Hexagon Transportation Consultants, Inc.

Memorandum

Date: February 13, 2026

To: Caroline Layden

From: Gary Black, AICP and Huy Tran, T.E.

Subject: Transportation Study for the Proposed Emblem Hercules Residential Development in Hercules, California

Hexagon Transportation Consultants, Inc. has completed a transportation study for the proposed Emblem Hercules residential development located at 625 Willow Avenue in Hercules, California. The study includes a Vehicle Miles Traveled (VMT) analysis to satisfy CEQA requirements, as well as an operations analysis for intersections in the immediate vicinity of the project site, a site access analysis, and an on-site circulation review.

The project site is generally bounded by Willow Avenue to the south, the eastbound I-80 off-ramp to the east and north, and the I-80 freeway to the west (see Figure 1). The proposed development includes 180 multi-family residential units on a currently vacant site. Vehicle access would be provided via a full-access driveway on Willow Avenue and a separate gated emergency access point located between this driveway and the I-80 off-ramp (see Figure 2). The project would also construct a marked mid-block crosswalk across Willow Avenue at the project driveway to provide a direct pedestrian connection to the Hercules Transit Center (see Figure 1). In addition, sidewalks would be constructed along the project's Willow Avenue frontage extending to the San Pablo Avenue/Sycamore Avenue intersection to provide pedestrian access between the project site and nearby destinations.

Vehicle Miles Traveled

Under CEQA, transportation impacts are evaluated using VMT rather than roadway congestion or level of service. This change, required by Senate Bill 743, shifts the focus from reducing vehicle delay to reducing overall vehicle travel, greenhouse gas emissions, and automobile dependence in support of statewide climate and sustainability goals. Reducing VMT is intended to reduce greenhouse gas emissions, support sustainable land use patterns, and promote multimodal transportation options.

VMT measures the total miles traveled by personal motorized vehicles generated by a project on a typical weekday. Residential developments located near major transit stops, employment centers, and complementary land uses tend to generate fewer and shorter vehicle trips. Proximity to frequent transit services provides a convenient alternative to driving, encourages transit use, and reduces reliance on personal vehicles, thereby lowering VMT.

Figure 1
Project Site Location

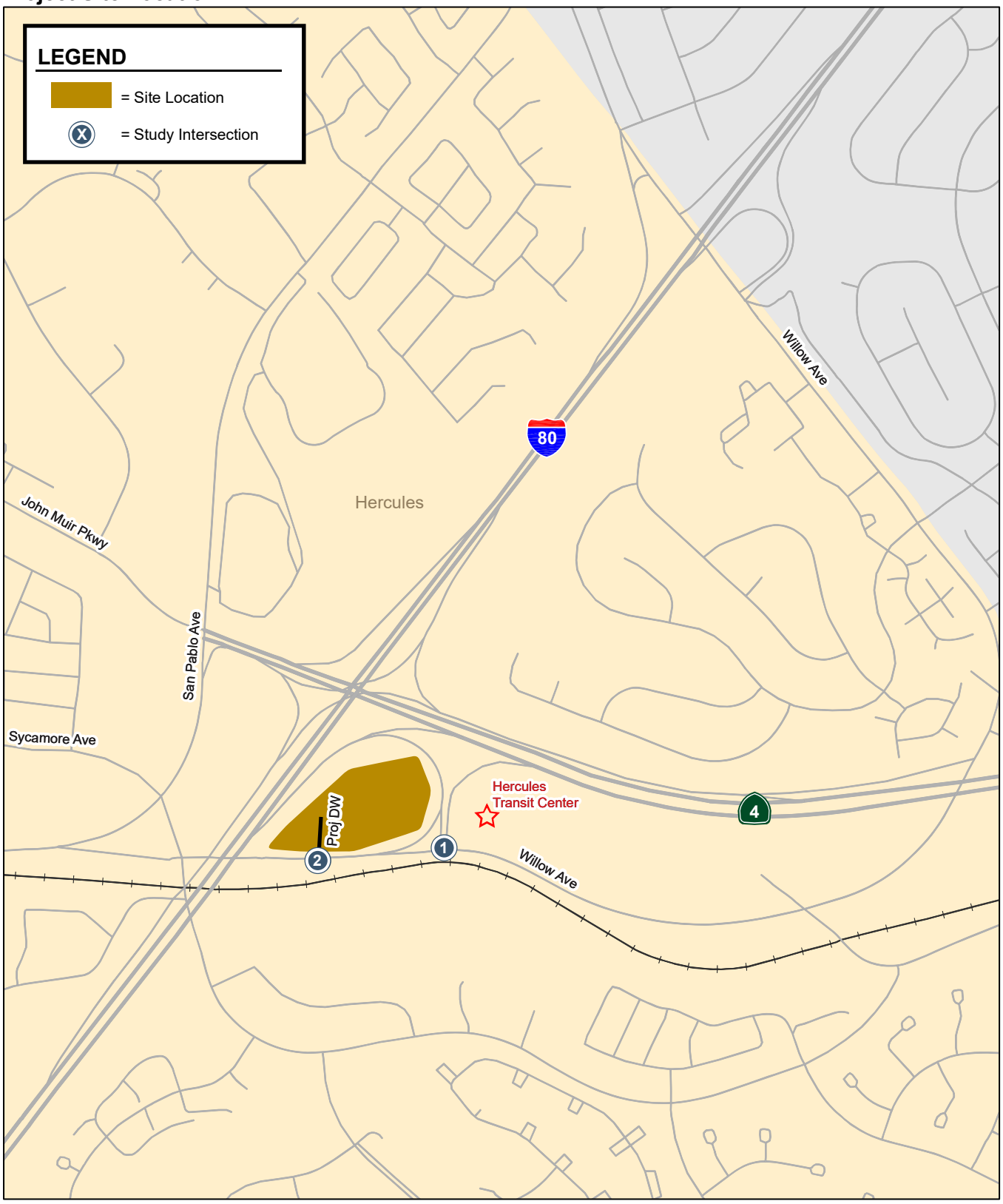
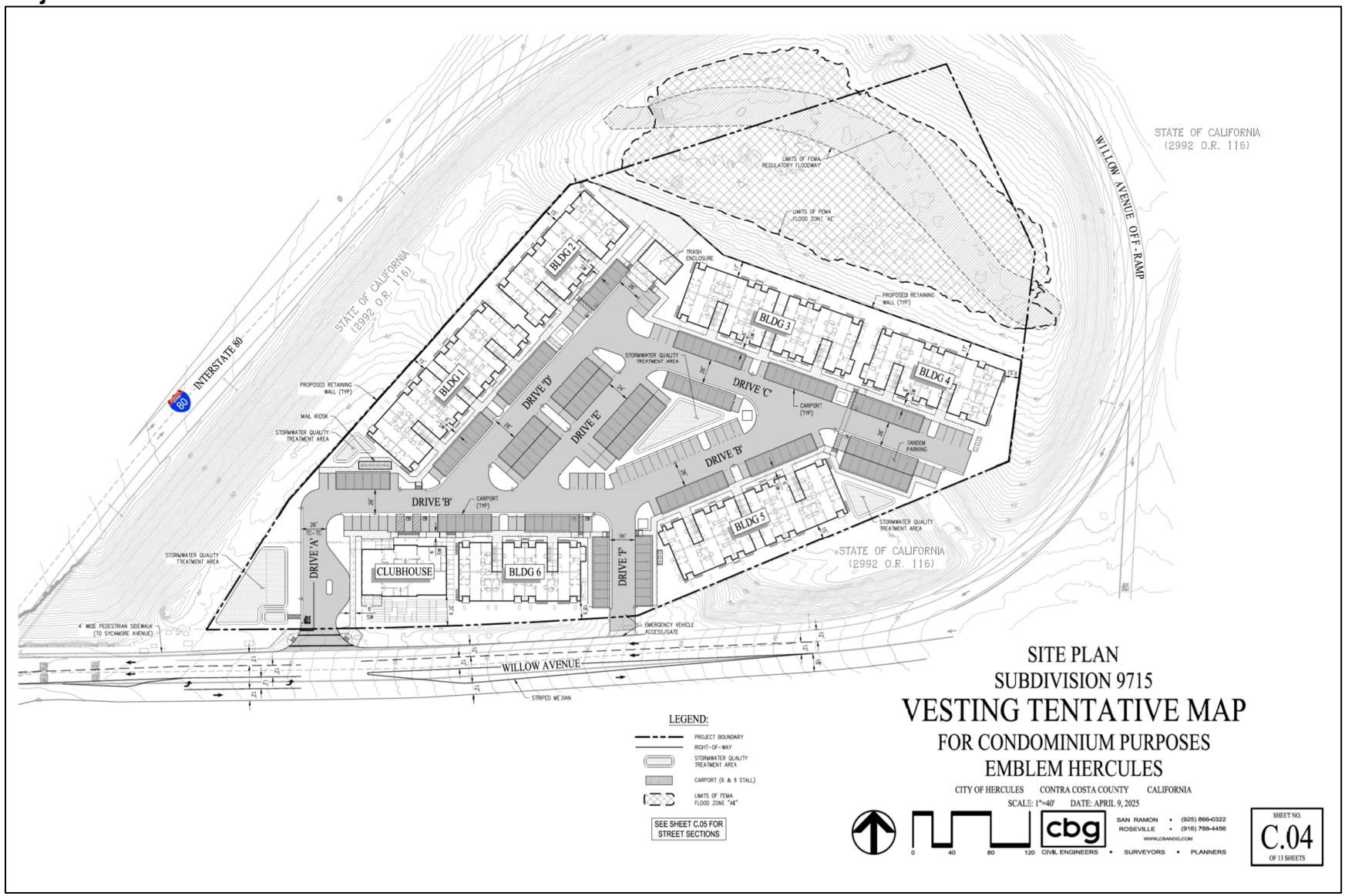


Figure 2
Project Site Plan



VMT Analysis

Since the City of Hercules does not have an adopted VMT policy, the VMT analysis adheres to the guidance provided in the Contra Costa County Transportation Analysis Guidelines, dated June 23, 2020. These guidelines include a VMT screening criterion stating that residential projects located within ½ mile of an existing major transit stop are presumed to have a less-than-significant impact under CEQA and do not require further VMT analysis. The County guidelines reference a service frequency interval of 15 minutes or less for two intersecting bus routes based on Public Resources Code Section 21064.3. However, Assembly Bill 2553, signed into law in September 2024, amended this section by increasing the qualifying bus service frequency interval from 15 to 20 minutes during peak commute periods.

The project site is located within ½ mile of the Hercules Transit Center, which qualifies as a major transit stop because it is served by two or more colinear major bus routes, defined as routes that run along the same street or corridor in the same general direction for a meaningful segment, with headways of 20 minutes or less during peak commute periods. Pedestrians traveling between the project site and the transit center would cross Willow Avenue at the proposed mid-block crosswalk at the project driveway, proceed east along the south side of Willow Avenue, and then cross Willow Avenue at the existing marked crosswalk east of the I-80 northbound off-ramp and SR 4 eastbound on-ramp. This approximately ¼-mile route (see Figure 3) represents the shortest legal walking path and is considered an acceptable walking distance, as confirmed by the City.

Given that the project is located within ½ mile of a qualifying major transit stop, it is presumed to have a less-than-significant VMT impact under CEQA, and a project-level VMT analysis is not required.

Operations Analysis

This study includes an analysis of the following two intersections.

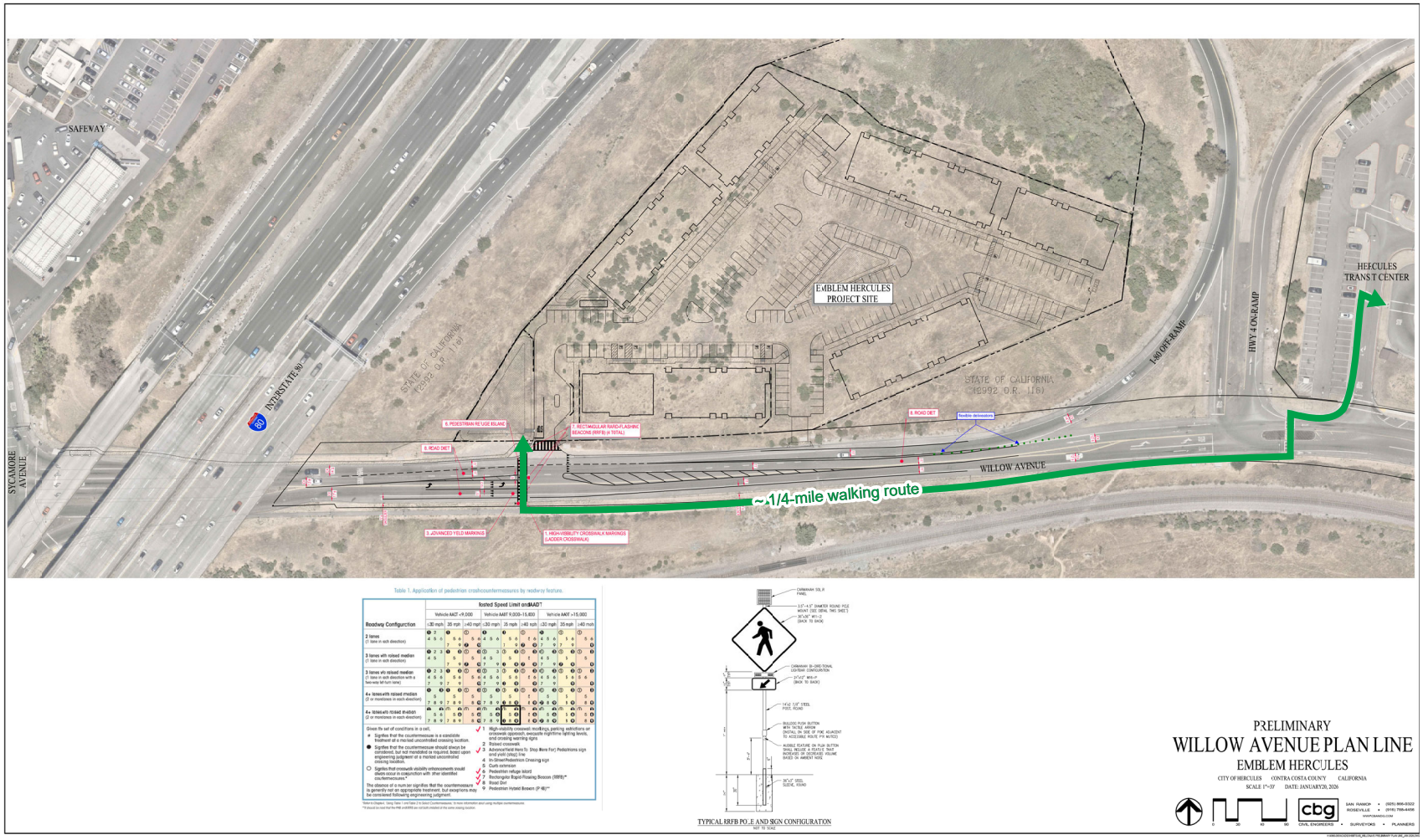
1. I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue
2. Project Driveway and Willow Avenue

Traffic conditions at both study intersections were analyzed for the weekday AM and PM peak hours. The weekday AM peak hour of traffic is generally between 7:00 AM and 9:00 AM, and the weekday PM peak hour is typically between 4:00 PM and 6:00 PM. These periods represent the most congested traffic conditions on a typical weekday. The methodology and results of the analysis are discussed below.

Project Trip Generation, Distribution, and Assignment

The magnitude of traffic generated by a new development and the locations where that traffic would appear are estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the amount of traffic entering and exiting the site is estimated for the AM and PM peak hours. During the trip distribution step, an estimate is made regarding the directions from which and to which the project trips would travel. In the trip assignment step, the project trips are assigned to specific roadways and intersections within the study area. These procedures are further described in the following sections.

Figure 3
¼-Mile Walking Route between Project Site and Hercules Transit Center



Trip Generation

Through empirical research, data have been collected to quantify the amount of traffic produced by various types of land uses. This research is compiled in the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th Edition (2021). The standard trip generation rates from this manual can be applied to predict future traffic increases resulting from a new development. The rates published for "Multifamily Housing (Low-Rise)" (ITE Land Use 220) were used to estimate the trips generated by the proposed residential project with three-story buildings. This land use category includes condominiums, as proposed by the project, in buildings with two or three floors and at least three dwelling units. Additionally, the PM peak-hour trip estimates were based on ITE's time-of-day distribution (see Attachment 1) to provide a conservative estimate of project trips.

Based on the recommended rates and the size of the proposed development, it is estimated that the project would generate 1,299 daily trips, with 79 trips (19 inbound and 60 outbound) occurring during the AM peak hour and 116 trips (73 inbound and 43 outbound) occurring during the PM peak hour (see Table 1).

Table 1
Project Trip Generation Estimates

			AM Peak Hour						PM Peak Hour					
		Daily		Split		Trips				Split		Trips		
Proposed Land Use	Size	Rate[1]	Trip	Rate[1]	In	Out	In	Out	Total	Rate[2]	In	Out	In	Out	Total
Residential	180 Dwelling Units	6.828	1,229	0.437	24%	76%	19	60	79	0.647	63%	37%	73	43	116

Notes:
[1]Equation trip generation rates per dwelling unit are based on the ITE's Trip Generation Manual, 11th Edition for Land Use Code 220 (Multifamily Housing (Low-Rise) in a General Urban/Suburban area.
[2]Based on ITE's time of day distribution (see attachment).

Trip Distribution and Assignment

The directional distribution of site-generated traffic was forecasted based on existing travel patterns, the relative locations of complementary land uses in the area, and information from previous traffic studies conducted for nearby developments. The peak-hour trips associated with the proposed project were added to the transportation network in accordance with the distribution patterns discussed above (see Figure 4).

Traffic Volumes

Existing conditions are represented by traffic counts collected for the study intersections in September 2024. Project trips, as determined in the project trip assignment, were then added to the existing traffic volumes to obtain the existing plus project traffic volumes. The traffic counts are provided in Attachment 1, and the traffic volumes are shown in Figure 5 and tabulated in Attachment 2.

Figure 4
Project Trip Distribution and Assignment

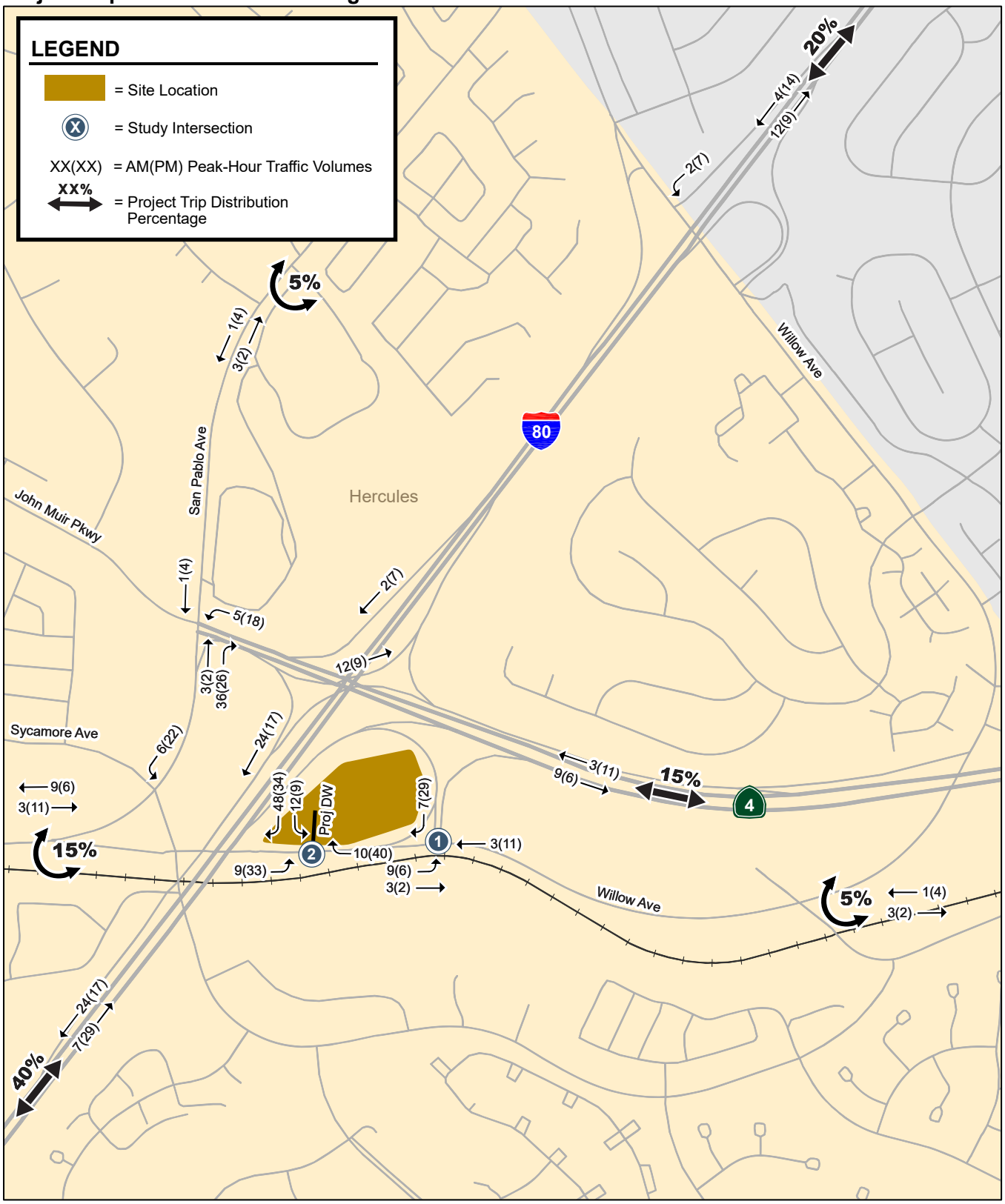
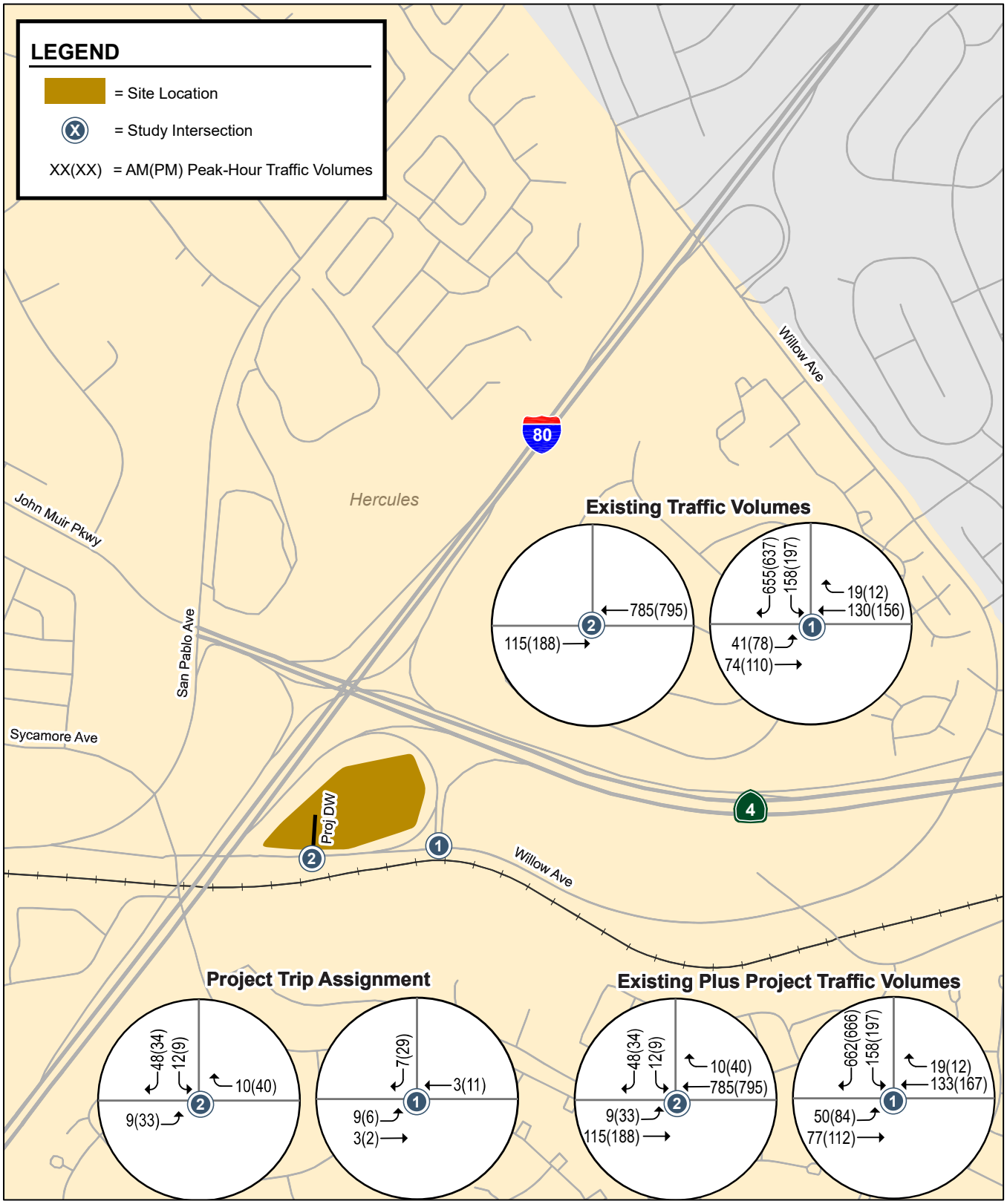


Figure 5
Traffic Volumes



Study Intersection Evaluation

Traffic operations at the study intersection and project driveway were evaluated based on level of service analysis, queuing analysis, peak-hour signal warrant analysis, left-turn warrant analysis, and sight distance analysis. Each analysis is described below.

Level of Service

Methodology

Traffic operations at the study intersections were evaluated using the latest Highway Capacity Manual, 7th Edition (HCM7), level of service (LOS) methodology with the latest Synchro software. For unsignalized intersections, the level of service is determined by the average control delay experienced by vehicles stopping at the intersection. The weighted average delay for the entire intersection and the corresponding LOS are reported for all-way stop-controlled intersections, while the worst movement delay and the corresponding LOS are reported for one-way stop-controlled intersections. The correlation between average delay and level of service for unsignalized intersections is shown in Table 2.

Table 2
Unsignalized Intersection Level of Service Based on Average Delay

Level of Service	Description	Average Delay Per Vehicle (Sec.)
A	Little or no traffic delay	10.0 or less
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays	greater than 50.0

Source: Transportation Research Board, *Highway Capacity Manual, 7th Edition* (Washington, D.C., 2022).

Level of Service Standard

Caltrans
Caltrans has established a level of service (LOS) standard between C and D for all its facilities. Therefore, this study considers LOS C as the standard for the intersection of the I-80 NB Off-Ramp/SR 4 EB On-Ramp at Willow Avenue, which is under Caltrans' jurisdiction.

City of Hercules
The City of Hercules General Plan has established LOS D as the standard for Willow Avenue near the project site. The project driveway/Willow Avenue intersection is under the jurisdiction of the City of Hercules and is subject to the LOS D standard.

Level of Service Analysis

The results of the intersection level of service analysis (see Table 3 and Attachment 3) indicate that both study intersections are projected to operate at acceptable levels of service during both the AM and PM peak hours under existing plus project conditions, in accordance with the applicable level of service standards mentioned above.

Queuing Analysis

The queuing analysis is based on 95th percentile queue lengths from Synchro. The results show that the projected 95th percentile queue lengths at the study locations during both the AM and PM peak hours under existing plus project conditions could be accommodated within the existing or planned storage capacities (see Table 4 and Attachment 3).

Peak-Hour Signal Warrant Analysis

Traffic conditions at the unsignalized study intersections were assessed to determine if a traffic signal would be warranted based on the peak-hour volume signal warrant (Warrant #3) outlined in the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD). This method indicates whether current and projected peak-hour traffic levels would justify installing a traffic signal.

The peak-hour signal warrant analysis shows that projected traffic volumes during both the AM and PM peak hours under existing plus project conditions fall below the threshold warranting signalization at either study intersection. The peak-hour signal warrant checks are provided in Attachment 4.

Site Access

The project site would include two access points on Willow Avenue. The primary access, labeled “Drive A,” would be a full-access driveway approximately 26 feet wide, providing two-way circulation for vehicles entering and exiting the site. This driveway would serve as the main point of ingress and egress for residents and visitors. Adjacent to Drive A would be a drop-off/pick-up area in front of the clubhouse.

A secondary access point, labeled “Drive F,” would be located east of the full-access driveway, between Drive A and the I-80 northbound off-ramp. It would be gated and designated for emergency vehicle access only.

The project would construct a marked mid-block crosswalk across Willow Avenue at the project driveway, as well as sidewalks along its Willow Avenue frontage extending to the San Pablo Avenue/Sycamore Avenue intersection. The mid-block crosswalk would provide a direct pedestrian connection toward the Hercules Transit Center. After crossing at the project driveway, pedestrians would proceed east along the south side of Willow Avenue and use the existing marked crosswalk east of the I-80 northbound off-ramp and SR 4 eastbound on-ramp to access the transit center. The sidewalk improvements would also provide pedestrian access between the project site and nearby destinations.

Table 3
Level of Service Analysis Summary

#	Intersection	Jurisdiction	LOS Standard	Control	Peak Hour	Count Date	Existing Delay[1] (sec)	Existing LOS	Existing plus Project Delay[1] (sec)	Existing plus Project LOS	Change in Delay
1	I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue	Caltrans	C	AWSC	AM	09/10/24	9.2	A	9.2	A	0.0
					PM	09/10/24	9.6	A	9.7	A	0.1
2	Project Driveway and Willow Avenue	Hercules	D	OWSC	AM	09/10/24	--	--	15.4	C	--
					PM	09/10/24	--	--	15.0	C	--

Notes:
[1] The reported delay and level of service for an all-way stop-controlled intersection correspond to the weighted average delay of the entire intersection. The reported delay and level of service for a one-way stop-controlled intersection correspond to the movement with the highest (worst) delay.
AWSC = all-way stop-control and OWSC = one-way stop-control

Table 4
Queuing Analysis Summary

#	Intersection	Peak Hour	Storage Capacity (feet) EBL	SBL	SB	95th Percentile Queue Length (feet)[1] Existing EBL	Existing SBL	Existing Plus Project EBL	Existing Plus Project SBL	Existing Plus Project SB
1	I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue	AM	100	200	--	25	25	25	25	--
		PM	100	200	--	25	50	25	50	--
2	Project Driveway and Willow Avenue	AM	125	--	125	--	--	25	--	25
		PM	125	--	125	--	--	25	--	25

Notes:
EBL = eastbound left; WB = westbound, SBL = southbound, and SB = southbound
[1]Assumed 25 feet per vehicle

Operations at Main Project Driveway

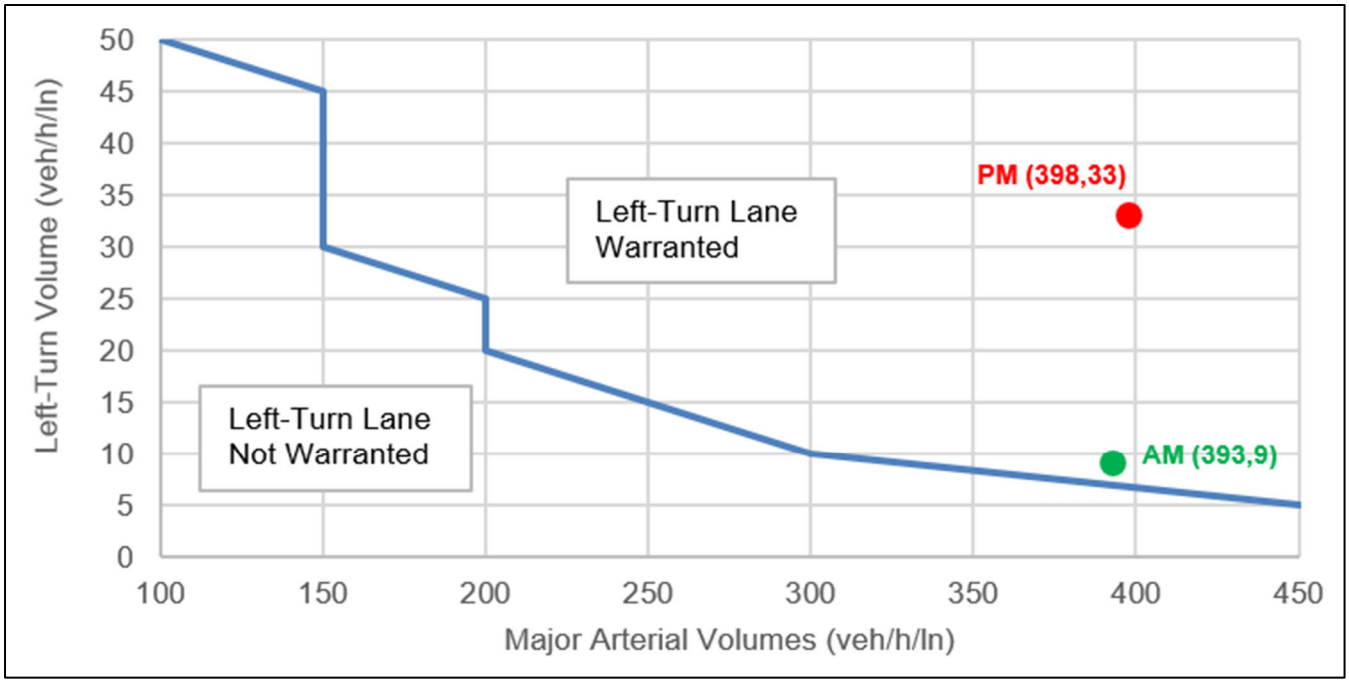
The projected maximum number of peak-hour trips at the main project driveway is shown in Figure 3 and summarized as follows: 60 outbound trips during the AM peak hour and 73 inbound trips during the PM peak hour, equating to approximately one trip per minute during peak hours. Given the modest number of project trips at the driveway and the availability of sufficient gaps on Willow Avenue, the project driveway is expected to operate acceptably during peak hours. Therefore, stop control at the driveway should be adequate to ensure smooth traffic operations, as already shown on the site plan.

Peak-Hour Left-Turn Warrant Analysis

A left-turn lane warrant analysis was conducted at the proposed Project Driveway/Willow Avenue T-intersection to determine whether a separate left-turn lane from eastbound Willow Avenue would be necessary to safely and efficiently accommodate project traffic. Based on the AASHTO's A Policy on Geometric Design of Highways and Streets (2018), the analysis indicates that the projected 28 eastbound left turns into the driveway during the PM peak hour under existing plus project conditions would warrant a separate left-turn lane. This is because the major road volume on Willow Avenue is projected to exceed 150 vehicles per hour per lane at this intersection, meeting the AASHTO guidelines for providing a separate left-turn lane (see Figure 6).

Willow Avenue is approximately 50 feet wide, including shoulders, at the project driveway. The site plan already proposes widening Willow Avenue to accommodate a four-lane cross-section with shoulders and includes a separate eastbound left-turn lane at the proposed Project Driveway/Willow Avenue T-intersection. This configuration is expected to safely and efficiently accommodate project traffic.

Figure 6
AASHTO Left-Turn Lane Warrant Guidelines for T-Intersections



Sight Distance Analysis

Adequate sight distance at the main project driveway must be provided according to the Caltrans Highway Design Manual to reduce collision risks and ensure safe access. Sufficient sight distance allows drivers to safely exit driveways and identify appropriate gaps in traffic. The minimum acceptable sight distance is typically defined as the stopping sight distance, which varies based on roadway speeds. In the project vicinity, Willow Avenue has a posted speed limit of 35 mph. Since speed limits are often based on the 85th percentile speed, which may be slightly higher than the posted limit, a speed of 40 mph was used to evaluate the stopping sight distance requirements more conservatively. According to the Caltrans Highway Design Manual, the stopping sight distance for roadways operating at 40 mph is 300 feet.

To ensure safe access, drivers exiting the main project driveway would need a clear line of sight of at least 300 feet in both directions on Willow Avenue. Field observations and the site plan confirmed that these sight distances would be met, providing drivers with the visibility needed to safely enter and exit the site. Any potential obstructions, such as landscaping or signage, would need to be carefully managed to prevent visibility issues at the driveway.

Recommendation: The site design must ensure that landscaping, signage, and other features along the main project frontage and entrance do not block sight distance.

On-Site Circulation

On-site vehicular circulation would be provided via a private internal roadway network that connects the full-access driveway at “Drive A” on Willow Avenue to the residential buildings, parking areas, and common amenities. The drive aisles are shown to be 26 feet wide, which would accommodate two-way traffic and provide direct access to surface parking spaces.

The site also includes two dead-end drive aisles at the termini of Drive F and Drive C, both of which lack dedicated turnaround areas. Dead-end aisles are generally undesirable, as vehicles entering these aisles and finding no available parking would be required to back out.

Recommendation: Turnaround areas should be provided at the termini of Drive F and Drive C to allow vehicles to safely perform a three-point turn if no parking spaces are available.

The site plan shows tandem parking spaces along the south side of the dead-end aisle at the terminus of Drive C. It is assumed these spaces are assigned to the same unit.

Emergency Vehicle Circulation

Emergency vehicle access to the project site would be provided via the main full-access driveway on Willow Avenue and a gated Emergency Vehicle Access (EVA) driveway located east of the main driveway. These two access points would connect to the internal private roadway network, allowing emergency vehicles to circulate throughout the site. The site plan indicates that the internal drive aisles would be 26 feet wide, which would be adequate to accommodate fire trucks and other emergency vehicles. Emergency vehicles would be able to reach all residential buildings; however, the dead-end aisle at the terminus of Drive C would not include a turnaround, requiring emergency vehicles to back out after entering this area. Despite this limitation, overall emergency access throughout the site would be considered adequate.

In accordance with California Fire Code (CFC) Section 503.3 and California Vehicle Code (CVC) Section 22500.1, access roadways with an unobstructed width of less than 28 feet are required to have signs posted or curbs painted red with the words NO PARKING – FIRE LANE clearly marked. Since all project drive aisles would be 26 feet wide, this requirement would apply, and parking would need to be prohibited along the drive aisles except in designated parking spaces.

Recommendation: It is recommended that fire lane signage or red curb markings be installed along all drive aisles to comply with CFC §503.3 and CVC §22500.1, ensuring unobstructed emergency vehicle access throughout the site.

Garbage Pick-Up

The site plan indicates that garbage trucks would enter the project via the main driveway on Willow Avenue and proceed to the terminus of Drive D for trash pickup at the designated enclosure. The 26-foot-wide drive aisles would provide adequate clearance for garbage trucks to maneuver throughout the site, allowing for efficient access and circulation during collection operations.

Findings and Recommendations

The purpose of this transportation study was to evaluate the project's VMT impact under CEQA and to review operations at the I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue and the Project Driveway/Willow Avenue intersections during the AM and PM peak hours under existing and existing plus project conditions, as well as site access and on-site circulation.

The VMT analysis determined that the project qualifies for a screening exemption because it is located within ½ mile of the Hercules Transit Center, which qualifies as a major transit stop with colinear bus headways of 20 minutes or less during peak commute periods. Therefore, the project is presumed to have a less-than-significant VMT impact.

The operations analysis showed that both study intersections would operate at acceptable levels during peak hours and would not require signalization, with projected queues accommodated within available storage. A separate eastbound left-turn lane at the project driveway would be warranted and is included in the site plan. Stopping sight distance would be adequate, and site access and on-site circulation would be generally acceptable, with minor improvements recommended for turnaround areas and compliance with fire lane access requirements. Based on these findings, the following recommendations are provided:

- Ensure that landscaping, signage, and other features do not obstruct the required stopping sight distance at the main project driveway.
- Provide turnaround areas at the termini of Drive F and Drive C to improve on-site circulation efficiency.
- Install fire lane signage or red curb markings along all drive aisles to comply with CFC §503.3 and CVC §22500.1, ensuring unobstructed emergency vehicle access throughout the site.

Attachments:
Attachment 1 – Traffic Counts and Time-of-Day Trip Generations
Attachment 2 – Volume Summary
Attachment 3 – Level of Service and Queuing Calculations
Attachment 4 – Signal Warrant Checks

Embem Hercules Residential Development Transportation Study

Attachments

February 13, 2026

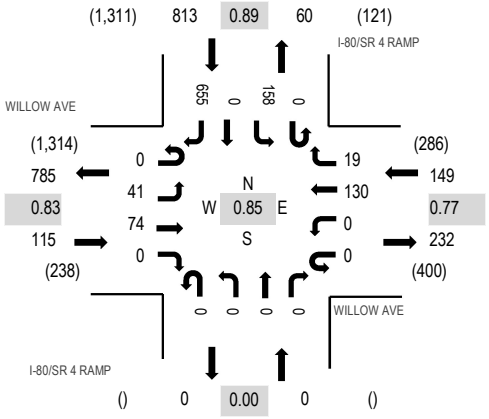
Attachment 1

Traffic Counts

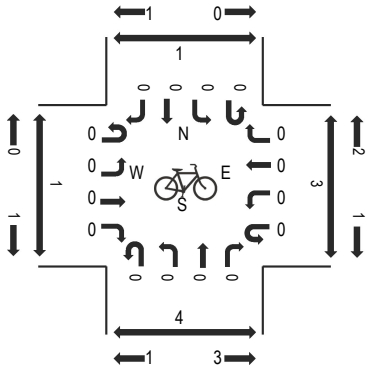
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 I-80/SR 4 RAMP & WILLOW AVE AM
Date: Tuesday, September 10, 2024
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:00 AM - 08:15 AM

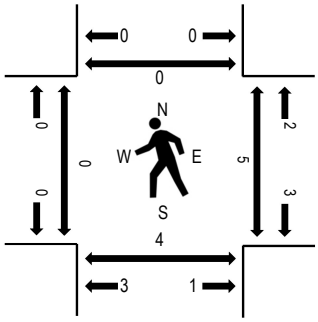
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	WILLOW AVE Eastbound				WILLOW AVE Westbound				I-80/SR 4 RAMP Northbound				I-80/SR 4 RAMP Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	9	28	0	0	0	25	1	0	0	0	0	0	14	0	79	156	758	0	4	4	0
7:15 AM	0	8	17	0	0	0	31	4	0	0	0	0	0	19	0	88	167	920	0	0	0	0
7:30 AM	0	14	16	0	0	0	34	7	0	0	0	0	1	26	0	97	195	997	0	0	0	0
7:45 AM	0	10	21	0	0	0	28	7	0	0	0	0	0	27	0	147	240	1,068	0	0	0	0
8:00 AM	0	13	23	0	0	0	47	6	0	0	0	0	0	56	0	173	318	1,077	0	2	1	0
8:15 AM	0	11	15	0	0	0	24	7	0	0	0	0	0	40	0	147	244		0	2	2	0
8:30 AM	0	6	21	0	0	0	42	0	0	0	0	0	0	36	0	161	266		0	0	0	0
8:45 AM	0	11	15	0	0	0	17	6	0	0	0	0	0	26	0	174	249		0	1	1	0

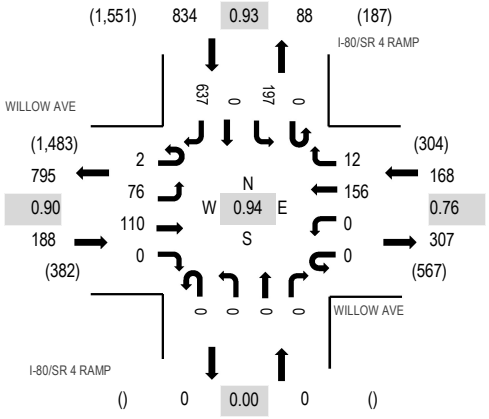
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
Lights	0	40	61	0	0	0	113	17	0	0	0	0	0	154	0	644	1,029
Mediums	0	1	13	0	0	0	17	2	0	0	0	0	0	4	0	8	45
Total	0	41	74	0	0	0	130	19	0	0	0	0	0	158	0	655	1,077

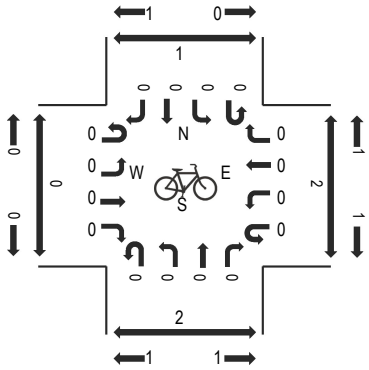
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 I-80/SR 4 RAMP & WILLOW AVE PM
Date: Tuesday, September 10, 2024
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:45 PM - 06:00 PM

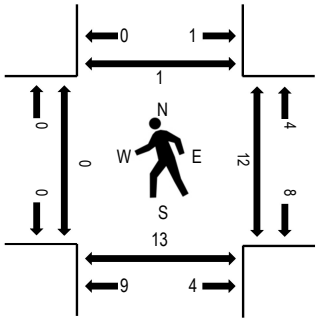
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	WILLOW AVE Eastbound				WILLOW AVE Westbound				I-80/SR 4 RAMP Northbound				I-80/SR 4 RAMP Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	1	26	26	0	0	0	30	3	0	0	0	0	0	40	0	146	272	1,047	0	3	3	0
4:15 PM	0	24	30	0	0	0	46	5	0	0	0	0	0	45	0	141	291	1,050	0	0	0	0
4:30 PM	1	17	27	0	0	0	29	2	0	0	0	0	0	35	0	134	245	1,053	0	2	2	0
4:45 PM	1	18	23	0	0	0	18	3	0	0	0	0	1	34	0	141	239	1,114	0	4	4	0
5:00 PM	1	19	26	0	0	0	32	6	0	0	0	0	0	39	0	152	275	1,190	0	3	3	0
5:15 PM	1	12	24	0	0	0	53	2	0	0	0	0	0	48	0	154	294		0	7	7	0
5:30 PM	0	23	30	0	0	0	33	2	0	0	0	0	0	54	0	164	306		0	1	1	1
5:45 PM	0	22	30	0	0	0	38	2	0	0	0	0	0	56	0	167	315		0	1	2	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
Lights	2	74	100	0	0	0	142	11	0	0	0	0	0	191	0	636	1,156
Mediums	0	1	10	0	0	0	14	1	0	0	0	0	0	5	0	0	31
Total	2	76	110	0	0	0	156	12	0	0	0	0	0	197	0	637	1,190

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use				
Source: ITE *Trip Generation Manual* , 11th Edition				
Land Use Code	220			
Land Use	Multifamily Housing (Low-Rise)			
Subcategory	Not Close to Rail Transit			
Setting	General Urban/Suburban			
Time Period	Weekday	Hourly		
# Data Sites	6	Trips		
	% of 24-Hour Vehicle Trips	based on	From Trip Gen Table	
Time	Total	ITE hourly %	1,229	Daily
12:00 - 1:00 AM	0.7%	8		
1:00 - 2:00 AM	0.4%	5		
2:00 - 3:00 AM	0.4%	5		
3:00 - 4:00 AM	0.4%	4		
4:00 - 5:00 AM	0.9%	11		
5:00 - 6:00 AM	1.6%	19		
6:00 - 7:00 AM	4.2%	51		
7:00 - 8:00 AM	6.5%	79	79	AM Peak Hour
8:00 - 9:00 AM	5.8%	72		of Adjacent Street Traffic
9:00 - 10:00 AM	3.9%	48		Between 7-9AM
10:00 - 11:00 AM	3.6%	44		
11:00 - 12:00 PM	4.3%	53		
12:00 - 1:00 PM	4.3%	53		
1:00 - 2:00 PM	4.2%	52		
2:00 - 3:00 PM	5.2%	65		
3:00 - 4:00 PM	6.1%	75		
4:00 - 5:00 PM	7.9%	97	98	PM Peak Hour
5:00 - 6:00 PM	9.5%	116		of Adjacent Street Traffic
6:00 - 7:00 PM	8.2%	101		Between 4-6PM
7:00 - 8:00 PM	6.4%	79		
8:00 - 9:00 PM	5.9%	72		
9:00 - 10:00 PM	4.4%	54		
10:00 - 11:00 PM	3.5%	43		
11:00 - 12:00 AM	1.9%	24		
Total	**100.0%**	**1,229**		

Attachment 2

Volume Summary

Intersection Volumes
AM Peak Hour

Int.#[Model#](Traffix#)[Synchro#] 1
Intersection Name: I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue
Peak Hour: AM
Count Date: 09/10/24

	Movements												
	North Approach			East Approach			South Approach			West Approach			
Scenario:	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
Existing Conditions	**655**	**0**	**158**	**19**	**130**	**0**	**0**	**0**	**0**	**0**	**74**	**41**	**1,077**
Proposed Project Trips	8	0	0	0	3	0	0	0	0	0	3	9	23
Existing Plus Project Conditions	**663**	**0**	**158**	**19**	**133**	**0**	**0**	**0**	**0**	**0**	**77**	**50**	**1,100**

Int.#[Model#](Traffix#)[Synchro#] 2
Intersection Name: Project Driveway and Willow Avenue
Peak Hour: AM
Count Date: 09/10/24

	Movements												
	North Approach			East Approach			South Approach			West Approach			
Scenario:	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
Existing Conditions	**0**	**0**	**0**	**0**	**785**	**0**	**0**	**0**	**0**	**0**	**115**	**0**	**900**
Proposed Project Trips	48	0	12	10	0	0	0	0	0	0	0	9	79
Existing Plus Project Conditions	**48**	**0**	**12**	**10**	**785**	**0**	**0**	**0**	**0**	**0**	**115**	**9**	**979**

Intersection Volumes
PM Peak Hour

Int.#[Model#](Traffix#)[Synchro#] 1
Intersection Name: I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue
Peak Hour: PM
Count Date: 09/10/24

	Movements												
	North Approach			East Approach			South Approach			West Approach			
Scenario:	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
Existing Conditions	**637**	**0**	**197**	**12**	**156**	**0**	**0**	**0**	**0**	**0**	**110**	**78**	**1,190**
Proposed Project Trips	29	0	0	0	11	0	0	0	0	0	2	6	48
Existing Plus Project Conditions	**666**	**0**	**197**	**12**	**167**	**0**	**0**	**0**	**0**	**0**	**112**	**84**	**1,238**

Int.#[Model#](Traffix#)[Synchro#] 2
Intersection Name: Project Driveway and Willow Avenue
Peak Hour: PM
Count Date: 09/10/24

	Movements												
	North Approach			East Approach			South Approach			West Approach			
Scenario:	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
Existing Conditions	**0**	**0**	**0**	**0**	**795**	**0**	**0**	**0**	**0**	**0**	**188**	**0**	**983**
Proposed Project Trips	34	0	9	40	0	0	0	0	0	0	0	33	116
Existing Plus Project Conditions	**34**	**0**	**9**	**40**	**795**	**0**	**0**	**0**	**0**	**0**	**188**	**33**	**1,099**

Attachment 3

Level of Service and Queuing Calculations

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	41	74	130	19	158	0
Future Vol, veh/h	41	74	130	19	158	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	48	87	153	22	186	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay, s/veh	8.8	9	9.6
HCM LOS	A	A	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	87%	0%
Vol Right, %	0%	0%	13%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	74	149	158
LT Vol	41	0	0	158
Through Vol	0	74	130	0
RT Vol	0	0	19	0
Lane Flow Rate	48	87	175	186
Geometry Grp	5	5	4a	2
Degree of Util (X)	0.076	0.126	0.226	0.254
Departure Headway (Hd)	5.705	5.202	4.645	4.917
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	628	689	773	731
Service Time	3.439	2.936	2.676	2.949
HCM Lane V/C Ratio	0.076	0.126	0.226	0.254
HCM Control Delay, s/veh	8.9	8.7	9	9.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.4	0.9	1

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	77	133	19	158	0
Future Vol, veh/h	50	77	133	19	158	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	59	91	156	22	186	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay, s/veh	8.8	9.1	9.7
HCM LOS	A	A	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	88%	0%
Vol Right, %	0%	0%	13%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	50	77	152	158
LT Vol	50	0	0	158
Through Vol	0	77	133	0
RT Vol	0	0	19	0
Lane Flow Rate	59	91	179	186
Geometry Grp	5	5	4a	2
Degree of Util (X)	0.093	0.131	0.232	0.256
Departure Headway (Hd)	5.711	5.208	4.666	4.96
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	627	688	769	723
Service Time	3.448	2.944	2.7	2.994
HCM Lane V/C Ratio	0.094	0.132	0.233	0.257
HCM Control Delay, s/veh	9	8.7	9.1	9.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.4	0.9	1

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	78	110	156	12	197	0
Future Vol, veh/h	78	110	156	12	197	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	83	117	166	13	210	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay, s/veh	9.2	9.4	10.2
HCM LOS	A	A	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	93%	0%
Vol Right, %	0%	0%	7%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	78	110	168	197
LT Vol	78	0	0	197
Through Vol	0	110	156	0
RT Vol	0	0	12	0
Lane Flow Rate	83	117	179	210
Geometry Grp	5	5	4a	2
Degree of Util (X)	0.133	0.171	0.239	0.295
Departure Headway (Hd)	5.773	5.269	4.815	5.067
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	620	679	743	706
Service Time	3.521	3.017	2.862	3.113
HCM Lane V/C Ratio	0.134	0.172	0.241	0.297
HCM Control Delay, s/veh	9.4	9.1	9.4	10.2
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.5	0.6	0.9	1.2

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	84	112	167	12	197	0
Future Vol, veh/h	84	112	167	12	197	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	89	119	178	13	210	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay, s/veh	9.3	9.6	10.3
HCM LOS	A	A	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	93%	0%
Vol Right, %	0%	0%	7%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	112	179	197
LT Vol	84	0	0	197
Through Vol	0	112	167	0
RT Vol	0	0	12	0
Lane Flow Rate	89	119	190	210
Geometry Grp	5	5	4a	2
Degree of Util (X)	0.144	0.175	0.256	0.298
Departure Headway (Hd)	5.787	5.283	4.831	5.115
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	617	677	741	700
Service Time	3.54	3.036	2.883	3.165
HCM Lane V/C Ratio	0.144	0.176	0.256	0.3
HCM Control Delay, s/veh	9.5	9.2	9.6	10.3
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.5	0.6	1	1.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	115	785	10	12	48
Future Vol, veh/h	9	115	785	10	12	48
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	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	11	135	924	12	14	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	935	0	-	0	1086	468
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	156	-
Critical Hdwy	4.16	-	-	-	6.66	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.238	-	-	-	3.538	3.338
Pot Cap-1 Maneuver	720	-	-	-	222	538
Stage 1	-	-	-	-	342	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	720	-	-	-	219	538
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	337	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.73	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	720	-	-	-	417
HCM Lane V/C Ratio	0.015	-	-	-	0.169
HCM Ctrl Dly (s/v)	10.1	-	-	-	15.4
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	188	795	40	9	34
Future Vol, veh/h	33	188	795	40	9	34
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	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	35	200	846	43	10	36

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	888	0	-	0	1137	444
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	270	-
Critical Hdwy	4.145	-	-	-	6.645	6.945
Critical Hdwy Stg 1	-	-	-	-	5.845	-
Critical Hdwy Stg 2	-	-	-	-	5.445	-
Follow-up Hdwy	2.2285	-	-	-	3.5285	3.3285
Pot Cap-1 Maneuver	755	-	-	-	207	560
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	772	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	755	-	-	-	198	560
Mov Cap-2 Maneuver	-	-	-	-	198	-
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	772	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.49	0	15.02
HCM LOS			C

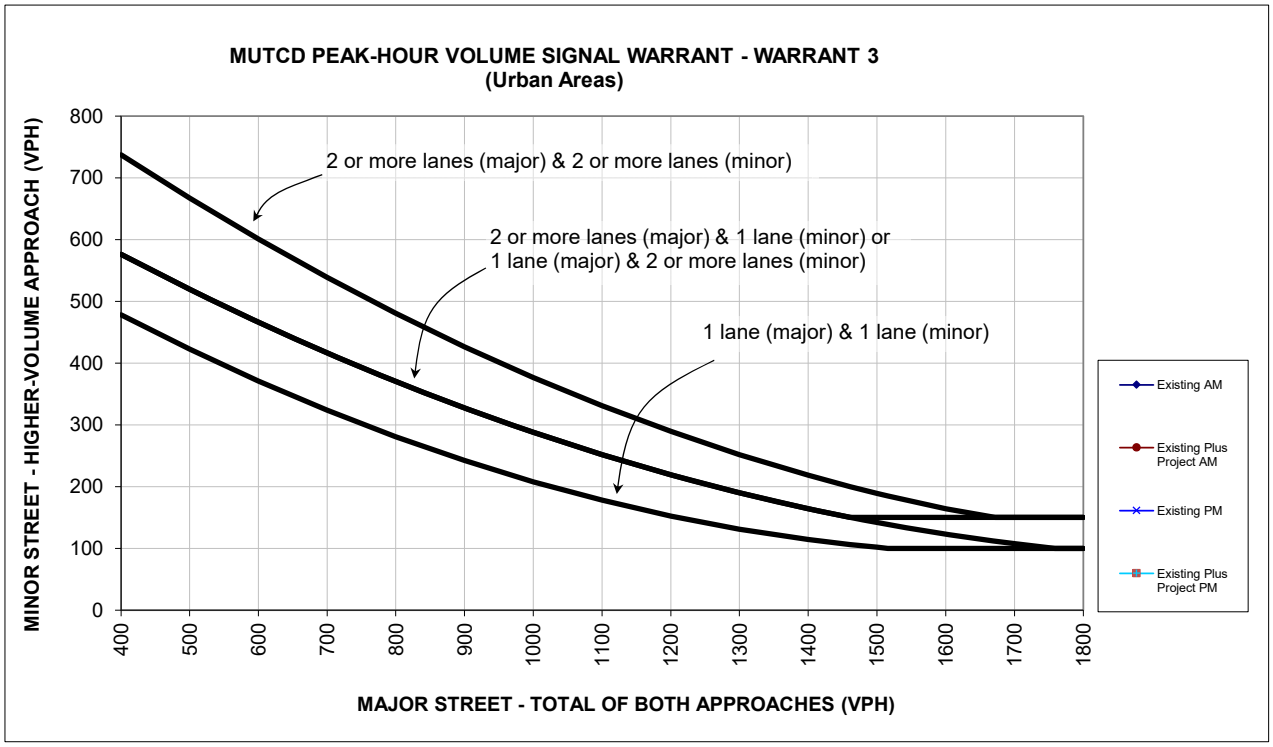
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	755	-	-	-	405
HCM Lane V/C Ratio	0.046	-	-	-	0.113
HCM Ctrl Dly (s/v)	10	-	-	-	15
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Attachment 4

Signal Warrant Checks

Emblem Hercules Residential Development Transportation Study

1 . I-80 NB Off-Ramp/SR 4 EB On-Ramp and Willow Avenue



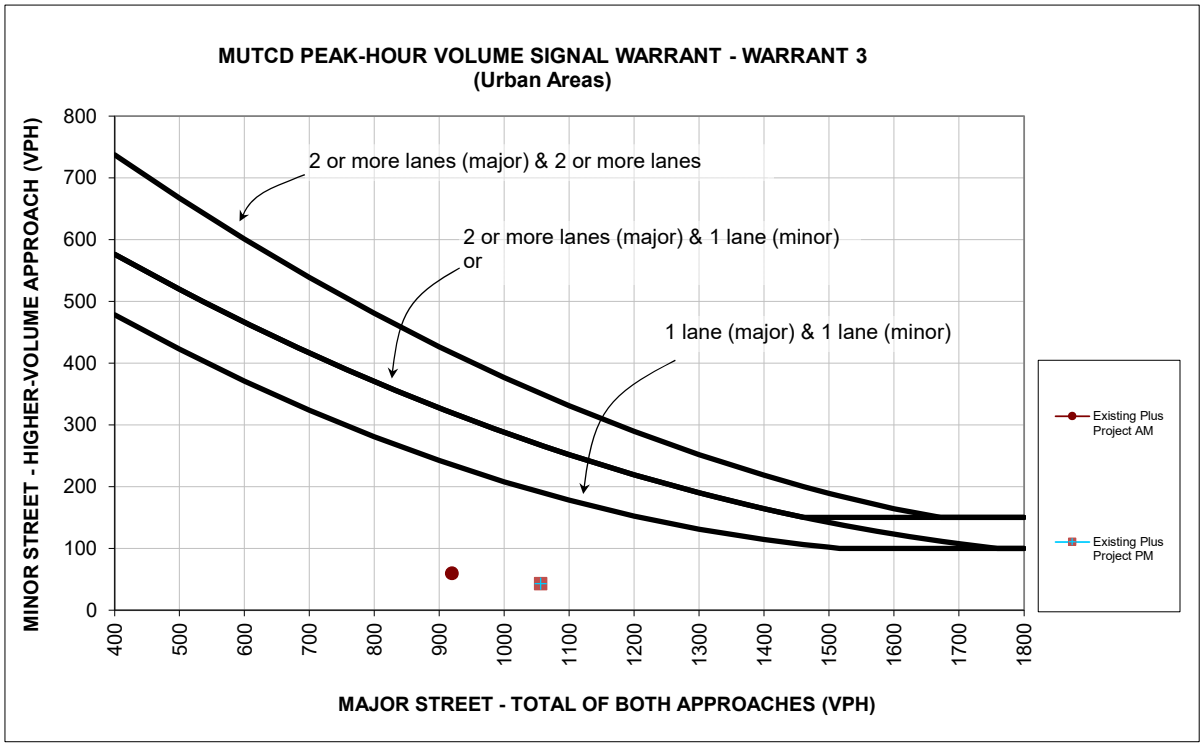
Source: Figure 4C-3 of the Manual on Unifrom Traffic Control and Devices (MUTCD) from California Department of Transportation (Caltrans).
* 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes
and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

		Approach Lanes: One	Approach Lanes: 2 or More	Existing AM	Existing Plus Project AM
Major Street - Both Approaches	Willow Avenue	X		264	279
Minor Street - Highest Approach	I-80 NB Off-Ramp/SR 4 EB On-Ramp	X		158	158
		Warrant Met?		No	No

		Approach Lanes: One	Approach Lanes: 2 or More	Existing PM	Existing Plus Project PM
Major Street - Both Approaches	Willow Avenue	X		356	375
Minor Street - Highest Approach	I-80 NB Off-Ramp/SR 4 EB On-Ramp	X		197	197
		Warrant Met?		No	No

Emblem Hercules Residential Development Transportation Study

2 . Project Driveway and Willow Avenue



Source: Figure 4C-3 of the Manual on Unifrom Traffic Control and Devices (MUTCD) from California Department of Transportation (Caltrans).
* 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.

		Approach Lanes		Existing Plus Project AM
		One	2 or More	
Major Street - Both Approaches	Willow Avenue	X		919
Minor Street - Highest Approach	Project Driveway	X		60
		Warrant Met?		No

		Approach Lanes		Existing Plus Project PM
		One	2 or More	
Major Street - Both Approaches	Willow Avenue	X		1056
Minor Street - Highest Approach	Project Driveway	X		43
		Warrant Met?		No