Memorandum

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

To: Sunny Ghia, PE, QSD
Ghia Management Services, Inc.
25 E. Airway Blvd
Livermore, CA 94551

From: Mario Tambellini, PE, TE
Pranesh Tarikere, PE

Date: July 28, 2023

Subject: **Brentwood Popeyes Fast Food Restaurant Local Traffic Analysis (LTA)**

INTRODUCTION

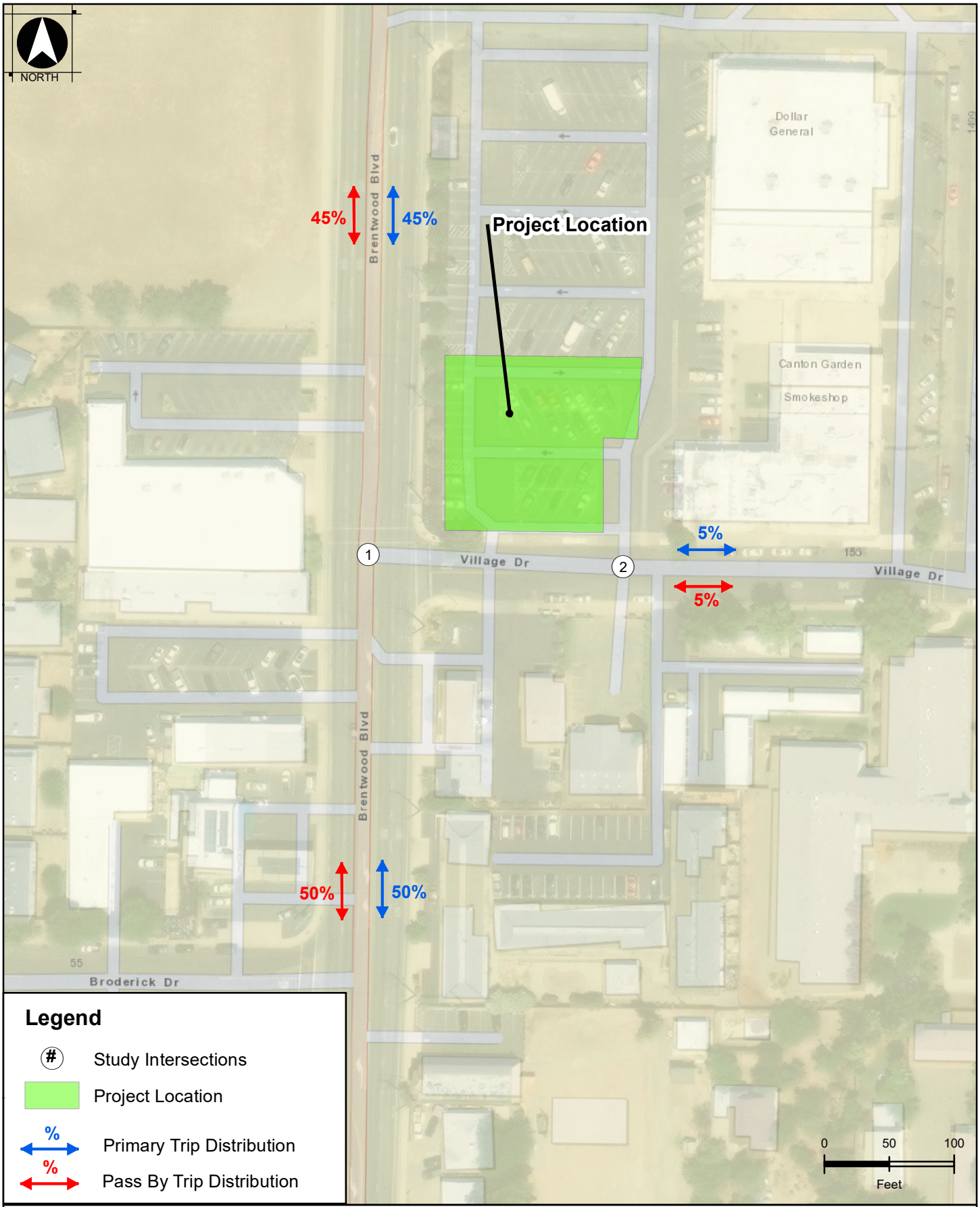
This Local Traffic Analysis (LTA) has been prepared to present the results of a traffic assessment for the proposed Popeyes Fast Food Restaurant Project (Project) located in the City of Brentwood (City). The Project would construct a Popeyes restaurant with drive-through on a site located on the existing southwest area of the Brentwood Plaza Shopping Center at the northwest corner of the intersection of Brentwood Boulevard & Village Drive. The Project location is shown in **Figure 1**. There is a currently a Dollar General and several small retail businesses located along the eastern portion of the Project site. The Project would demolish the existing parking located in the southwest corner of this retail center. This LTA includes the following:

- Project trip generation
- Intersection and roadway operations analysis
- Site access analysis, including Project driveway throat length
- Discussion of Project impact on existing multimodal facilities
- On-site parking evaluation
- Drive-through queueing analysis

This LTA has been prepared based on the 2014 *City of Brentwood General Plan* and the 2011 *Brentwood Boulevard Specific Plan.*

PROJECT DESCRIPTION

The Project proposes to construct a 2,583 square-foot Popeyes restaurant with a drive-through on a site that currently contains parking for various existing retail buildings. Project access would be provided via an existing driveway on Village Drive located approximately 200 feet east of the intersection of Brentwood Boulevard with Village Drive. There is one additional existing driveway on Brentwood Boulevard that serves the Brentwood Plaza Shopping Center to the north of the Project site, however, this analysis conservatively assumes all Project traffic would utilize the existing driveway on Village Drive. The 2014 *City of Brentwood General Plan* designates the site as part of the 2011 *Brentwood Boulevard Specific Plan* (BBSP), which accommodates a range of residential, commercial, office, mixed use, and other complementary uses that encourage the revitalization of the Brentwood Boulevard corridor within the Brentwood Boulevard Specific Plan area. According to the BBSP's Zoning Map, the site is zoned Mixed Use Commercial/Office/Industrial/Residential (COIR). The Project site plan is included in **Attachment A**.



Project Location and Study Vicinity

Brentwood Popeyes LTA

Brentwood, CA

July 2023

Figure 1

WOOD RODGERS

J:\4000-s\4742001_Brentwood_Popeyes\GIS\Tasks\Fig_1_Location_and_Facilities_Dist.mxd 7/13/2023 11:51:06 AM Randerson

ANALYSIS SCENARIOS AND STUDY FACILITIES

Weekday Midday peak hour and Weekday PM peak hour Intersection operations were studied under the following scenarios:

- Existing Conditions
- Existing Plus Project Conditions

The following intersections and roadway facilities were included in this analysis:

Study Intersections:

1. Brentwood Boulevard & Village Drive
2. Brentwood Plaza Shopping Center Driveway & Village Drive

The study facilities are shown in **Figure 1**.

ANALYSIS METHODOLOGY

INTERSECTION OPERATIONS ANALYSIS

Synchro 11 software and Highway Capacity Manual, 6th Edition (HCM 6th Edition) methodology was used to determine intersection delay and LOS operations under Existing and Existing Plus Project weekday Midday and PM peak hour conditions.

For signalized intersections, the intersection delays and LOS reported are the average values for the whole intersection. For one-way stop-controlled (OWSC) intersections, the worst approach/movement delay and LOS is reported. The delay-based HCM 6th Edition LOS criteria for different types of intersection controls are outlined in **Table 1**.

Table 1. HCM 6th Edition Intersection LOS Thresholds

Level of Service	Description	Intersection Control Delay (seconds/vehicle)	
		Unsignalized	Signalized
A	Free-flow conditions with negligible to minimal delays.	delay ≤ 10.0	delay ≤ 10.0
B	Good progression with slight delays.	10.0 < delay ≤ 15.0	10.0 < delay ≤ 20.0
C	Relatively higher delays.	15.0 < delay ≤ 25.0	20.0 < delay ≤ 35.0
D	Somewhat congested conditions with longer but tolerable delays.	25.0 < delay ≤ 35.0	35.0 < delay ≤ 55.0
E	Congested conditions with significant delays.	35.0 < delay ≤ 50.0	55.0 < delay ≤ 80.0
F	Jammed or grid-lock type operating conditions.	delay > 50.0	delay > 80.0
Source: HCM 6th Edition Exhibit 19-8 and 20-2.			

LEVEL OF SERVICE CRITERIA

The City's General Plan Circulation Element Policy CIR 1-4 states that when a traffic analysis indicates that the Level of Service (LOS) for a street designated as a Route of Regional Significance should be maintained at "D" or better. Policy CIR 1-5 states that intersections that are unsignalized and not designated as Routes of Regional Significance shall be maintained at "D" or better, with controlled movements allowed at "E" or "F" if the intersection operates at LOS "C" overall, and/or if the "Peak Hour" signal warrant remains unmet. As both study intersections are unsignalized and Brentwood Boulevard is classified as a Route of Regional Significance, based on City general Plan requirements, the minimum acceptable LOS for the study intersections is considered to be LOS "D".

Signal Warrants

California Manual on Uniform Traffic Control Devices (CA MUTCD) Peak Hour Signal Warrant #3 was used to evaluate the potential need for installation of a traffic signal at the intersection of Brentwood Boulevard & Village Drive.

OPERATIONS ANALYSIS

Existing Traffic Volumes

Weekday Midday and PM peak hour turning movement counts were collected on Thursday, January 12, 2023 between 11:30 AM to 1:30 PM and between 4:00 PM to 6:00 PM. Traffic data count sheets are included in **Attachment B**. A summary of the lane geometry and intersection turning movements for Existing conditions are presented in **Figures 2** and **3**, respectively.

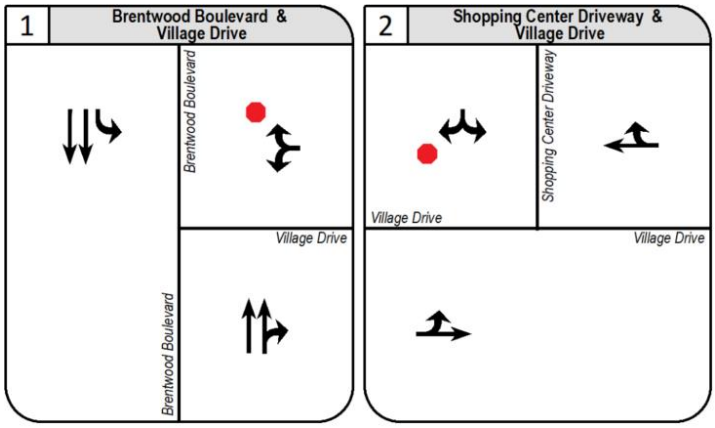


Figure 2. Existing Conditions Lane Geometrics and Control

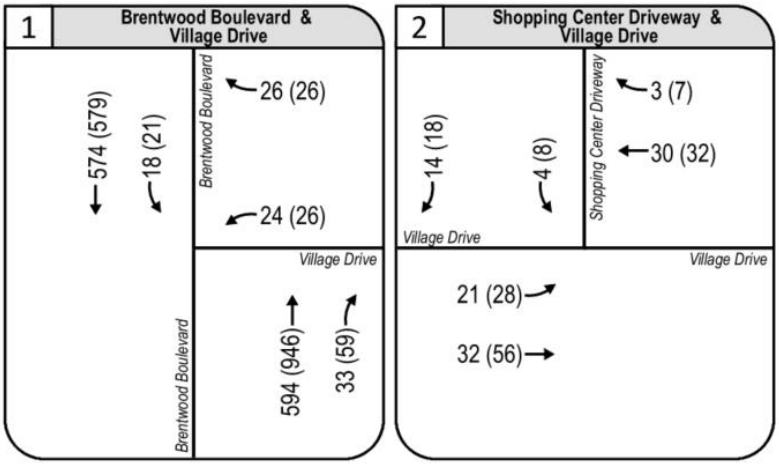


Figure 3. Existing Conditions Traffic Volumes

Project Trip Generation and Distribution

The trip generation data contained in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition,* was used to estimate the number of trips generated by the Project. The ITE land use category of Fast-Food Restaurant with Drive Through (ITE Code 934) was used to represent the Project. **Table 2** shows the Project trip generation estimate.

Table 2. Project Trip Generation

Land Use	Quantity	Units	Daily	Midday Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Fast Food (with drive-through)[1]	2.583	KSF[2]	1,208	67	65	132	44	41	85
Pass-By Trips (Daily/Midday/PM = 55%)[3]			*664*	*36*	*36*	*72*	*24*	*23*	*47*
Primary Trips[4]			***544***	***31***	***29***	***60***	***20***	***18***	***38***

Notes:
[1]The daily trip rate is based on the fitted curve equation and peak hour trip rates are based on the average rates for the proposed land use consistent with information contained in the ITE Trip Generation Manual, 11th Edition. Midday trip generation is based on weekday PM peak hour of generator rates.
[2]KSF = thousand square feet
[3]PM Pass-By percentages are based on data contained in the ITE Trip Generation Manual, 11th Edition Pass-By Tables Appendices.
[4]Primary Trips = Generated Trips - Pass-By Trips

As illustrated in Error! Reference source not found., the proposed Project is anticipated to generate a total of 544 daily primary trips, 60 Midday peak hour primary trips (31 inbound, 29 outbound), and 38 PM peak hour primary trips (20 inbound, 18 outbound) under typical weekday traffic demand conditions.

Project trips were assigned to the surrounding roadway network based on the following distribution, which was developed based on Project characteristics, existing travel patterns, and knowledge of the area. Primary Project trips and pass-by trips were assigned to the roadway network based on distributions shown in **Figure 1**. Pass-by trips are considered vehicle trips currently on the local roadway network that would make a short diversion to visit the project site. In this case, pass-by trips were considered to originate from vehicles traveling northbound or southbound on Brentwood Boulevard and eastbound and westbound on Village Drive.

Primary and pass-by distributions are illustrated in **Figure 1**. Primary Project Trip assignment is shown in **Figure 4** and Pass-by Project Trip assignment is shown in **Figure 5**. Primary project trips and pass-by trips are added to Existing volumes to obtain Existing Plus Project peak hour volumes, which are shown in **Figure 6**.

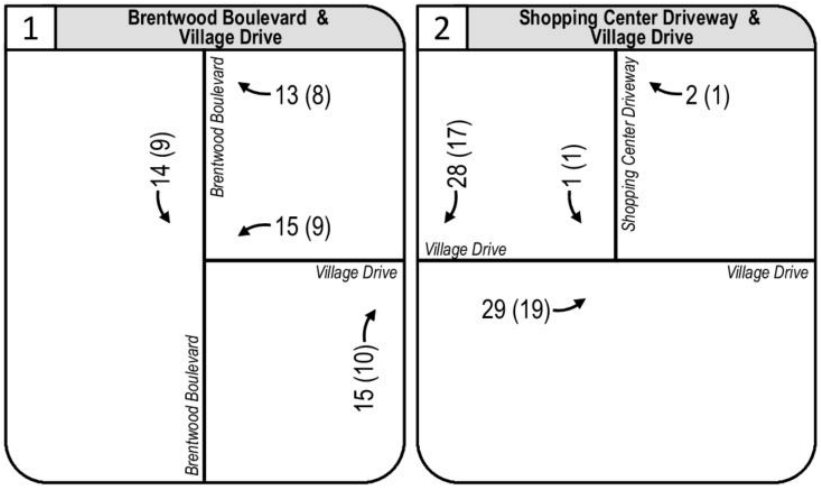


Figure 4. Primary Project Trip Assignment – Midday Peak Hour (PM Peak Hour)

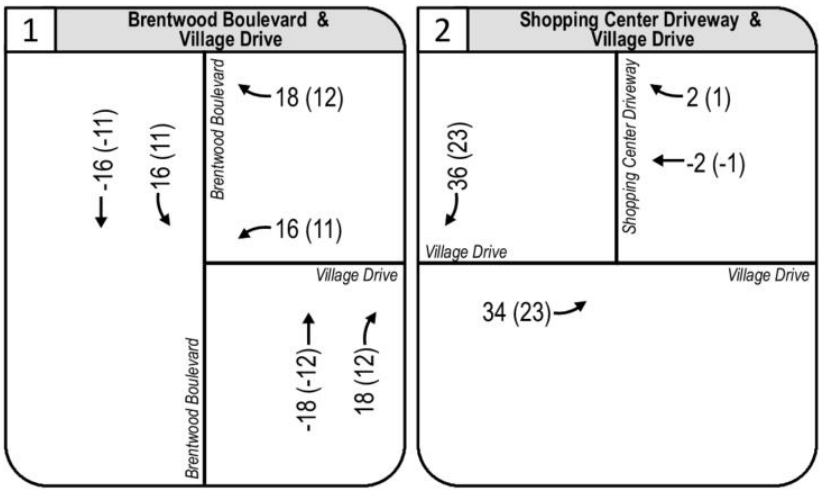


Figure 5. Pass-By Project Trip Assignment – Midday Peak Hour (PM Peak Hour)

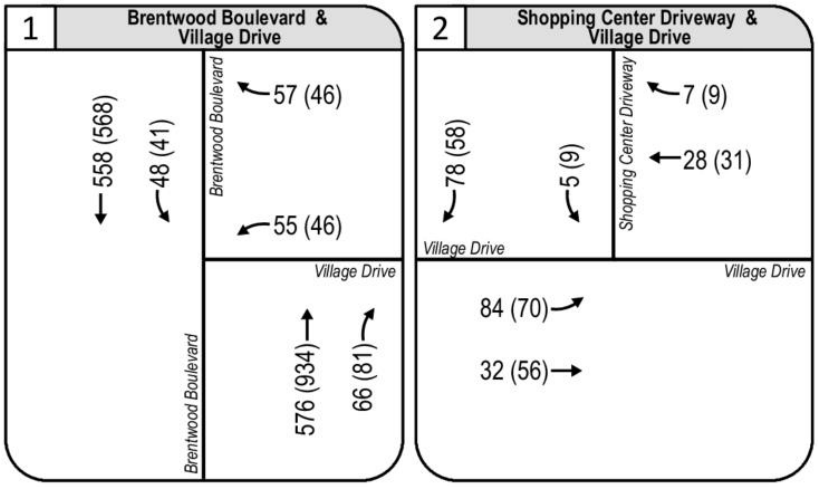


Figure 6. Existing Plus Project Conditions Traffic Volumes – Midday Peak Hour (PM Peak Hour)

INTERSECTION LEVEL OF SERVICE

Table 3 presents a summary of the intersection LOS operations under weekday Midday and PM peak hour Existing and Existing Plus Project conditions.

As shown in **Table 3**, all intersections operate at acceptable LOS (LOS "D" or better) under Existing and Existing Plus Project conditions. Synchro software HCM 6th Edition intersection LOS output reports are included in **Attachment C**.

CA MUTCD Peak Hour Signal Warrant #3 is currently unmet at the Brentwood Boulevard & Village Drive intersection. Signal warrant worksheets are provided in **Attachment D**.

Table 3. Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Existing		Wrnt Met?[3]	Existing Plus Project		Wrnt Met?
					Delay (sec/veh)[2]	LOS		Delay (sec/veh)[2]	LOS	
1	Brentwood Boulevard & Village Drive	OWSC[1]	D	Midday	13.2	B	No	15.1	C	No
				PM	19.8	C	No	23.9	C	No
2	Brentwood Plaza Shopping Center Driveway & Village Drive	OWSC[1]	D	Midday	8.8	A	-	9.1	A	-
				PM	8.9	A	-	9.0	A	-

Notes:
[1] OWSC = One-Way Stop-Controlled
[2] For OWSC, the worst approach/movement delay and LOS is reported.
[3] Wrnt Met? = Peak Hour Signal Warrant #3

INTERSECTION QUEUEING ANALYSIS

Vehicle queuing was analyzed at the study intersections for all stop-controlled movements and movements with turn pockets that the Project would add trips to. **Table 4** shows the available storage lengths and 95th percentile queues under all analysis scenarios. As shown in **Table 4**, all 95th percentile queues are anticipated to be accommodated by the existing available storage for all study scenarios.

Table 4. Queueing Analysis Results

#	Intersection	Movement	Available Storage (ft)[1]	Peak Hour	95th Percentile Queue (ft)	
					Existing	Existing Plus Project
1	Brentwood Boulevard & Village Drive	SBL	80	Midday	<20	<20
				PM	<20	<20
		WB	115	Midday	<20	<20
				PM	<20	30
2	Brentwood Plaza Shopping Center Driveway & Village Drive	SB	--	Midday	<20	<20
				PM	<20	<20

Notes: One queued vehicle length is considered to be 20 feet long.
[1] For stop-controlled movements, available storage represents the distance to the nearest cross-street.

INTERNAL SITE CIRCULATION AND PARKING

BRENTWOOD PLAZA SHOPPING CENTER DRIVEWAY THROAT LENGTH

The throat length for vehicles exiting the Brentwood Plaza Shopping Center Driveway onto Village Drive is approximately 100 feet. The 95th percentile queues for the southbound approach of the Project driveway are projected to be one vehicle (approximately 20 feet) or less under Existing Plus Project conditions. Thus, the throat length is considered sufficient based on the 95th percentile queues shown in the Synchro output reports included in **Attachment C**.

TRANSIT, BICYCLES, AND PEDESTRIANS

Transit service in the City of Brentwood is provided by Tri Delta Transit (TDT). The nearest transit stops to the Project site are located within 200 feet of the Brentwood Boulevard & Village Drive intersection and are served by the 391, 300X and 384 Bus Routes, located approximately 200 and 300 feet from the site. The 391 Brentwood Park & Ride/Pittsburg Center Station, 300X Brentwood Park & Ride/Antioch BART, and 384 Brentwood Park & Ride/Antioch BART serves the Tri Delta Transit system. The Tri Delta Transit service is

accessible from the Project site via existing pedestrian facilities along Brentwood Boulevard. The Project is not anticipated to adversely affect existing transit facilities.

Existing striped bike lanes are present along Brentwood Boulevard north and south of Village Drive. Based on the Project site plan, adequate onsite bicycle parking and storage for patrons will be provided.

Existing sidewalks are present along both sides of Brentwood Boulevard and Village Drive within the Project vicinity, with existing curb ramps and pedestrian crossings present on two of the three legs of the Brentwood Boulevard & Village Drive intersection. The Project would provide connectivity to the existing sidewalk 40 feet north of the northeast corner of the Brentwood Boulevard & Village Drive intersection. The Project would provide adequate connectivity to existing bicycle and pedestrian facilities.

PARKING

Based on requirements outlined in Section 17.620.012 of the City Zoning Ordinance, the Project is required to provide 1 parking space per 100 square foot gross floor area (GFA), plus 1 space per 50 square feet of gross floor area used for other assembly uses. However, when located in shopping centers, the number of required parking spaces may be reduced at the time of issuance of a conditional use permit. The Project proposes to provide 15 total parking spaces, including two (2) accessible parking space, plus an additional 140 parking spaces exist in the surrounding Brentwood Plaza Shopping Center. As the Project is located within a larger shopping center, the existing shared parking spaces would likely accommodate Project customers.

DRIVE-THROUGH QUEUEING ANALYSIS

A drive-through queueing analysis was performed for the Project based on data collected at other Popeye restaurants within 15 miles of the Project site. Drive-through queueing data over five-minute intervals was collected on Tuesday, June 06, 2023, between 12 PM to 1 PM and 5 PM to 6 PM, at the following locations:

- Popeyes at 5019 Lone Tree Way, Antioch, CA
- Popeyes at 101 Carol Lane, Oakley, CA
- Popeyes at 1283 East Leland Road, Pittsburg, CA

Drive-through queueing data is included in **Attachment E**. A summary of the drive-through queue data is included in **Table 5**.

Table 5. Maximum Drive-Through Queueing at Near-by Popeyes Restaurants

Location	Available Drive-Through Storage (ft)[1]	Max Observed Queue (veh (ft))	
		Noon	PM
Popeyes at 5019 Lone Tree Way, Antioch	150	6 (120')	6 (120')
Popeyes at 101 Carol Lane, Oakley	150	5 (100')	6 (120')
Popeyes at 1283 East Leland Road, Pittsburg	115	8 (160')	7 (140')

Notes:
[1] Available drive-through storage is measured from the drive-through entrance to the order pick-up window(s).

The Pittsburg location was shown to experience the highest maximum queue of 8 vehicles (approximately 160 feet) during the Midday peak hour.

Based on the maximum queue data collected at the near-by Popeyes locations, the Project is likely to experience a maximum drive-through queue of 8 vehicles. As shown in **Attachment A**, the Project site plan would provide total queue storage of approximately 370 feet, or room for approximately 18 vehicles, and would therefore accommodate the maximum projected drive-through queue of 8 vehicles. The Project site also includes dual order boards. Projected maximum queues would not block the Brentwood Plaza Shopping Center Driveway of the Popeyes parking lot area.

CONCLUSION

The proposed Project is anticipated to generate a total of 544 daily primary trips, 60 Midday peak hour primary trips (31 inbound, 29 outbound), and 38 PM peak hour primary trips (20 inbound, 18 outbound) under typical weekday traffic demand conditions.

Intersection LOS at all study intersections was projected to be acceptable (LOS "D" or better) under all study scenarios. CA MUTCD Peak Hour Signal Warrant #3 is currently unmet at the Brentwood Boulevard & Village Drive intersection. All 95th percentile queues are anticipated to be accommodated by the existing available storage for all study scenarios.

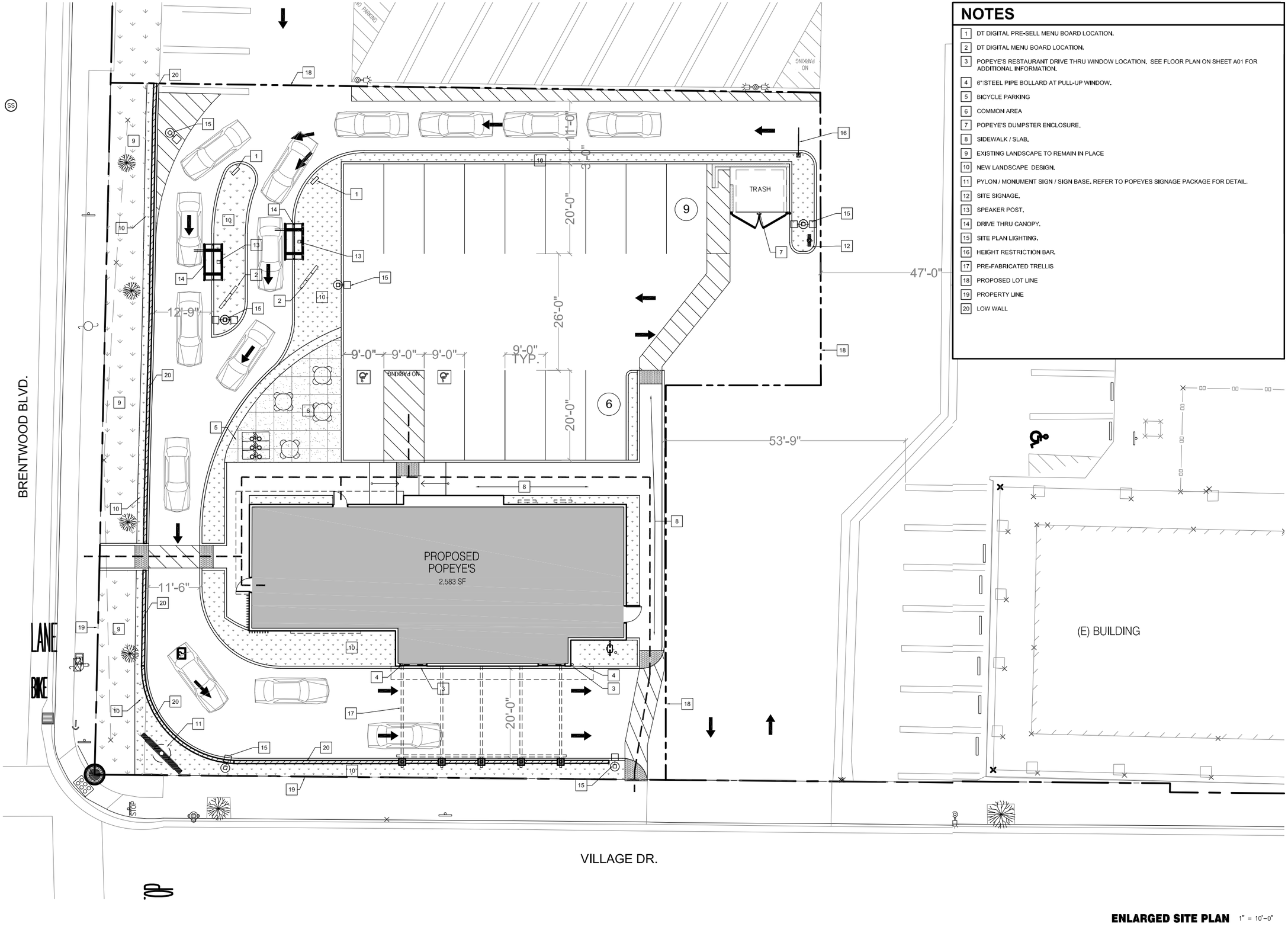
The throat length for vehicles exiting the Project driveway onto Village Drive is approximately 100-feet. The 95th percentile queues for the southbound approach of the Project driveway are projected to be one vehicle (approximately 20 feet) or less under Existing Plus Project conditions. Thus, the driveway throat length is considered sufficient.

The Project would provide adequate connectivity to existing bicycle and pedestrian facilities. The Project proposes to provide 15 total parking spaces, including two (2) accessible parking spaces, with additional parking provided by existing spaces within the Brentwood Plaza Shopping Center.

A drive-through queueing analysis was performed for the Project based on data collected at similar drive-through restaurants within 15 miles of the Project vicinity, including Antioch, Oakley, and Pittsburg. Of the three sites, the Pittsburg location experience the maximum drive-through queue of 8 vehicles. The Project site has dual order boards and allow for a total drive-through queueing capacity of 18 vehicles. Based on the maximum queues collected at similar Popeyes sites, the Project is likely to experience a maximum drive-through queue of 8 vehicles. The Project site would accommodate the maximum projected drive-through queue.

ATTACHMENT A

PROJECT SITE PLAN



NOTES

1. DT DIGITAL PRE-SELL MENU BOARD LOCATION.
2. DT DIGITAL MENU BOARD LOCATION.
3. POPEYE'S RESTAURANT DRIVE THRU WINDOW LOCATION. SEE FLOOR PLAN ON SHEET A01 FOR ADDITIONAL INFORMATION.
4. 6" STEEL PIPE BOLLARD AT PULL-UP WINDOW.
5. BICYCLE PARKING
6. COMMON AREA
7. POPEYE'S DUMPSTER ENCLOSURE.
8. SIDEWALK / SLAB.
9. EXISTING LANDSCAPE TO REMAIN IN PLACE
10. NEW LANDSCAPE DESIGN.
11. PYLON / MONUMENT SIGN / SIGN BASE. REFER TO POPEYES SIGNAGE PACKAGE FOR DETAIL.
12. SITE SIGNAGE.
13. SPEAKER POST.
14. DRIVE THRU CANOPY.
15. SITE PLAN LIGHTING.
16. HEIGHT RESTRICTION BAR.
17. PRE-FABRICATED TRELLIS
18. PROPOSED LOT LINE
19. PROPERTY LINE
20. LOW WALL

New Popeys w/ Existing stripping

New proposed stalls at popeyes	15
(E) Accessible stalls	6
(E) Center stalls	63
(E) Permiter stalls	48
(E) Stalls behind bldg	23
Total	**155**

AGJM DESIGN STUDIO

PROJECT MANAGER: MIKE JIBAJA
15998 SKYRIDGE DR
RIVERSIDE, CA 92503
T: 909.520.3381
E: MIKE@AGJMDESIGN.COM

CLIENT: SUNNY GHAI
GHAI MANAGEMENT SERVICES, INC.
25 E. AIRWAY BLVD.
LIVERMORE CA
T: 510.573.5905
E: SUNNY@GHAIMANAGEMENT.COM

IMPROVEMENT AREA:

18,746 SF

TOTAL PARKING STALLS:

10 STANDARD STALLS
2 ACCESSIBLE STALLS

ADDRESS:
BRENTWOOD BLVD.
BRENTWOOD CA, 94513

ASSESSORS #: 016-150-106-9
ZONING: BBSP
LOT SIZE: 3.4 ACRES

POPEYES

PROPOSED ENLARGED SITE PLAN

03.22.23

ENLARGED SITE PLAN 1" = 10'-0"

ATTACHMENT B

TRAFFIC COUNTS

Prepared by National Data & Surveying Services

Brentwood Laundromat Parking Dwy & Village Dr

Peak Hour Turning Movement Count

ID: 23-080009-002
City: Brentwood

Day: Thursday
Date: 1/12/2023

PEAK HOURS	
AM	NONE
NOON	11:45 AM - 12:45 PM
PM	04:15 PM - 05:15 PM

COUNT PERIODS	
AM	NONE
NOON	11:30 AM - 01:30 PM
PM	4:00 PM - 06:00 PM

SOUTHBOUND — Brentwood Laundromat Parking Dwy

AM	0	0	0	0	0	AM
NOON	14	0	4	0	24	NOON
PM	18	0	8	0	34	PM

EASTBOUND — Village Dr

AM	NOON	PM	
0	43	51	⇦
0	0	1	↶ 0
0	21	27	↱ 0
0	32	56	→ 0
0	0	0	↴ 0
AM	NOON	PM	

WESTBOUND — Village Dr

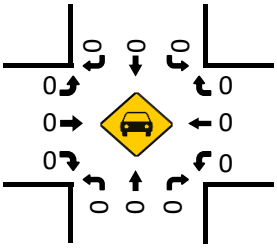
PM	NOON	AM	
7	3	0	↰ 0
32	29	0	← 0
0	0	0	↰ 0
0	1	0	↶ 0
64	37	0	⇨
PM	NOON	AM	

NORTHBOUND — Brentwood Laundromat Parking Dwy

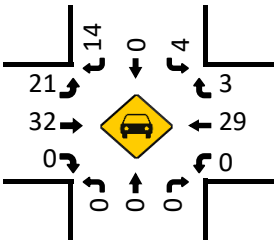
PM	0	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

CONTROL			
No Control			
TEV	0 AM	104 NOON	149 PM
PHF		0.74	0.93

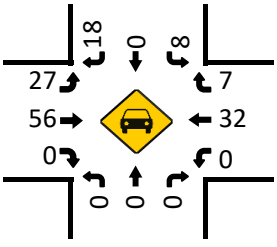
Totals (AM)



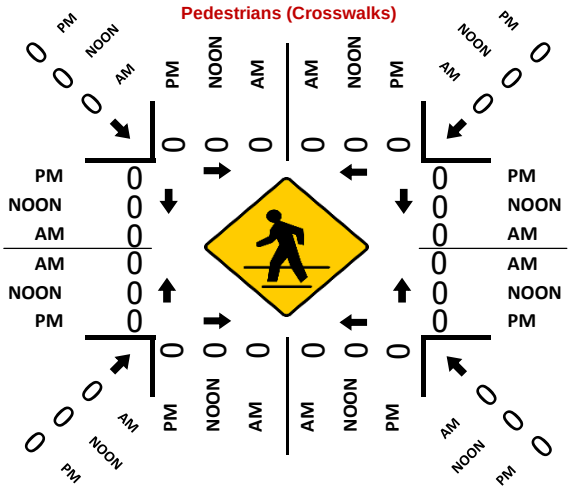
Totals (NOON)



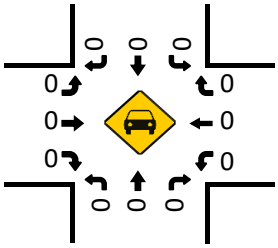
Totals (PM)



Pedestrians (Crosswalks)



Totals (AM)



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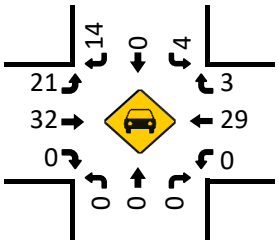
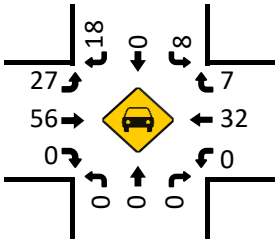


Totals (PM)



Prepared by National Data & Surveying Services

Brentwood Blvd & Village Dr

Peak Hour Turning Movement Count

ID: 23-080009-001
City: Brentwood

Day: Thursday
Date: 1/12/2023

PEAK HOURS	COUNT PERIODS
NONE	NONE
12:00 PM - 01:00 PM	11:30 AM - 01:30 PM
04:30 PM - 05:30 PM	4:00 PM - 06:00 PM

SOUTHBOUND (Brentwood Blvd)

AM	0	0	0	0	0	AM
NOON	0	574	18	0	620	NOON
PM	0	579	21	0	972	PM

EASTBOUND (Village Dr)

AM	NOON	PM	
0	0	0	⇦
0	0	0	↶ 0
0	0	0	→ 0
0	0	0	↷ 0
0	0	0	⇩

WESTBOUND (Village Dr)

	PM	NOON	AM
0 ↷	26	26	0
0 ←	0	0	0
0 ↶	25	24	0
0 ↶	1	0	0
⇨	81	51	0

CONTROL

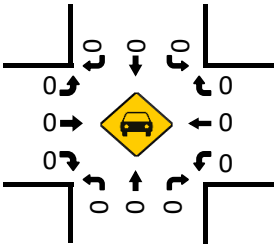
1-Way Stop(WB)

TEV	0 AM	1269 NOON	1657 PM
PHF		0.99	0.89

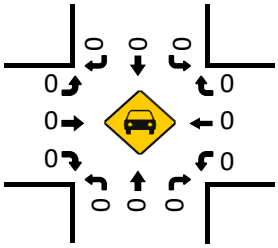
NORTHBOUND (Brentwood Blvd)

PM	604	0	0	946	59	PM
NOON	598	0	0	594	33	NOON
AM	0	0	0	0	0	AM

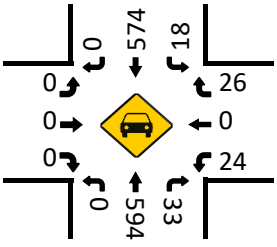
Totals (AM)



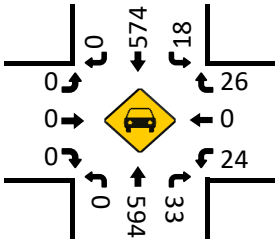
Totals (AM)



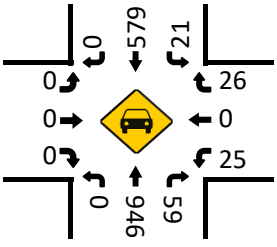
Totals (NOON)



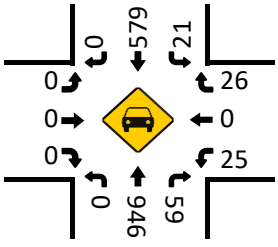
Totals (NOON)



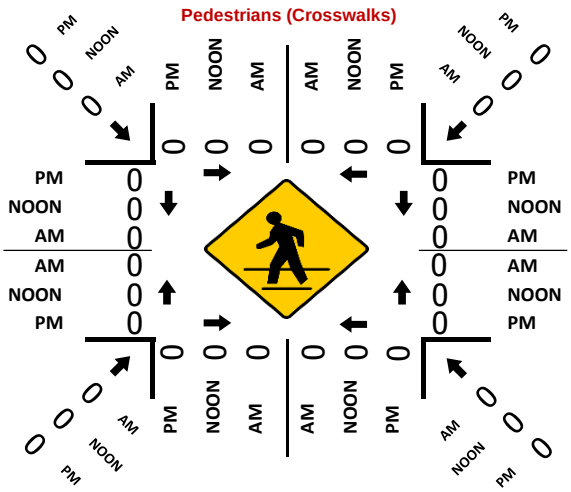
Totals (PM)



Totals (PM)



Pedestrians (Crosswalks)



ATTACHMENT C

SYNCHRO HCM 6TH EDITION REPORTS

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	26	594	33	18	574
Future Vol, veh/h	25	26	594	33	18	574
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	-	-	-	80	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	26	600	33	18	580

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	943	317	0	0	633	0
Stage 1	617	-	-	-	-	-
Stage 2	326	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	261	679	-	-	946	-
Stage 1	501	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	256	679	-	-	946	-
Mov Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	691	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	488	946	-
HCM Lane V/C Ratio	-	-	0.106	0.019	-
HCM Control Delay (s)	-	-	13.2	8.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	32	30	3	4	14
Future Vol, veh/h	21	32	30	3	4	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	43	41	4	5	19

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	45	0	-	0	142	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	99	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1563	-	-	-	851	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	925	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1563	-	-	-	836	1027
Mov Cap-2 Maneuver	-	-	-	-	836	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	925	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1563	-	-	-	977
HCM Lane V/C Ratio	0.018	-	-	-	0.025
HCM Control Delay (s)	7.3	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	26	946	59	21	579
Future Vol, veh/h	25	26	946	59	21	579
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	-	-	-	80	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	29	1063	66	24	651

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1470	565	0	0	1129	0
Stage 1	1096	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	118	468	-	-	615	-
Stage 1	282	-	-	-	-	-
Stage 2	666	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	113	468	-	-	615	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	282	-	-	-	-	-
Stage 2	640	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.8	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	301	615	-
HCM Lane V/C Ratio	-	-	0.19	0.038	-
HCM Control Delay (s)	-	-	19.8	11.1	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	28	56	32	7	8	18
Future Vol, veh/h	28	56	32	7	8	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	60	34	8	9	19

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	42	0	-	0	158	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	120	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1567	-	-	-	833	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	905	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1567	-	-	-	816	1034
Mov Cap-2 Maneuver	-	-	-	-	816	-
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	905	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1567	-	-	-	955
HCM Lane V/C Ratio	0.019	-	-	-	0.029
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	54	57	576	66	48	558
Future Vol, veh/h	54	57	576	66	48	558
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	-	-	-	80	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	55	58	582	67	48	564

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	994	325	0	0	649	0
Stage 1	616	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	242	671	-	-	933	-
Stage 1	501	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	230	671	-	-	933	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	629	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	470	933	-
HCM Lane V/C Ratio	-	-	0.239	0.052	-
HCM Control Delay (s)	-	-	15	9.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.9	0.2	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	84	32	28	7	5	77
Future Vol, veh/h	84	32	28	7	5	77
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	43	38	9	7	104

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	47	0	-	0	314	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	271	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1560	-	-	-	679	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1560	-	-	-	628	1027
Mov Cap-2 Maneuver	-	-	-	-	628	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	775	-

Approach	EB	WB	SB
HCM Control Delay, s	5.4	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1560	-	-	-	989
HCM Lane V/C Ratio	0.073	-	-	-	0.112
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	46	934	81	41	568
Future Vol, veh/h	46	46	934	81	41	568
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	-	-	-	80	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	52	1049	91	46	638

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1506	570	0	0	1140	0
Stage 1	1095	-	-	-	-	-
Stage 2	411	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	112	465	-	-	609	-
Stage 1	282	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	103	465	-	-	609	-
Mov Cap-2 Maneuver	213	-	-	-	-	-
Stage 1	282	-	-	-	-	-
Stage 2	590	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.9	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	292	609	-
HCM Lane V/C Ratio	-	-	0.354	0.076	-
HCM Control Delay (s)	-	-	23.9	11.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	1.5	0.2	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	56	31	9	9	58
Future Vol, veh/h	70	56	31	9	9	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	60	33	10	10	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	248	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	210	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1566	-	-	-	740	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	825	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1566	-	-	-	703	1034
Mov Cap-2 Maneuver	-	-	-	-	703	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	825	-

Approach	EB	WB	SB
HCM Control Delay, s	4.1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1566	-	-	-	972
HCM Lane V/C Ratio	0.048	-	-	-	0.074
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

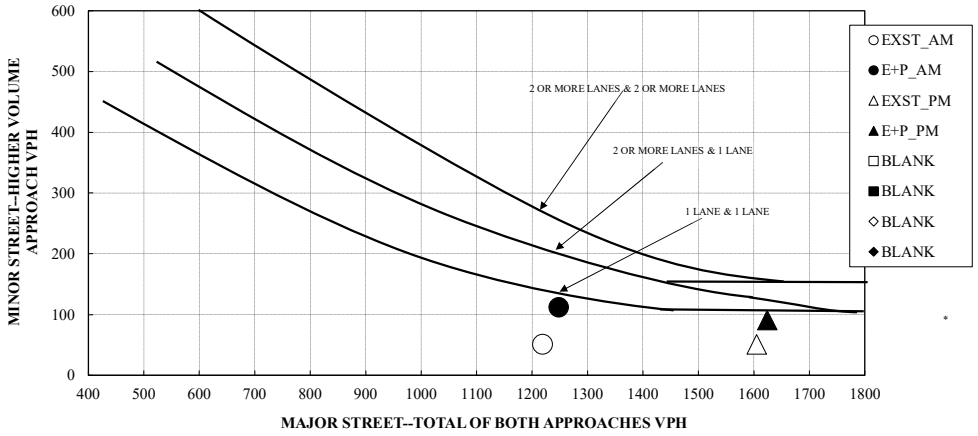
ATTACHMENT D

CA MUTCD PEAK HOUR SIGNAL WARRANT #3

CA SIGNAL WARRANT 3 ANALYSIS

SCENARIOS: "AM/PM PEAK HOUR" CONDITIONS

FIGURE 4C-3 WARRANT 3 PEAK HOUR VOLUME (CALIFORNIA MUTCD)



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

SCENARIO	APPROACH(ES)		WARRANT MET?
	MAJOR	MINOR	
EXST_AM	1219	51	NO
E+P_AM	1248	112	NO
EXST_PM	1605	51	NO
E+P_PM	1624	91	NO
BLANK	0	0	NO
BLANK	0	0	NO
BLANK	0	0	NO
BLANK	0	0	NO

Note: Major approach is the total of both approaches. Minor approach is the highest of both approaches.

Date: **July 13, 2023** Intersection No.: **1**

Intersection: **Brentwood Blvd & Village Dr**

Number of lanes on MAJOR street: **2**

Number of lanes on MINOR street: **1**

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

ATTACHMENT E

DRIVE-THROUGH QUEUEING DATA

Prepared by National Data & Surveying Services

MAX QUEUE

Location: Popeyes Louisiana Kitchen, 5019 Lone Tree Wy
City: Antioch, CA
Date: 6/6/2023 (Tuesday)

MAX Queue Length (# of vehicles)		
TIME	Drive Thru Queue From Pickup Window to End of Queue	Notes
12:00 PM	4	
12:05 PM	4	
12:10 PM	5	
12:15 PM	6	
12:20 PM	4	
12:25 PM	3	
12:30 PM	3	
12:35 PM	2	
12:40 PM	6	
12:45 PM	5	
12:50 PM	4	
12:55 PM	5	
5:00 PM	2	
5:05 PM	2	
5:10 PM	2	
5:15 PM	2	
5:20 PM	2	
5:25 PM	2	
5:30 PM	6	
5:35 PM	6	
5:40 PM	5	
5:45 PM	4	
5:50 PM	3	
5:55 PM	2	
Totals	89	

Prepared by National Data & Surveying Services

MAX QUEUE

Location: Popeyes Louisiana Kitchen, 101 Carol Ln
City: Oakley, CA
Date: 6/6/2023 (Tuesday)

MAX Queue Length (# of vehicles)		
TIME	Drive Thru Queue From Pickup Window to End of Queue	Notes
12:00 PM	4	
12:05 PM	2	
12:10 PM	5	
12:15 PM	4	
12:20 PM	3	
12:25 PM	3	
12:30 PM	2	
12:35 PM	2	
12:40 PM	2	
12:45 PM	2	
12:50 PM	2	
12:55 PM	3	
5:00 PM	2	
5:05 PM	4	
5:10 PM	3	
5:15 PM	1	
5:20 PM	1	
5:25 PM	0	
5:30 PM	2	
5:35 PM	3	
5:40 PM	4	
5:45 PM	6	
5:50 PM	4	
5:55 PM	5	
Totals	69	

Prepared by National Data & Surveying Services

MAX QUEUE

Location: Popeyes Louisiana Kitchen, 1283 E Leland Rd
City: Pittsburg, CA
Date: 6/6/2023 (Tuesday)

MAX Queue Length (# of vehicles)		
TIME	Drive Thru Queue From Pickup Window to End of Queue	Notes
12:00 PM	5	
12:05 PM	3	
12:10 PM	7	
12:15 PM	8	
12:20 PM	8	
12:25 PM	7	
12:30 PM	6	
12:35 PM	6	
12:40 PM	4	
12:45 PM	3	
12:50 PM	2	
12:55 PM	6	
5:00 PM	4	
5:05 PM	5	
5:10 PM	5	
5:15 PM	7	
5:20 PM	6	
5:25 PM	5	
5:30 PM	5	
5:35 PM	3	
5:40 PM	3	
5:45 PM	4	
5:50 PM	4	
5:55 PM	3	
Totals	119	