	-	0

HCM 2010 TWSC  
3: Robinson Rd/Driveway & Bodega Ave

Cumulative Conditions  
Timing Plan: P.M. Peak

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	1	437	42	14	590	7	36	0	13	1	1	2
Future Vol, veh/h	1	437	42	14	590	7	36	0	13	1	1	2
Conflicting Peds, #/hr	0	0	6	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	475	46	15	641	8	39	0	14	1	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	653	0	0	527	0	0	1183	1189	504	1186	1208	649
Stage 1	-	-	-	-	-	-	506	506	-	679	679	-
Stage 2	-	-	-	-	-	-	677	683	-	507	529	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	934	-	-	1040	-	-	166	188	568	166	183	470
Stage 1	-	-	-	-	-	-	549	540	-	441	451	-
Stage 2	-	-	-	-	-	-	443	449	-	548	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	930	-	-	1034	-	-	162	183	565	159	178	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	183	-	159	178	-
Stage 1	-	-	-	-	-	-	545	536	-	439	442	-
Stage 2	-	-	-	-	-	-	433	440	-	534	523	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			29.4			19.8		
HCM LOS							D			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	200	930	-	-	1034	-	-	247
HCM Lane V/C Ratio	0.266	0.001	-	-	0.015	-	-	0.018
HCM Control Delay (s)	29.4	8.9	-	-	8.5	-	-	19.8
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	0.1

## APPENDIX B: UPDATED ANALYSIS SYNCHRO REPORTS

HCM 2010 TWSC  
 3: Robinson Rd/Site Access & Bodega Ave

11/07/2022

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	1	425	56	6	386	8	40	1	18	21	0	6
Future Vol, veh/h	1	425	56	6	386	8	40	1	18	21	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	91	91	91	74	74	74	63	63	63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	512	67	7	424	9	54	1	24	33	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	433	0	0	579	0	0	996	995	546	1003	1024	429
Stage 1	-	-	-	-	-	-	548	548	-	443	443	-
Stage 2	-	-	-	-	-	-	448	447	-	560	581	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1127	-	-	995	-	-	223	245	538	221	235	626
Stage 1	-	-	-	-	-	-	521	517	-	594	576	-
Stage 2	-	-	-	-	-	-	590	573	-	513	500	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1127	-	-	995	-	-	218	243	538	209	233	626
Mov Cap-2 Maneuver	-	-	-	-	-	-	218	243	-	209	233	-
Stage 1	-	-	-	-	-	-	520	516	-	593	572	-
Stage 2	-	-	-	-	-	-	577	569	-	488	500	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			24.1			22.8		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	267	1127	-	-	995	-	-	245
HCM Lane V/C Ratio	0.299	0.001	-	-	0.007	-	-	0.175
HCM Control Delay (s)	24.1	8.2	-	-	8.6	-	-	22.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.2	0	-	-	0	-	-	0.6

Intersection						
Int Delay, s/veh	6.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	0	22	6	4	5	0
Future Vol, veh/h	0	22	6	4	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	24	7	4	5	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	23	5	5	0	-	0
Stage 1	5	-	-	-	-	-
Stage 2	18	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	993	1078	1616	-	-	-
Stage 1	1018	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	989	1078	1616	-	-	-
Mov Cap-2 Maneuver	989	-	-	-	-	-
Stage 1	1014	-	-	-	-	-
Stage 2	1005	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	4.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1616	-	1078	-	-
HCM Lane V/C Ratio	0.004	-	0.022	-	-
HCM Control Delay (s)	7.2	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC  
 3: Robinson Rd/Site Access & Bodega Ave

11/07/2022

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	4	362	35	12	502	16	30	0	11	15	1	3
Future Vol, veh/h	4	362	35	12	502	16	30	0	11	15	1	3
Conflicting Peds, #/hr	0	0	6	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	89	89	89	68	68	68	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	436	42	13	564	18	44	0	16	15	1	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	586	0	0	484	0	0	1074	1085	463	1078	1097	577
Stage 1	-	-	-	-	-	-	473	473	-	603	603	-
Stage 2	-	-	-	-	-	-	601	612	-	475	494	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	989	-	-	1079	-	-	198	217	599	196	213	516
Stage 1	-	-	-	-	-	-	572	558	-	486	488	-
Stage 2	-	-	-	-	-	-	487	484	-	570	546	-
Platoon blocked, %		-	-	-	-	-						
Mov Cap-1 Maneuver	985	-	-	1073	-	-	192	211	596	187	207	514
Mov Cap-2 Maneuver	-	-	-	-	-	-	192	211	-	187	207	-
Stage 1	-	-	-	-	-	-	566	552	-	482	480	-
Stage 2	-	-	-	-	-	-	477	476	-	552	540	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			25.5			23.9		
HCM LOS							D			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	235	985	-	-	1073	-	-	209
HCM Lane V/C Ratio	0.257	0.005	-	-	0.013	-	-	0.091
HCM Control Delay (s)	25.5	8.7	-	-	8.4	-	-	23.9
HCM Lane LOS		D	A	-	-	A	-	C
HCM 95th %tile Q(veh)		1	0	-	-	0	-	0.3

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	13	7	4	0
Future Vol, veh/h	0	15	13	7	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	14	8	4	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	40	4	4	0	0
Stage 1	4	-	-	-	-
Stage 2	36	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	972	1080	1618	-	-
Stage 1	1019	-	-	-	-
Stage 2	986	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	963	1080	1618	-	-
Mov Cap-2 Maneuver	963	-	-	-	-
Stage 1	1010	-	-	-	-
Stage 2	986	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	4.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1618	-	1080	-	-
HCM Lane V/C Ratio	0.009	-	0.015	-	-
HCM Control Delay (s)	7.2	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 2010 TWSC  
 3: Robinson Rd/Site Access & Bodega Ave

11/07/2022

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	1	513	68	7	465	9	48	1	22	21	0	7
Future Vol, veh/h	1	513	68	7	465	9	48	1	22	21	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	558	74	8	505	10	52	1	24	23	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	515	0	0	632	0	0	1127	1128	595	1136	1160	510
Stage 1	-	-	-	-	-	-	597	597	-	526	526	-
Stage 2	-	-	-	-	-	-	530	531	-	610	634	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1051	-	-	951	-	-	182	204	504	179	195	563
Stage 1	-	-	-	-	-	-	490	491	-	535	529	-
Stage 2	-	-	-	-	-	-	533	526	-	482	473	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1051	-	-	951	-	-	178	202	504	169	193	563
Mov Cap-2 Maneuver	-	-	-	-	-	-	178	202	-	169	193	-
Stage 1	-	-	-	-	-	-	490	491	-	534	525	-
Stage 2	-	-	-	-	-	-	521	522	-	458	473	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			29.5			25.6		
HCM LOS							D			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	223	1051	-	-	951	-	-	205
HCM Lane V/C Ratio	0.346	0.001	-	-	0.008	-	-	0.148
HCM Control Delay (s)	29.5	8.4	-	-	8.8	-	-	25.6
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.5	0	-	-	0	-	-	0.5



HCM 2010 TWSC  
 8: Site Access/Bear Meadows

11/07/2022

Intersection						
Int Delay, s/veh	5.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	6	5	6	0
Future Vol, veh/h	0	22	6	5	6	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	24	7	5	7	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	26	7	7	0	0
Stage 1	7	-	-	-	-
Stage 2	19	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	989	1075	1614	-	-
Stage 1	1016	-	-	-	-
Stage 2	1004	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	985	1075	1614	-	-
Mov Cap-2 Maneuver	985	-	-	-	-
Stage 1	1012	-	-	-	-
Stage 2	1004	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	3.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1614	-	1075	-	-
HCM Lane V/C Ratio	0.004	-	0.022	-	-
HCM Control Delay (s)	7.2	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC  
 3: Robinson Rd/Site Access & Bodega Ave

11/07/2022

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Vol, veh/h	4	437	42	14	603	17	36	0	13	15	1	3
Future Vol, veh/h	4	437	42	14	603	17	36	0	13	15	1	3
Conflicting Peds, #/hr	0	0	6	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	60	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	475	46	15	655	18	39	0	14	16	1	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	677	0	0	527	0	0	1208	1219	504	1211	1233	668
Stage 1	-	-	-	-	-	-	512	512	-	698	698	-
Stage 2	-	-	-	-	-	-	696	707	-	513	535	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	915	-	-	1040	-	-	160	180	568	159	177	458
Stage 1	-	-	-	-	-	-	545	536	-	431	442	-
Stage 2	-	-	-	-	-	-	432	438	-	544	524	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	912	-	-	1034	-	-	155	175	565	152	172	456
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	175	-	152	172	-
Stage 1	-	-	-	-	-	-	540	531	-	428	434	-
Stage 2	-	-	-	-	-	-	422	430	-	528	519	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			30.8			28.9		
HCM LOS							D			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	192	912	-	-	1034	-	-	171
HCM Lane V/C Ratio	0.277	0.005	-	-	0.015	-	-	0.121
HCM Control Delay (s)	30.8	9	-	-	8.5	-	-	28.9
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.1	0	-	-	0	-	-	0.4

Intersection						
Int Delay, s/veh	5.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	13	8	4	0
Future Vol, veh/h	0	15	13	8	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	14	9	4	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	41	4	4	0	-	0
Stage 1	4	-	-	-	-	-
Stage 2	37	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	970	1080	1618	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	985	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	961	1080	1618	-	-	-
Mov Cap-2 Maneuver	961	-	-	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	985	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	4.5	0
HCM LOS	A		

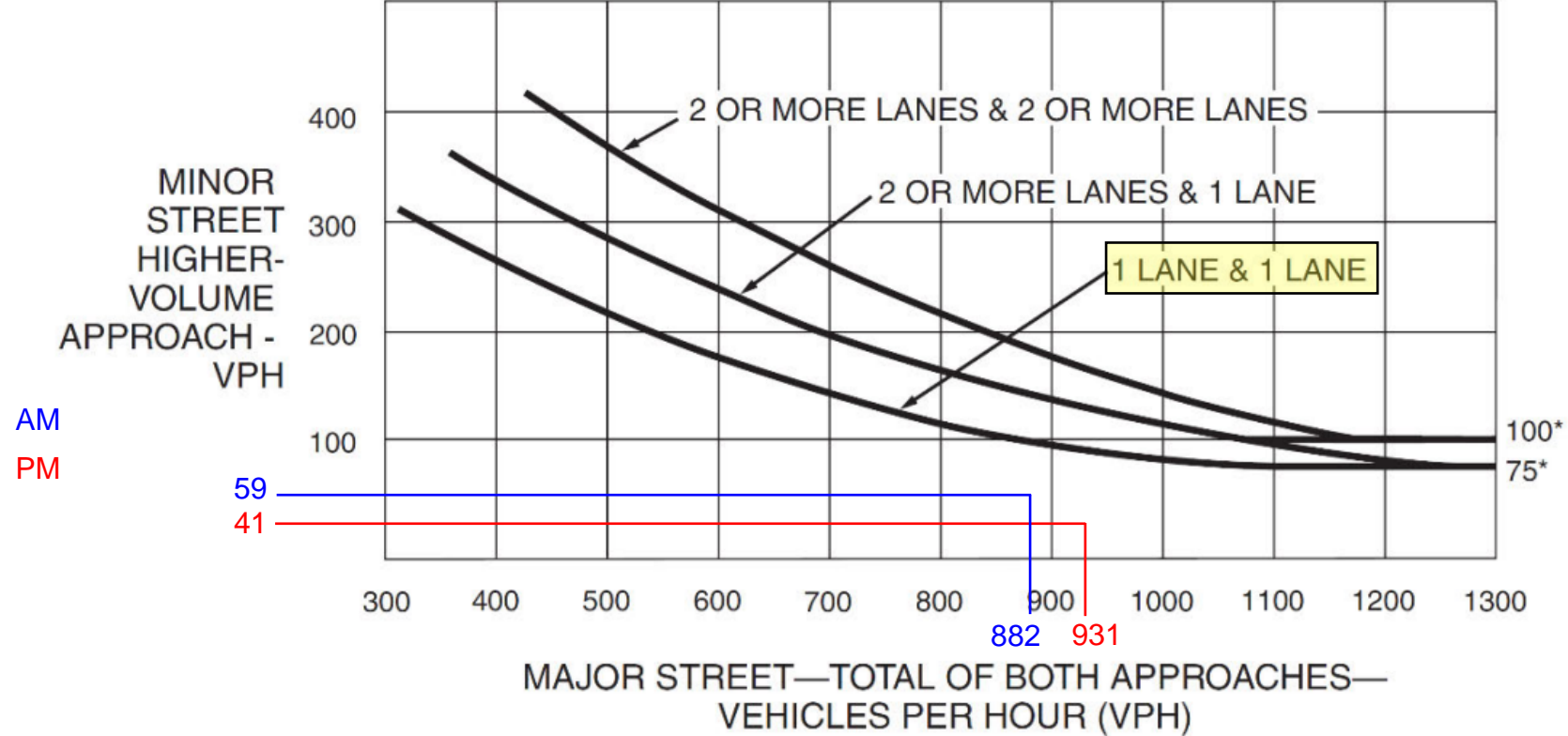
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1618	-	1080	-	-
HCM Lane V/C Ratio	0.009	-	0.015	-	-
HCM Control Delay (s)	7.2	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

**APPENDIX C: UPDATED SIGNAL WARRANT ANALYSIS (CAMUTCD WARRANT 3)**

# Existing + Project (Revised Volumes)

## CAMUTCD (Rev 6, March 30, 2021)

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**  
 (COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

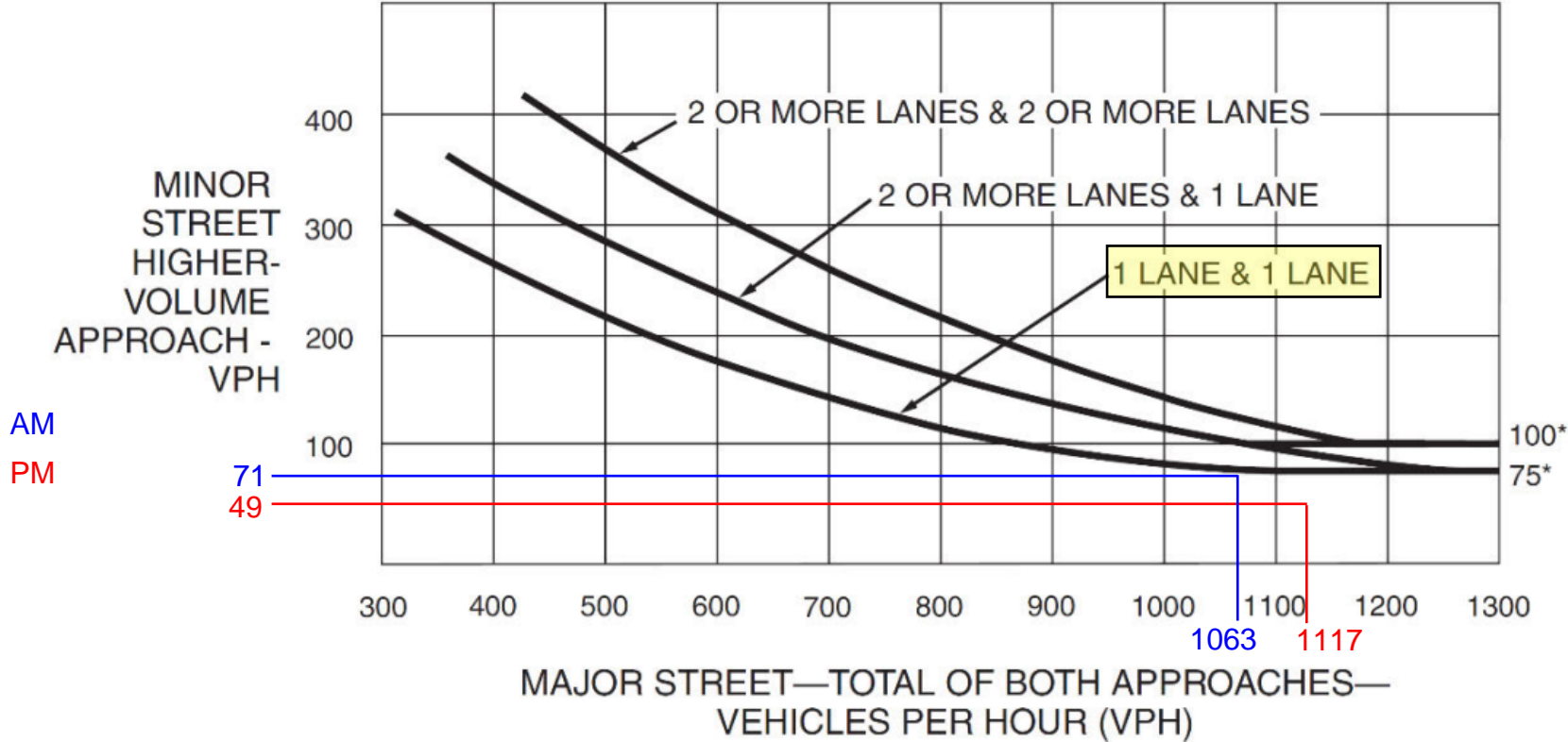


\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

# Cumulative + Project (Revised Volumes)

## CAMUTCD (Rev 6, March 30, 2021)

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**  
 (COMMUNITY LESS THAN 10,000 POPULATION 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 D: CITY COMMENTS (EXCERPT)**



52. The project as proposed by the applicant will have two access points, one on the east side aligned with Robinson Road and a western access which would be midblock between Robinson Road and Nelson Way-Gold Ridge Farm. The western access will need to be restricted to right-turn movements in and out, with no left-turn access due to proximity to the Nelson/Bodega intersection, as well as an existing concrete median preventing left turns at this location. Prior to the approval of the first building permit, the applicant shall provide an updated traffic analysis to address the following:

- a. Due to the concerns of traffic safety at the intersection of Bodega Avenue/Robinson Road which serves the project's main access, the intersection needs be evaluated to determine if a traffic signal were warranted with the addition of project. It should be noted that the estimated traffic volumes for the project in the previous traffic study were incorrect (as previously noted). These traffic volumes, which should include all of the project's left-turn in and left-turn out traffic, shall be updated. These volumes shall then be used to calculate traffic signal warrants for the Robinson Road intersection.
- b. The existing townhome development to the east (Bear Meadows) gains access directly to the Bodega Avenue/Robinson Road intersection. The current design plans for the project access will likely cause delay to this existing traffic. This issue shall be examined further using a queuing analysis to determine if the design of the access needs to change so as not to cause significant delay to the existing townhome traffic. This analysis shall be submitted to the City for review and approval, and any potential additional conditions. These conditions/modifications shall be incorporated into the building permit submittal.
- c. If project construction is phased, both access points will be required to be completed in the first phase of construction prior to occupancy. The project shall provide an interim plan to provide the access needed to serve truck traffic during construction as part of any Construction Management Plan.

53. Developer shall be responsible for the installation of pedestrian crossing improvements at the Bodega Avenue/Robinson Road intersection on the westerly side of Bodega Avenue. Said crossing improvement shall consist of Bodega Avenue crosswalk markings and signage, ADA curb ramps, and new pedestrian-activated flashing Rapid Rectangular Flashing Beacon (RRFB) or other pedestrian safety requirements as needed based on the required Traffic Analysis.