

Avellana Solar and Broadband Project
February 2023

U.S. Dept. of Agriculture

Rural Utilities Service

Environmental Assessment

APPENDIX H

TRAFFIC IMPACT ANALYSIS



**U.S. Department of Agriculture
Rural Utilities Service (RUS)**

Avellana Senior Living Mobile Homes Traffic Impact Analysis

County of San Bernardino, California

January 12, 2022

Prepared by:



TJW ENGINEERING, INC.
9841 Irvine Center Drive, Suite 200
Irvine, CA 92618
949.878.3509 | www.tjwengineering.com



TJW ENGINEERING, INC.
TRAFFIC ENGINEERING &
TRANSPORTATION PLANNING
CONSULTANTS

January 12, 2022

Mr. David Weisman
AVELLANA PROPERTIES INC.
6101 Owensmouth Avenue
Woodland Hills, CA 91365

Subject: Traffic Impact Analysis – Avellana Senior Living Mobile Homes, County of San Bernardino

Dear Mr. Weisman:

TJW ENGINEERING, INC. (TJW) is pleased to present you with this traffic impact analysis for the proposed Avellana Senior Living Mobile Homes project located southwest of Highway 18 and Bear Valley Road in the County of San Bernardino.

This traffic study has been prepared to meet the traffic study requirements for the County of San Bernardino and assesses the forecast traffic operations associated with the proposed project and its impact on the local street network. This report is being submitted to you for review and forwarding to the County of San Bernardino.

Please contact us at (949) 878-3509 if you have any questions regarding this analysis.

Sincerely,

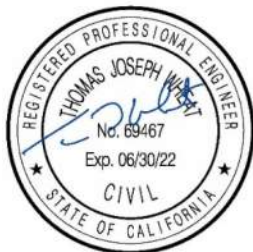
A handwritten signature in black ink, appearing to read 'TH Wheat', written over a light blue horizontal line.

Thomas Wheat, PE, TE
President

A handwritten signature in black ink, appearing to read 'DC', written over a light blue horizontal line.

David Chew, PTP
Transportation Planner

Registered Civil Engineer #69467
Registered Traffic Engineer #2565



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1.0 EXECUTIVE SUMMARY

This traffic impact analysis (TIA) analyzes the projected traffic operations associated with the proposed Avellana Senior Living Mobile Homes project located southwest of Highway 18 and Bear Valley Road in the County of San Bernardino. The purpose of this TIA is to evaluate potential circulation system deficiencies that may result from development of the proposed project, and to recommend improvements to achieve acceptable operations, if applicable. This analysis has been prepared in coordination with the County of San Bernardino via a scoping agreement (See **Appendix A**) and is pursuant to applicable County of San Bernardino traffic impact analysis guidelines.

The proposed project consists of 399 affordable housing senior living mobile homes and on-site medical clinic, supermarket, and community center. Site access is planned via one full-access driveway along Bear Valley Road and one full-access driveway along Las Piedras Road. The site is currently zoned as Rural Living (RL) in the County of San Bernardino. The project site is currently vacant.

The proposed project is anticipated to be built and generating trips in 2022. A growth rate of 2% was used to account for 2022 volumes.

The proposed project is projected to generate 1,385 daily trips, 60 AM peak hour trips, and 124 PM peak hour trips.

The following three (3) intersections in the vicinity of the project site have been included in the intersection level of service (LOS) analysis:

1. Bear Valley Road / Highway 18
2. Bear Valley Road / Central Road
3. Bear Valley Road / Project Driveway

The study intersections are analyzed for the following study scenarios:

- Existing Year Traffic Condition
- Project Opening Year Base Traffic Condition
- Project Opening Year plus Project Traffic Condition

1.1 SUMMARY OF LEVEL OF SERVICE ANALYSIS RESULTS

Table ES-1 summarizes the results of the intersection level of service analysis based on the County of San Bernardino thresholds of significance for analyzing transportation deficiencies.



Table ES-1
Summary of Transportation Deficiencies at Study Intersections

Intersection			Opening Year Plus Project
1	Bear Valley	Hwy 18	No Deficiencies
2	Bear Valley	Central	No Deficiencies
3	Bear Valley	Project Dwy	No Deficiencies

Existing Conditions

The study intersections are projected to operate at an acceptable LOS during the AM and PM peak hours for *Existing* conditions.

Project Opening Year (OYNP) Conditions

The study intersections are projected to operate at an acceptable LOS during the AM and PM peak hours for *Project Opening Year* conditions.

Project Opening Year Plus Project (OYWP) Conditions

The study intersections are projected to operate at an acceptable LOS during the AM and PM peak hours for *Project Opening Year Plus Project* conditions.

1.2 SUMMARY OF DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

The determination of a deficiency at an intersection is based on the project’s contribution to the intersection’s level of service (LOS) as defined in *The County of San Bernardino Transportation Impact Study Guidelines (July 2019)*. Based on those thresholds, no off-site improvements were identified since the proposed project is projected to result in no deficiencies at the study intersections for all analysis scenarios.

1.3 SUMMARY OF VEHICLE MILES TRAVELED ANALYSIS

Consistent with the new metric of VMT for analysis of transportation impacts under CEQA, this analysis follows the OPR and County guidelines. As this project provides affordable housing, the project is presumed to have a less than significant transportation impact per CEQA guidelines.



2.0 INTRODUCTION

This traffic impact analysis (TIA) analyzes the projected traffic operations associated with the proposed Avellana Senior Living Mobile Homes project located southwest of Highway 18 and Bear Valley Road in the County of San Bernardino. The purpose of this TIA is to evaluate potential circulation system deficiencies that may result from development of the proposed project, and to recommend improvements to achieve acceptable operations, if applicable. This analysis has been prepared in coordination with the County of San Bernardino via a scoping agreement (See **Appendix A**) and is pursuant to applicable County of San Bernardino traffic impact analysis guidelines.

2.1 PROJECT DESCRIPTION

The proposed project consists of 399 affordable housing senior living mobile homes and on-site medical clinic, supermarket, and community center. Site access is planned via one full-access driveway along Bear Valley Road and one full-access driveway along Las Piedras Road. The site is currently zoned as Rural Living (RL) in the County of San Bernardino. The project site is currently vacant.

The proposed project is anticipated to be built and generating trips in 2022. A growth rate of 2% was used to account for 2022 volumes.

Exhibit 1 shows the project site location. **Exhibit 2** shows the proposed project site plan.

2.2 STUDY AREA

The following three (3) intersections in the vicinity of the project site have been included in the intersection level of service (LOS) analysis. The study intersections are all located within the County of San Bernardino.

1. Bear Valley Road / Highway 18
2. Bear Valley Road / Central Road
3. Bear Valley Road / Project Driveway

This traffic analysis follows the *County of San Bernardino Transportation Impact Study (July 2019)*.

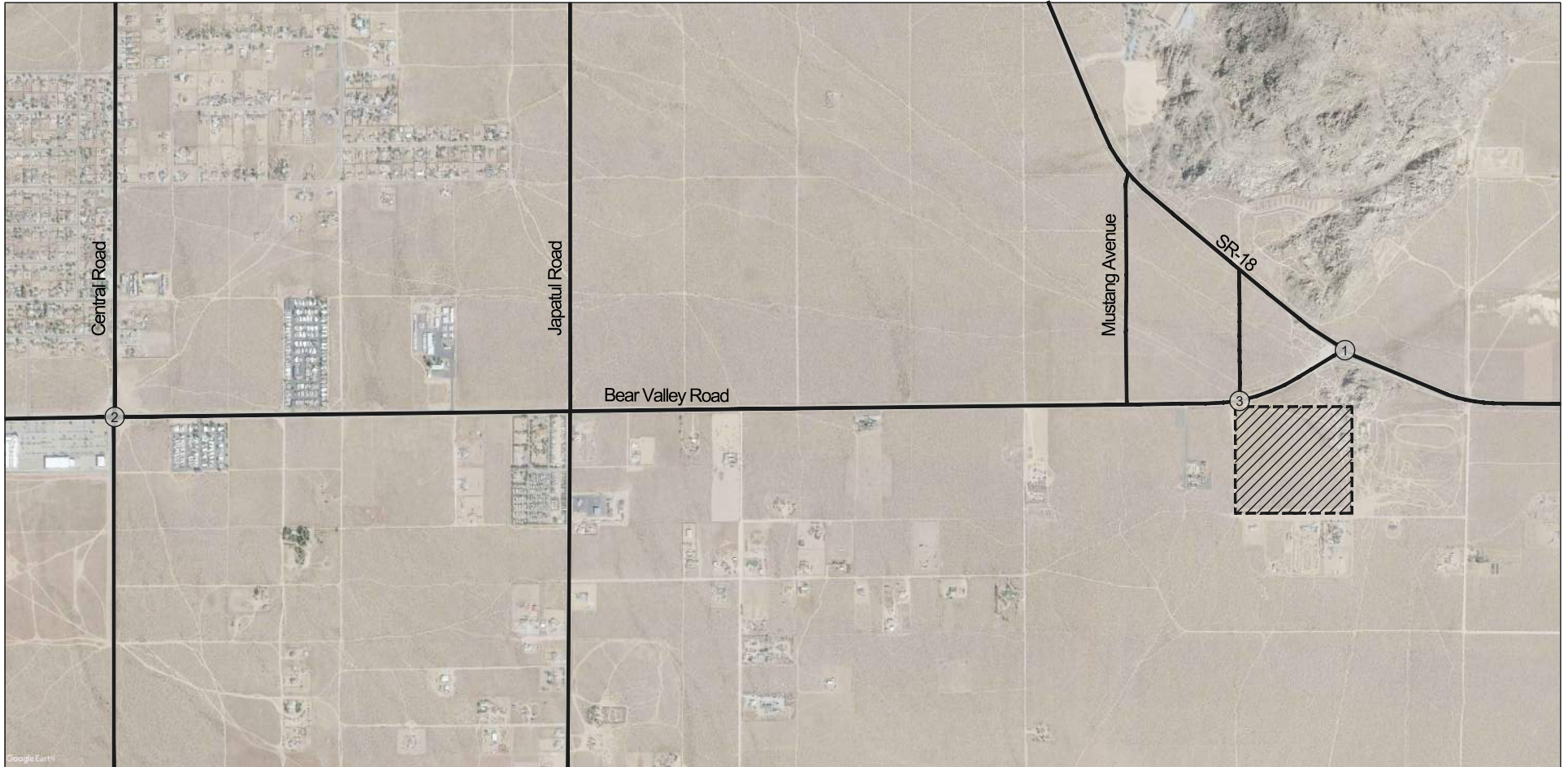
Exhibit 3 shows the location of the study intersections which are analyzed for the following study scenarios:

- Existing Year Traffic Condition
- Project Opening Year Traffic Condition
- Project Opening Year plus Project Traffic Condition

Traffic operations are evaluated for the following time periods:

- Weekday AM Peak Hour occurring within 7:00 AM to 9:00 AM; and
- Weekday PM Peak Hour occurring within 4:00 PM to 6:00 PM.





Legend:



-  Project Site
-  Study Intersection Location

Exhibit 1: Project Location

Avellana Senior Living Mobile Homes Traffic Impact Analysis



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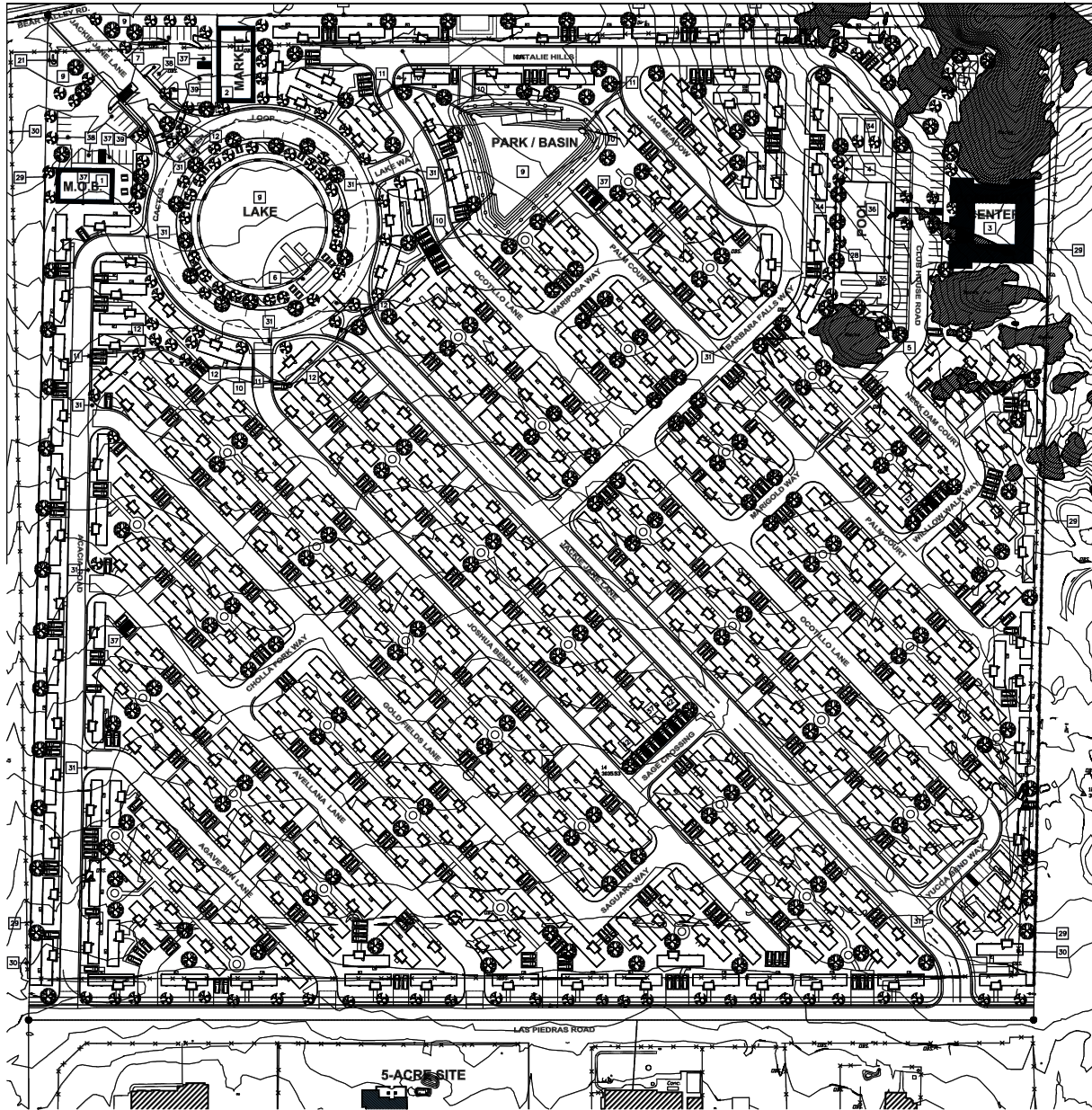


Exhibit 2: Proposed Project Site Plan

Avellana Senior Living Mobile Homes Traffic Impact Analysis

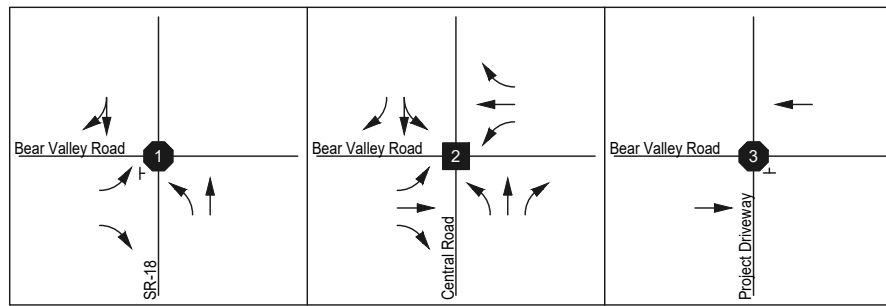


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Legend:

- Project Site
- ← Existing Lane
- Signal-Controlled Intersection
- Stop-Controlled Intersection
- T+ Cross Street Stop Control
- 2U 2-Lane Undivided Roadway

Exhibit 3: Lane Geometry and Intersection Controls

Avellana Senior Living Mobile Homes Traffic Impact Analysis



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2.3 ANALYSIS METHODOLOGY

2.3.1 Intersection Analysis Methodology

Level of Service (LOS) is commonly used to describe the quality of flow on roadways and at intersections using a range of LOS from LOS A (free flow with little congestion) to LOS F (severely congested conditions). The definitions for LOS for interruption of traffic flow differ depending on the type of traffic control (traffic signal, unsignalized intersection with side street stops, unsignalized intersection with all-way stops). The *Highway Capacity Manual (HCM) 6* (Transportation Research Board, 2016) methodology expresses the LOS of an intersection in terms of delay time for the intersection approaches. The HCM methodology utilizes different procedures for different types of intersection control.

The County of San Bernardino and Caltrans traffic impact study guidelines require signalized intersection operations be analyzed utilizing the HCM 6th Edition methodology. Intersection LOS for signalized intersections is based on the intersections average control delay for all movements at the intersection during the peak hour. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Table 1 describes the general characteristics of traffic flow and accompanying delay ranges at signalized intersections.

Table 1:
HCM – LOS & Delay Ranges – Signalized Intersections

Level of Service	Description	Delay (in seconds)
A	Very favorable progression; most vehicles arrive during green signal and do not stop. Short cycle lengths.	0 – 10.00
B	Good progression, short cycle lengths. More vehicles stop than for LOS A.	10.01 – 20.00
C	Fair progression; longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, though many vehicles still pass through without stopping.	20.01 – 35.00
D	Progression less favorable, longer cycle length and high flow/capacity ratio. The proportion of vehicles that pass through without stopping diminishes. Individual cycle failures are obvious.	35.01 – 55.00
E	Severe congestion with some long-standing queues on critical approaches. Poor progression, long cycle lengths and high flow/capacity ratio. Individual cycle failures are frequent.	55.01 – 80.00
F	Very poor progression, long cycle lengths and many individual cycle failures. Arrival flow rates exceed capacity of intersection.	> 80.01

Source: Transportation Research Board, *Highway Capacity Manual*, HCM6 Edition (Washington D.C., 2016).

Collected peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. It is a common practice in LOS analysis to conservatively use a peak 15-minute flow rate



applied to the entire hour to derive flow rates in vehicles per hour that are used in the LOS analysis. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume. $PHF = \frac{Hourly\ Volume}{4 * Peak\ 15\ Minute\ Volume}$. The use of a 15-minute PHF produces a more detailed and conservative analysis compared to analyzing vehicles per hour. Existing PHFs, obtained from the existing traffic counts have been used for all analysis scenarios in this study.

The County of San Bernardino traffic study guidelines also require unsignalized intersection operations be analyzed utilizing the HCM 6th Edition methodology. Intersection operation for unsignalized intersections is based on the weighted average control delay expressed in seconds per vehicle.

At a two-way or side-street stop-controlled intersection, LOS is calculated for each stop-controlled minor street movement, for the left-turn movement(s) from the major street, and for the intersection as a whole. For approaches consisting of a single lane, the delay is calculated as the average of all movements in that lane. For all-way stop-controlled intersection, LOS is computed for the intersection as a whole.

Table 2 describes the general characteristics of traffic flow and accompanying delay ranges at unsignalized intersections.

Table 2:
HCM – LOS & Delay Ranges – Unsignalized Intersections

Level of Service	Description	Delay (in seconds)
A	Little or no delays.	0 – 10.00
B	Short traffic delays.	10.01 – 15.00
C	Average traffic delays.	15.01 – 25.00
D	Long traffic delays. Multiple vehicles in queue.	25.01 – 35.00
E	Very long delays. Demand approaching capacity of intersection	35.01 – 50.00
F	Very constrained flow with extreme delays and intersection capacity exceeded.	> 50.01

Source: Transportation Research Board, *Highway Capacity Manual*, HCM6 Edition (Washington D.C., 2016).

This analysis utilizes *Trafficware’s Synchro*, Version 10 analysis software for all signalized and unsignalized intersections. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis specified in Chapter 16 of the HCM. The level of service and capacity analysis performed within Synchro takes the optimization and coordination of signalized intersections within a network into consideration.

2.3.2 Vehicle Miles Traveled (VMT) Analysis

Senate Bill (SB) 743 was adopted in 2013 requiring the Governor’s Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts within the California Environmental Quality Act (CEQA). For land use projects, OPR has identified Vehicle Miles Traveled (VMT) as



the new metric for transportation analysis under CEQA. The regulatory changes to the CEQA guidelines that implement SB 743 were approved on December 28th, 2018 with an implementation date of July 1st, 2020 as the new metric.

2.4 PERFORMANCE CRITERIA

2.4.1 County of San Bernardino

Signalized Intersections

The County of San Bernardino has established level of service “C” or better as acceptable LOS for all signalized intersections within the Desert region. Any signalized study intersection in which the project traffic causes the intersection to degrade to an LOS D, E, or F shall identify improvements to improve operations to LOS C.

Unsignalized Intersections

For unsignalized intersections, the following has been established by the County of San Bernardino. An operational improvement would be required if the study determines that either section a) or both sections b) and c) occur:

- a) The addition of project related traffic causes the intersection to degrade from an LOS C or better to a LOS D or worse in the Desert region.
- b) The project adds 5.0 seconds or more delay to an intersection that is already projected to operate without project traffic at an LOS D, E, or F in the Desert region.
- c) One or both of the following conditions are met:
 - a. The project adds ten (10) or more trips to any minor street approach
 - b. The intersections meets the peak hour traffic signal warrant after the addition of project traffic

3.0 EXISTING CONDITIONS

3.1 EXISTING CIRCULATION NETWORK/STUDY AREA CONDITIONS

The characteristics of the roadways in the vicinity of the proposed project site are described in **Table 3**.

Table 3:
Roadway Characteristics within Study Area

Roadway	Classification ¹	Jurisdiction	Direction	Existing Travel Lanes	Median Type ²	Speed Limit (mph)	On-Street Parking
Highway 18	Arterial	San Bernardino	East-West	2	NM	55	No
Bear Valley Rd	Arterial	San Bernardino	East-West	2	NM	55	No
Central Rd	Arterial	San Bernardino	North-South	2	NM	55	No

1: Sources: County of San Bernardino General Plan

2: NM = No Median

Exhibit 3 show existing conditions study area intersection and roadway geometry.

3.2 EXISTING TRAFFIC VOLUMES

To determine the existing operation of the study intersections, AM and PM peak period traffic counts at the study intersections were collected on Wednesday August 11, 2021. Detailed traffic count data is provided in **Appendix B**.

Exhibit 4 show existing AM and PM peak hour volumes at the study intersections.

3.3 EXISTING CONDITIONS INTERSECTION LEVEL OF SERVICE ANALYSIS

Existing conditions AM and PM peak hour intersection analysis is shown in **Table 4**. Calculations are based on the existing geometrics at the study area intersections as shown in **Exhibit 3**. HCM analysis sheets are provided in **Appendix C**.

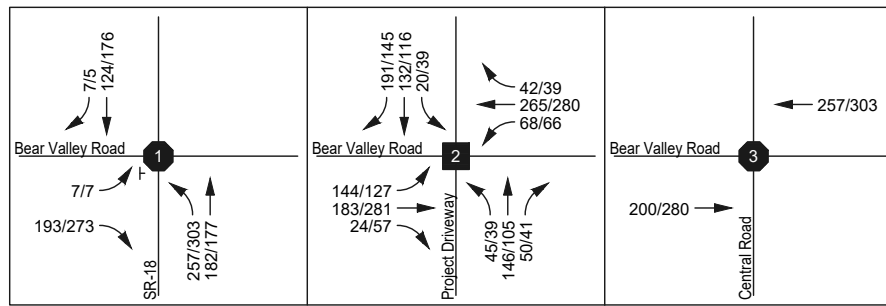
Table 4:
Intersection Analysis – Existing Conditions

Intersection			Control Type	Peak Hour	Existing Conditions	
					Delay ¹	LOS
1	Bear Valley Rd	Hwy 18	OWSC	AM	10.5	B
				PM	12.2	B
2	Bear Valley Rd	Central Rd	Signal	AM	32.7	C
				PM	33.4	C
3	Bear Valley Rd	Project Dwy	OWSC	AM	--	--
				PM	--	--

Note: OWSC = One-Way Stop-Control; Delay shown in seconds per vehicle.

1 = Per the Highway Capacity Manual 6th Edition, for intersections with one-or-two-way stop-control, the delay and LOS for the worst individual movement is shown.

As shown in **Table 4**, the study intersections are currently operating at an acceptable LOS during the AM and PM peak hours for *existing* conditions.



Legend:

- XX/XX AM/PM Peak Hour Volumes
- Project Site

Exhibit 4: Existing Peak Hour Volumes

Avellana Senior Living Mobile Homes Traffic Impact Analysis



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4.0 PROPOSED PROJECT

4.1 PROJECT DESCRIPTION

The proposed project consists of 399 affordable housing senior living mobile homes and on-site medical clinic, supermarket, and community center. Site access is planned via one full-access driveway along Bear Valley Road and one full-access driveway along Las Piedras Road. The site is currently zoned as Rural Living (RL) in the County of San Bernardino. The project site is currently vacant.

The proposed project is anticipated to be built and generating trips in 2022. A growth rate of 2% was used to account for 2022 volumes.

Exhibit 2 previously showed the proposed project site plan.

4.2 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic, both inbound and outbound, produced by a development. Determining trip generation for a proposed project is based on projecting the amount of traffic that the specific land uses being proposed will produce. Industry standard *Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition, 2017)* trip generation rates were used to determine trip generation of for most of the proposed project land uses.

Table 5 summarizes the projected AM peak hour, PM peak hour and daily trip generation of the proposed project. The proposed project is projected to generate 1,385 daily trips, 60 AM peak hour trips, and 124 PM peak hour trips.

Table 5:
Proposed Project Trip Generation

Proposed Land Use ¹	Qty	Unit ²	Daily Trips (ADTs)		AM Peak Hour					PM Peak Hour				
			Rate	Volume	Rate	In:Out Split	Volume			Rate	In:Out Split	Volume		
							In	Out	Total			In	Out	Total
Congregate Care Facility (253)	399	DU	2.02	812	0.07	60:40	17	11	28	0.18	53:47	38	34	72
Clinic (630)	5.0	TSF	38.16	191	3.64	78:22	12	6	18	3.53	29:71	7	11	18
Supermarket (850)	3.5	TSF	106.78	374	3.82	60:40	8	5	13	9.24	51:49	16	16	32
Utility (170)	2.0	Emp	4.11	8	0.70	80:20	1	0	1	0.76	20:80	0	2	2
Total				1,385			38	22	60			61	63	124

1: Rates from ITE Trip Generation (10th Edition, 2017)

2: DU = Dwelling Unit; TSF = Thousand Square Feet; Emp = Employee



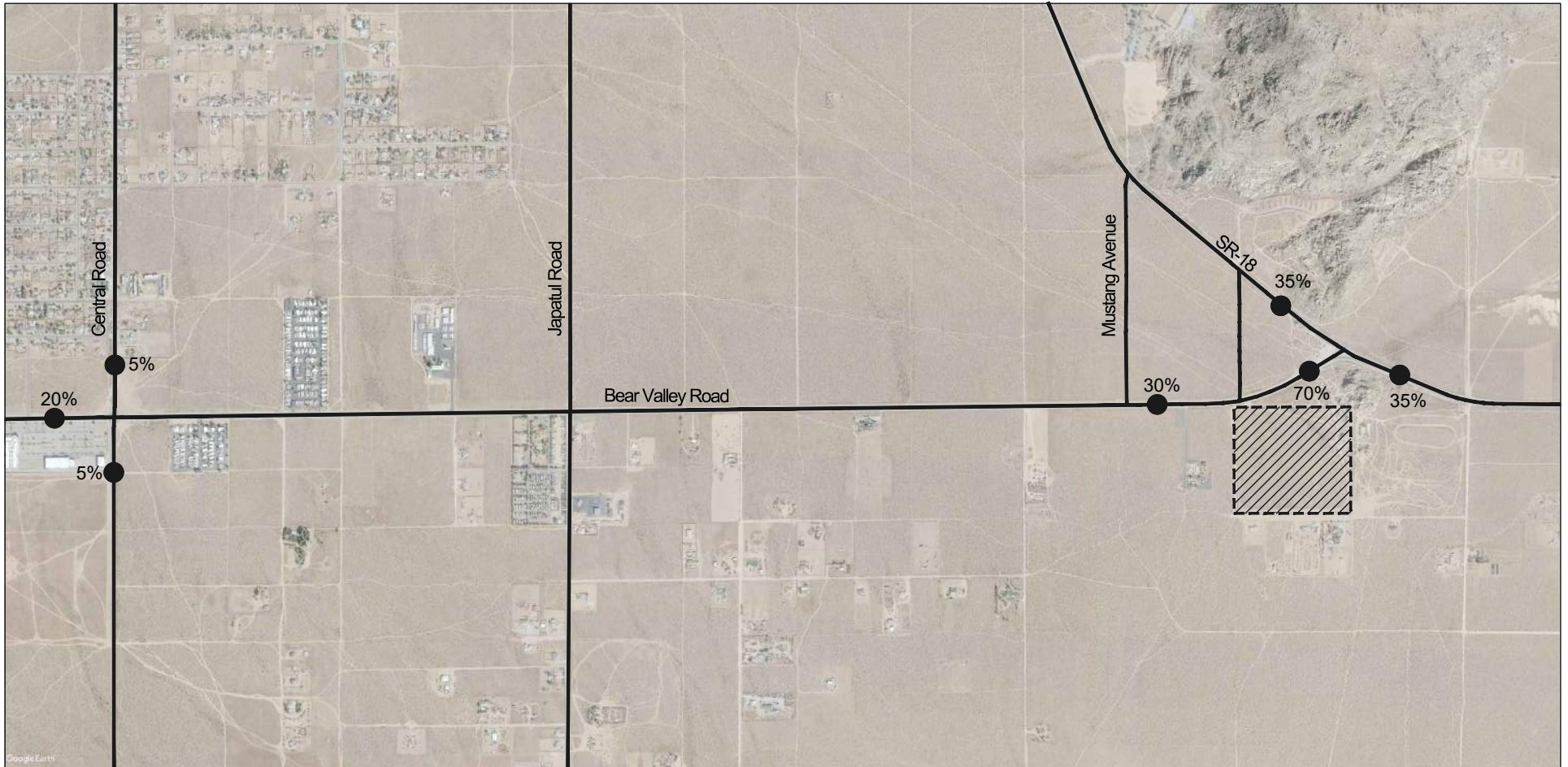
4.3 PROJECT TRIP DISTRIBUTION

Projecting trip distribution involves the process of identifying probable destinations and traffic routes that will be utilized by the proposed project's traffic. The potential interaction between the proposed land use and surrounding regional access routes are considered to identify the probable routes onto which project traffic would distribute. The projected trip distribution for the proposed project is based on anticipated travel patterns to and from the project site.

Exhibit 5 shows the projected trip distribution of proposed project trips.

4.4 CUMULATIVE PROJECTS TRAFFIC

Opening Year (2021) traffic volumes were developed using an annual ambient growth rate of 2%. It is assumed the growth rate of 2% would account for any potential cumulative projects within the study area.



Legend:
 XX% Percent Trip Distribution
 ----- Project Site

Exhibit 5: Trip Distribution at Study Intersections

Avellana Senior Living Mobile Homes Traffic Impact Analysis



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5.0 OPENING YEAR CONDITIONS (OYNP)

Opening Year (OYNP) traffic conditions analysis is intended to identify baseline conditions in the near-term without the proposed project.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for the *Opening Year* scenario are consistent with those previously shown in **Exhibit 3**.

5.2 OYNP TRAFFIC VOLUMES

Opening Year volumes include background traffic which includes nearby cumulative projects. Since the proposed project is expected to be built and generating trips in 2021, *Opening Year* volumes include a growth rate of 2% per year for one year, applied to existing volumes. It is assumed the growth rate of 2% would account for any potential cumulative projects within the study area.

Opening Year Volumes = (Existing (2021) Counts * 1.02¹)

Exhibit 6 shows *Opening Year* AM and PM peak hour volumes at the study intersections.

5.3 OYNP INTERSECTION LEVEL OF SERVICE ANALYSIS

Opening Year AM and PM peak hour intersection analysis is shown in **Table 6**. Calculations are based on the existing geometrics at the study area intersections as shown in **Exhibit 3**. HCM analysis sheets are provided in **Appendix C**.

Table 6:
Intersection Analysis – Project Opening Year Base (OYNP) Conditions

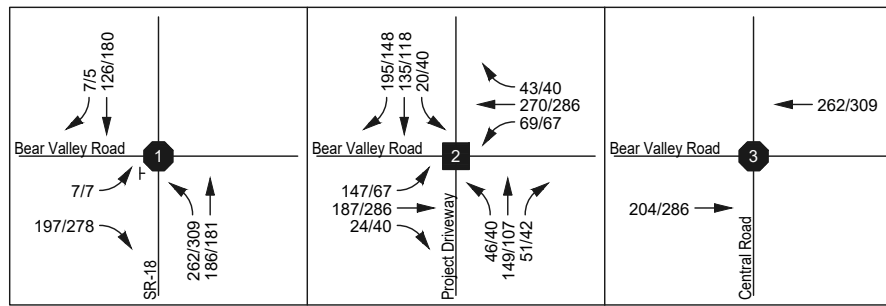
	Intersection		Control Type	Peak Hour	Existing Conditions	
					Delay ¹	LOS
1	Bear Valley Rd	Hwy 18	OWSC	AM	10.6	B
				PM	12.4	B
2	Bear Valley Rd	Central Rd	Signal	AM	32.9	C
				PM	34.1	C
3	Bear Valley Rd	Project Dwy	OWSC	AM	--	--
				PM	--	--

Note: OWSC = One-Way Stop-Control; Delay shown in seconds per vehicle.

1 = Per the Highway Capacity Manual 6th Edition, for intersections with one-or-two-way stop-control, the delay and LOS for the worst individual movement is shown.

As shown in **Table 6**, the study intersections are projected to continue to operate at an acceptable LOS during the AM and PM peak hours for *Opening Year* conditions.





Legend:

XX/XX AM/PM Peak Hour Volumes

----- Project Site

Exhibit 6: Project Opening Year Peak Hour Volumes

Avellana Senior Living Mobile Homes Traffic Impact Analysis



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6.0 OPENING YEAR PLUS PROJECT CONDITIONS (OYWP)

Opening Year Plus Project (OYWP) conditions analysis is intended to identify the project-related impacts on both the existing and planned near-term circulation system.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for the *pr Opening Year Plus Project* scenario are consistent with those previously shown in **Exhibit 3**, with the exception of project driveway and other facilities assumed to be constructed by the proposed project to provide site access.

6.2 OYWP TRAFFIC VOLUMES

Opening Year Plus Project volumes include background traffic which includes nearby cumulative projects and the addition the traffic projected to be generated by the proposed project. Since the proposed project is expected to be built and generating trips in 2022, *Opening Year Plus Project* volumes include a growth rate of 2% per year for one year, applied to existing base volumes. It is assumed the growth rate of 2% would account for any potential cumulative projects within the study area.

Opening Year Plus Project Volumes = (Existing (2021) Counts * 1.02¹) + Project Volume

Exhibit 7 shows *Opening Year Plus Project* AM and PM peak hour volumes at the study intersections.

6.3 OYWP INTERSECTION LEVEL OF SERVICE ANALYSIS

Opening Year Plus Project conditions AM and PM peak hour intersection analysis is shown in **Table 7**. HCM analysis sheets are provided in **Appendix C**.

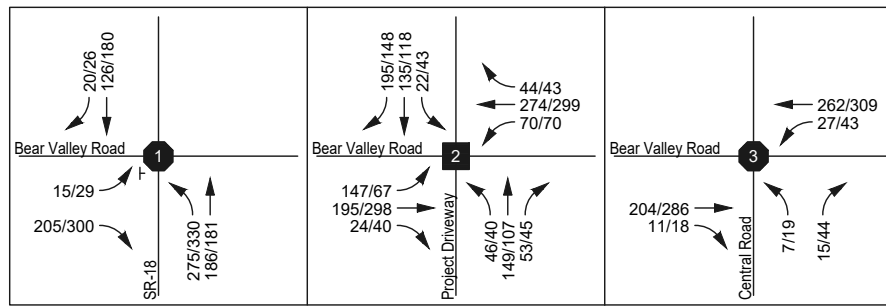
Table 7:
Intersection Analysis – Project Opening Year Plus Project (OYWP) Conditions

Intersection			Control Type	Peak Hour	OYNP Conditions		OYWP Conditions		Change	Deficient?
					Delay ¹	LOS	Delay ¹	LOS		
1	Bear Valley Rd	Hwy 18	OWSC	AM	10.6	B	11.1	B	0.5	No
				PM	12.4	B	14.5	B	2.1	No
2	Bear Valley Rd	Central Rd	Signal	AM	32.9	C	33.1	C	0.2	No
				PM	34.1	C	34.1	C	0.0	No
3	Bear Valley Rd	Project Dwy	OWSC	AM			10.7	B	--	No
				PM			12.7	B	--	No

Note: OWSC = One-Way Stop-Control; Delay shown in seconds per vehicle.

1 = Per the Highway Capacity Manual 6th Edition, for intersections with one-or-two-way stop-control, the delay and LOS for the worst individual movement is shown.

As shown in **Table 7**, the study intersections are projected to continue to operate at an acceptable LOS during the AM and PM peak hours for *project opening year base plus cumulative plus project* conditions.



Legend:

- XX/XX AM/PM Peak Hour Volumes
- Project Site

Exhibit 7: Project Opening Year With Project Peak Hour Volumes

7.0 VEHICLE MILES TRAVELED (VMT) ANALYSIS

Senate Bill (SB) 743 was adopted in 2013 requiring the Governor’s Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts within the California Environmental Quality Act (CEQA). For land use projects, OPR has identified Vehicle Miles Traveled (VMT) as the new metric for transportation analysis under CEQA. The regulatory changes to the CEQA guidelines that implement SB 743 were approved on December 28th, 2018 with an implementation date of July 1st, 2020 as the new metric.

Affordable and senior housing projects are often associated with low generating VMT. Several agencies (i.e. City of San Bernardino, City of Victorville, County of Riverside, and the County of Los Angeles), identify affordable housing projects and senior housing projects to have a less than significant impact on VMT and are screened from VMT analysis. OPR’s Technical Advisory on Evaluating Transportation Impacts in CEQA (December 2018) outlines various sources indicating affordable housing as a low generating VMT land uses and presumption of a less than significant impact. In addition, the County of San Bernardino’s General Plan Housing Element (Goal H-4) outlines to “Assist in the development, maintenance, modernization, and preservation of affordable housing; provide assistance where feasible for residents to rent or purchase adequate housing in San Bernardino County.”

As this project provides affordable housing and aims to provide a self-contained living experience, the project is presumed to have a less than significant transportation impact per CEQA guidelines.

APPENDIX



APPENDIX A

SCOPING AGREEMENT



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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This Scope for Traffic Study acknowledges San Bernardino County Department of Public Works, Traffic Division requirements of traffic impact analysis for the project and is subject to change:

Project Address:	24598-24300 Bear Valley Rd, Apple Valley, CA 92307		
Project Description:	Senior Living Mobile Homes		
City:	Apple Valley		
Project Buildout Year:	2022	Ambient Growth Rate per Year:	2%
Closest Intersection (Xtn) to the Project			
Xtn N/S Street Name:	Highway 18		
Xtn E/W Street Name:	Bear Valley Road		
Thomas Guide Pg+Grid:	Map 4388 + G6	County Supervisorial District:	1 st

	Engineer	Developer
Company:	Kimley-Horn and Associates, Inc.	Avellana Properties
Name:	Al Gerayeli	David Weisman
Address:	660 South Figueroa Street, Suite 2050	6101 Owensmouth Avenue
City, State, Zip Code:	Los Angeles, CA 90017	Woodland Hills, CA 91367
Phone #:	213 354 9408	310.626.9699
Fax #:		
Email:	Al.Gerayeli@kimley-horn.com	dweisman@theavellana.com

By: Avellana Properties

Reviewed By:

Print Name: David Weisman

Print Name:

Consultant/Developer's Representative **Date**

Traffic Division Representative **Date**

Al Gerayeli, P.E. (VA) 5/11/21



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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1. Traffic Distribution: Please insert or attach Figure(s) illustrating project trip distribution in percentages and volumes at the study intersections analyzed.

2. Trip Credit: Exact amount of credit subject to approval by Traffic Division.

Transportation Demand Management (TDM)	No	The community provides shuttle buses to Apple Valley twice a day. No TDM credit applied to provide a conservative analysis.
Existing Active Land Use	No	Vacant land
Previous Land Use	No	Vacant land
Internal Trip Reduction	No	Community includes a community center with a dining hall, a medical clinic, and a supermarket. No internal capture credit applied to provide a conservative analysis.
Pass-by Trip Reduction	No	Medical clinic and supermarket will primarily serve the residents but also accessible to the public outside of the community. No pass-by reduction credit applied to provide a conservative analysis.

3. Related Projects: Consultant should check with Planning in the San Bernardino County Department of Land Use Services and planning departments of adjoining Cities. Documentation of the consultation from these agencies shall be included in the traffic study. Related projects list shall be submitted to Traffic Division for our review and approval before being incorporated in the study.

4. Freeway Analysis: The potential traffic impact on the following Freeway(s) must be considered.

The applicant shall consult with the State of California Department of Transportation (Caltrans) to determine the California Environmental Quality Act levels of significance with regard to traffic impacts on Caltrans' freeway facilities. This consultation shall also include a determination of Caltrans requirements for the study of traffic impacts to its facilities and the mitigation of any such impacts. This analysis must follow the most current Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) and can be obtained from <http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tiguide.pdf>. If Caltrans finds that the project has a significant impact on the freeway, Caltrans shall be requested to include the basis for this finding in their response. If fees are proposed to mitigate the freeway impact, Caltrans shall be requested to identify the specific project to which the fees will apply. These written comments from Caltrans shall be included with the traffic study and submitted to Public Works for review and approval. If a documented good faith effort is made to consult with Caltrans and written comments cannot be obtained from within a reasonable amount of time, an analysis of the freeway impact shall be made using HCM procedures. Appendix A of the SANBAG CMP outlines allowable modifications to these



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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procedures. The SANBAG CMP can be viewed online at:
http://www.sanbag.ca.gov/planning/subr_congestion.html

5. Project Description

Avellana is a senior wellness community that includes an on-site community center, medical office, and supermarket. Following items describe community features:

- The community is a 55 and older only and the target resident will be 62-75.
- Shuttle buses will be provided to and from Apple Valley twice a day.
- A supermarket, community center, and medical/dental clinic will be provided on-site to address most of the essential needs of the residents within the community.
- The community center will employ 8 people and operate from 8:00 AM to 8:00 PM with delivery truck expected twice a week. The center will include a dining hall where residents can dine and an outdoor bar for socializing.
- The medical clinic will employ 4 people and operate from 8:00 AM to 5:00 PM with delivery truck expected once a week.
- The convenience store will employ 2 people and operate from 7:00 AM to 7:00 PM with delivery truck expected twice a week.
- The medical clinic and supermarket can serve the community due to the shortage of such services in the vicinity of the community, but the community center will serve the residents only.
- Avellana is a carbon neutral community. The community will build a 2MW power station, wells, purify it, and treats its wastewater onsite. The roads will not be asphalt or concrete. The roads will be built using durable, environmentally friendly material from post-consumer plastic grids and filled with aggregate.
- The utility parcel will house all the utilities. There will be a 2MW solar power station and battery storage facility, a water well with an 8" casing, some water storage tanks and pumps, a packaged water treatment plant, and some ancillary equipment. It will incorporate a solar farm and waste treatment plant. The facility will have two full time people and will only serve the development.



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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5. Trip Generation

Trip Generation Rate(s) Source: ITE Trip Generation			I – Institute of Transportation Engineers; S – San Diego Traffic Generators; C – County; O – Other:						Edition:		10th	
Land Use Code	Land Use	Rate Based on	Qty	*AVTE vs	ADT	Weekday a.m. peak		Weekday p.m. peak		Weekend peak hour		
						In	Out	In	Out	In	Out	
253	Congregate Care Facility	I	402 DU		812	17	11	38	34	NA	NA	
630	Clinic	I	5.0 KSF		191	12	6	7	11	NA	NA	
850	Supermarket	I	3.5 KSF		374	8	5	16	16	NA	NA	
170	Utility	I	2 Employees		8	1	0	0	2	NA	NA	
NA	Total	NA	NA		1385	38	22	61	63	NA	NA	

* - Average Vehicle Trip Ends.



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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For ITE Land Uses provide number and name of Land Use. e.g. LU 814 - Variety Store

6. Study Intersections: At minimum, the study shall include the following intersections. The list is subject to change after related projects, trip generation and distribution are determined. Consultant should check with adjoining Cities regarding their requirements in addition to the following County/City intersections. Documentation of the consultation from these agencies shall be included in the traffic study.

Xtn #	% County	Thomas Guide Page+Grid	N S/E/W Street Name	City	Signalized	CMP
1	50%	Map 4388 + G6	Bear Valley Rd at Highway 18	San Bernardino County	No	Yes
2	100%	Map 4388 + G6	Bear Valley Rd at Site Entrance	San Bernardino County	No	Yes
3	0%	Map 4388 + B6	Bear Valley Rd at Central Rd	Apple Valley	Yes	Yes

Cities to be consulted: Apple Valley



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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7. Other:

Traffic counts may be conducted immediately per the following:
<ul style="list-style-type: none"> • Must be taken on Tuesdays, Wednesdays or Thursdays.
<ul style="list-style-type: none"> • Must exclude holidays, and the first weekdays before and after the holiday.
<ul style="list-style-type: none"> • Must be taken on days when local schools or colleges are in session.
<ul style="list-style-type: none"> • Must be taken on days of good weather, and avoid atypical conditions (e.g., road construction, detours, or major traffic incidents).
<ul style="list-style-type: none"> • Traffic counts used for other traffic studies in the area shall NOT be reused again, unless 25% of the counts conducted for that particular traffic study are validated with new counts. The difference in volumes between the old and new counts at each corresponding movement should not be more than 10%.
<ul style="list-style-type: none"> • New traffic counts shall be checked to ensure the difference in volumes at corresponding approaches, if applicable, between two adjacent intersections is no more than 10% unless the difference can be justified.
<ul style="list-style-type: none"> • For all proposed mitigation measures, a conceptual plan for the improvements shall be submitted to our Traffic Studies section for review and approval prior to the approval of the Traffic Impact Analysis. All proposed improvements shall be within the right-of-way.
<ul style="list-style-type: none"> • For all cumulative mitigation measures, a cost estimate for the improvement shall be submitted.
VMT assessment will be performed consistent with the County guidelines as part of the traffic study.
Upon completion, traffic study will be submitted to Caltrans and City of Apple Valley for review and approval.
Following scenarios will be analyzed in the traffic study: 1) Existing condition, 2) Opening year 2022, and 3) Opening year 2022 plus project traffic.

This analysis must follow the most current Traffic Impact Study Guidelines for the County as stated in the County’s Road Planning and Design Standards.

8. Fees

The County charges on an actual cost basis for review of traffic studies. An initial deposit of \$1082 is required at the time that a land use application is filed with the Department of Land Use Services. If the review costs exceed the initial deposit, the applicant will be expected to provide additional funds and the review will be suspended until the additional funds are deposited.



SCOPE FOR TRAFFIC STUDY

Project Name:	Avellana Senior Living Mobile Homes
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9. Contact Information:

Please submit a signed copy of this scope for approval by the Traffic Division. Draft scopes may be sent electronically. Final scope with signature should be submitted in person or by US Mail to:

County of San Bernardino
Dept. of Public Works, Traffic Division
825 E. 3rd Street, Rm 115
San Bernardino, CA 92415-0835

Phone: 909-387-8186

Fax: 909-387-7809

Email: Anthony.Pham@dpw.sbcounty.gov



CONSULTANT: RED BRICK SOLUTION, LLC CONSULTING ENGINEERS & ARCHITECTS 331 S. RIO GRANDE STREET SUITE 203 SALT LAKE CITY, UTAH 84101 T: 801.224.5335 M: 801.816.5179

DAVID W. LARSON P.E. C52991 DATE

REGISTRATION



PROJECT

SITE PLAN 400 - HOME AVELLANA SENIOR WELLNESS 24550 LAS PIEDRAS ROAD APPLE VALLEY, CA

APPLICANT DEVELOPER

AVELLANA PROPERTIES 6101 OWENSMOUTH AVE. WOODLAND HILLS, CA 91367

REVISIONS

Table with columns: MARK, DATE, DESCRIPTION

PROJECT # RBS JN 200046 DRAWN BY: SC CHECKED BY: DWL PLOT DATE: 4/05/2021 APPLICATION TYPE:

PLANNED USE DEVELOPMENT

APN # 0435-015-13 0435-015-35

SHEET TITLE SITE PLAN A0.0 SHEET NUMBER

SAN BERNARDINO COUNTY SITE PLAN PERMIT

Table with sections: CBC / FIRE BUILDING ANALYSIS, LAND USE, PARKING ANALYSIS, PROPOSED PARKING, LANDSCAPE / BUFFER REQUIREMENTS, UTILITIES

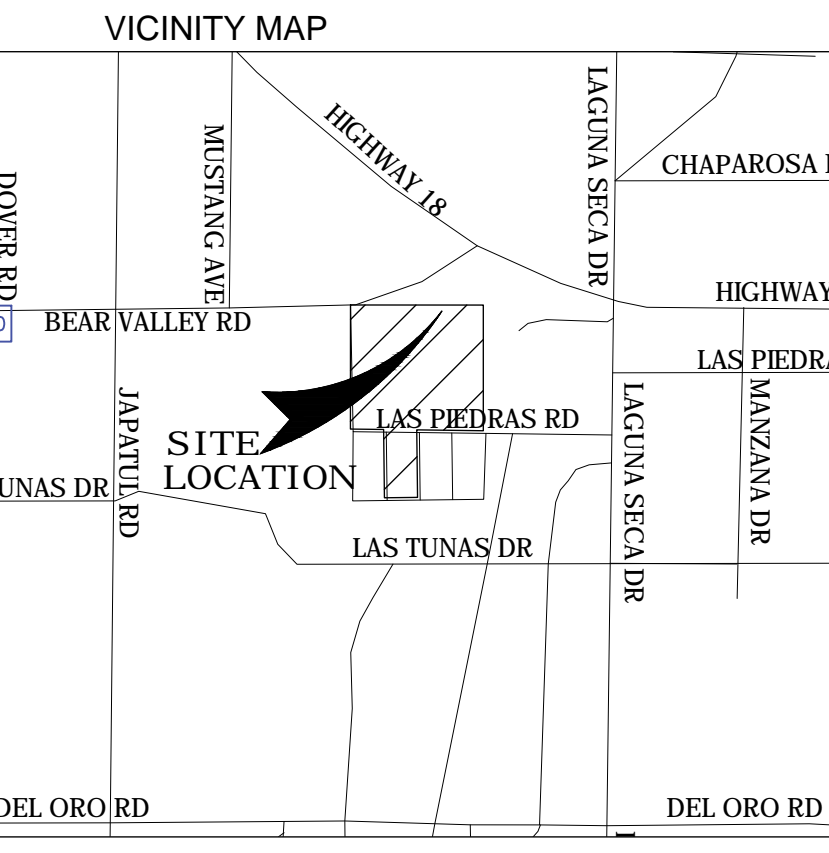
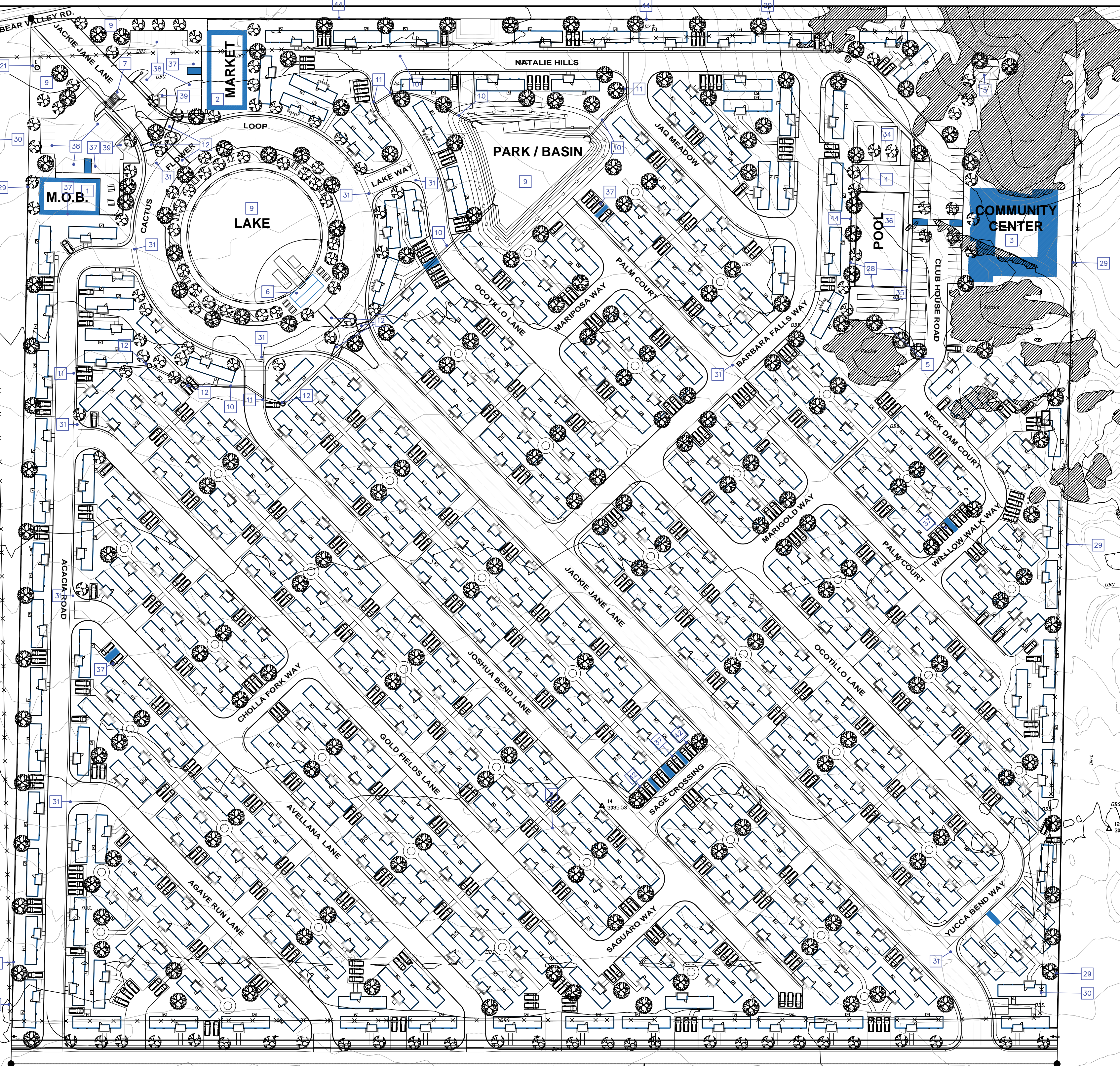
LEGEND: Symbols for monuments, water meters, bench marks, power poles, fire hydrants, trees, slopes, etc.

ABBREVIATIONS: AC = ASPHALT/CONCRETE, ASR = AUTOMATIC SPRINKLER RISER, etc.

Overall Project, Commercial Lot Break Downs, Residential Lot Break Downs

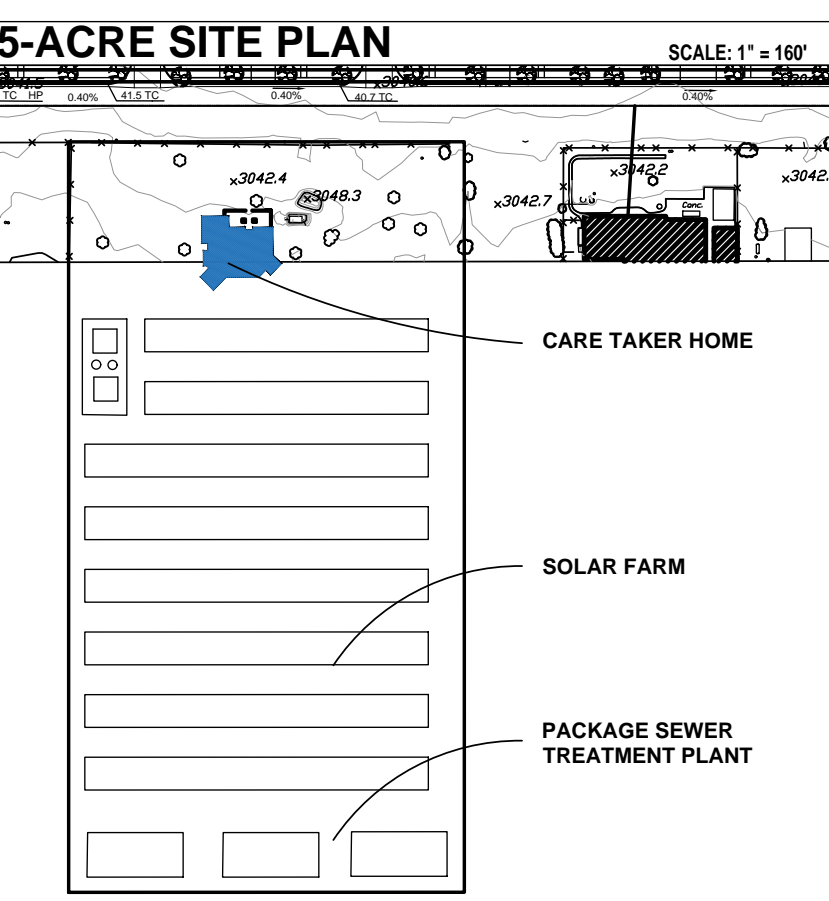
NOTES: 1. SIGNAGE: NO NEW SIGNS ARE PROPOSED AT THIS TIME.

LEGAL DESCRIPTION: PARCEL 1 - APN: 0436-015-13 THE NORTHWEST QUARTER OF NORTHEAST QUARTER OF SECTION 6 T4N, R2W, S8BM



SHEET INDEX: Table listing sheet numbers and names, such as A0.0 SITE PLAN / FIRE ACCESS & LEGAL EXHIBIT

KEYED NOTES: SEE SHEET A0.1 FOR LIST AND DESCRIPTION



PLANNING (Initial Review) This Plan is accepted and now may be submitted to reviewing agencies for consideration of requirements and approval.

FIRE DEPARTMENT Approved as noted: This approval does not constitute approval for code requirements other than Fire Dept. regulations and does not relieve the contractor of responsibility for compliance with all codes and regulations.

HAZARDOUS MATERIALS PLANS APPROVED Date: By:

ENVIRONMENTAL HEALTH SVS. PLANS APPROVED Date: By:

DPW - TRAFFIC/ROAD PERMITS PLANS APPROVED Date: By:

LAND DEVELOPMENT Road dedication required: YES NO Date completed: YES NO

BUILDING AND SAFETY APPROVED for submittal to Planning only. Date: By:

PLANNING (Final Approval) Site plan approved for submission to Building and Safety with letter. Approval Date: Expiration Date:

TABLE 1
SUMMARY OF PROJECT TRIP GENERATION
PROJECT: Avellana Senior Living Mobile Homes

Land Use	ITE Code	Unit	Trip Generation Rates ¹						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Congregate Care Facility	253	DU	2.020	0.042	0.028	0.07	0.095	0.085	0.18
Trip Generation Estimates									
Land Use	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
			Congregate Care Facility	402.00	DU	812	17	11	28
Total Project Trips			812	17	11	28	38	34	72
¹ Source: Institute of Transportation Engineers (ITE) <u>Trip Generation Manual</u> , 10 th Edition									

TABLE 2
SUMMARY OF PROJECT TRIP GENERATION
PROJECT: Avellana Senior Living Mobile Homes

Land Use	ITE Code	Unit	Trip Generation Rates ¹						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Clinic	630	KSF	38.160	2.439	1.201	3.64	1.412	2.118	3.53
Trip Generation Estimates									
Land Use	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
			Clinic	5.00	KSF	191	12	6	18
Total Project Trips			191	12	6	18	7	11	18
¹ Source: Institute of Transportation Engineers (ITE) <u>Trip Generation Manual</u> , 10 th Edition									

**TABLE 3
SUMMARY OF PROJECT TRIP GENERATION
PROJECT: Avellana Senior Living Mobile Homes**

Land Use	ITE Code	Unit	Trip Generation Rates ¹						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Supermarket	850	KSF	106.780	2.292	1.528	3.82	4.712	4.528	9.24
Trip Generation Estimates									
Land Use	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
			Supermarket	3.50	KSF	374	8	5	13
Total Project Trips			374	8	5	13	16	16	32
¹ Source: Institute of Transportation Engineers (ITE) <u>Trip Generation Manual</u> , 10 th Edition									

TABLE 4
SUMMARY OF PROJECT TRIP GENERATION
PROJECT: Avellana Senior Living Mobile Homes

Land Use	ITE Code	Unit	Trip Generation Rates ¹						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Utility	170	Number of Employees	4.110	0.567	0.133	0.70	0.616	0.144	0.76
Trip Generation Estimates									
Land Use	Quantity	Unit	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Utility	2.00	Number of Employees	8	1	0	1	0	2	2
Total Project Trips			8	1	0	1	0	2	2
¹ Source: Institute of Transportation Engineers (ITE) <u>Trip Generation Manual</u> , 10 th Edition									

Legend



Project Site



Study Intersections (intersection number)

XX%

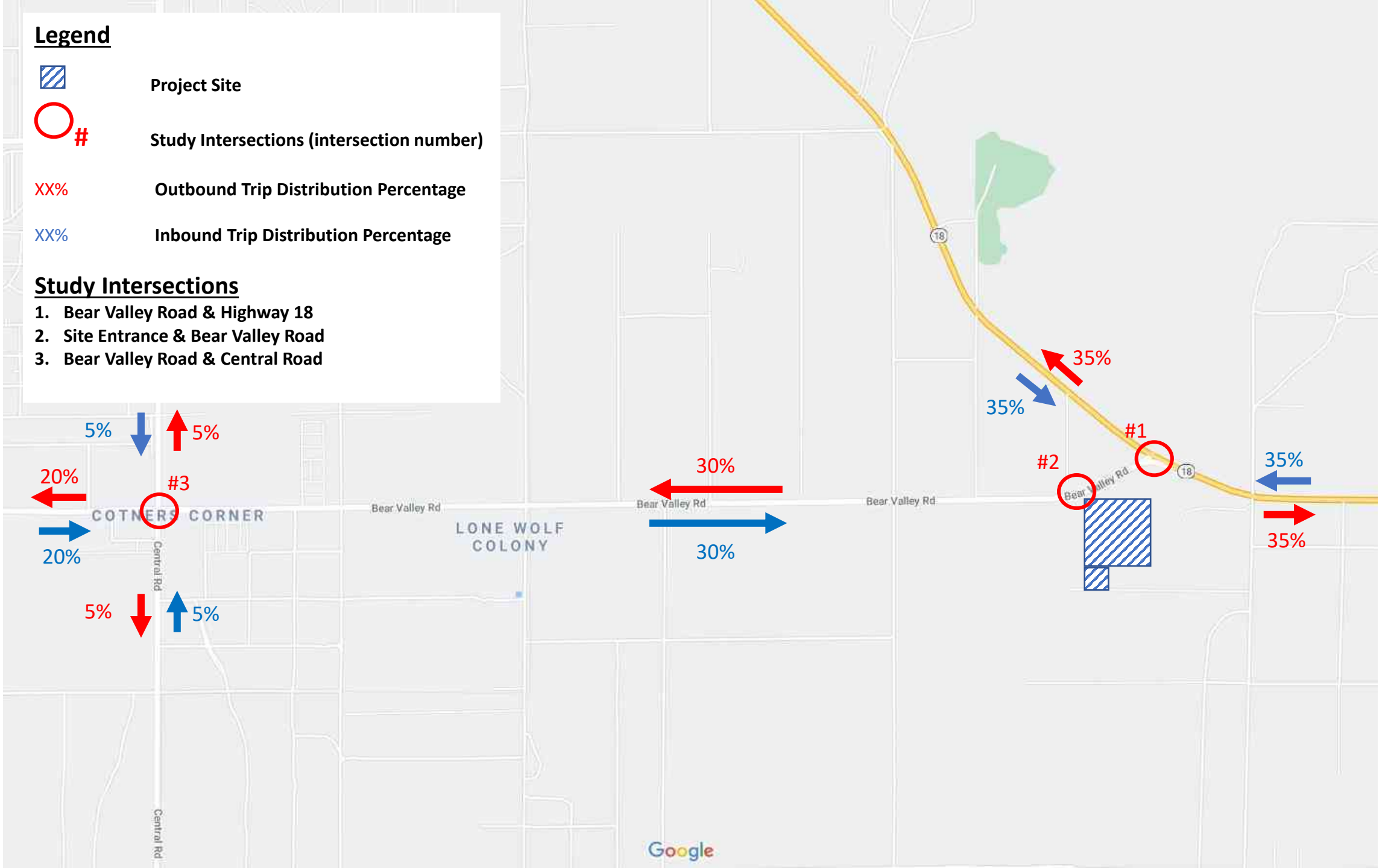
Outbound Trip Distribution Percentage

XX%

Inbound Trip Distribution Percentage

Study Intersections

1. Bear Valley Road & Highway 18
2. Site Entrance & Bear Valley Road
3. Bear Valley Road & Central Road



Legend



Project Site



Study Intersections (intersection number)

XX (XX)

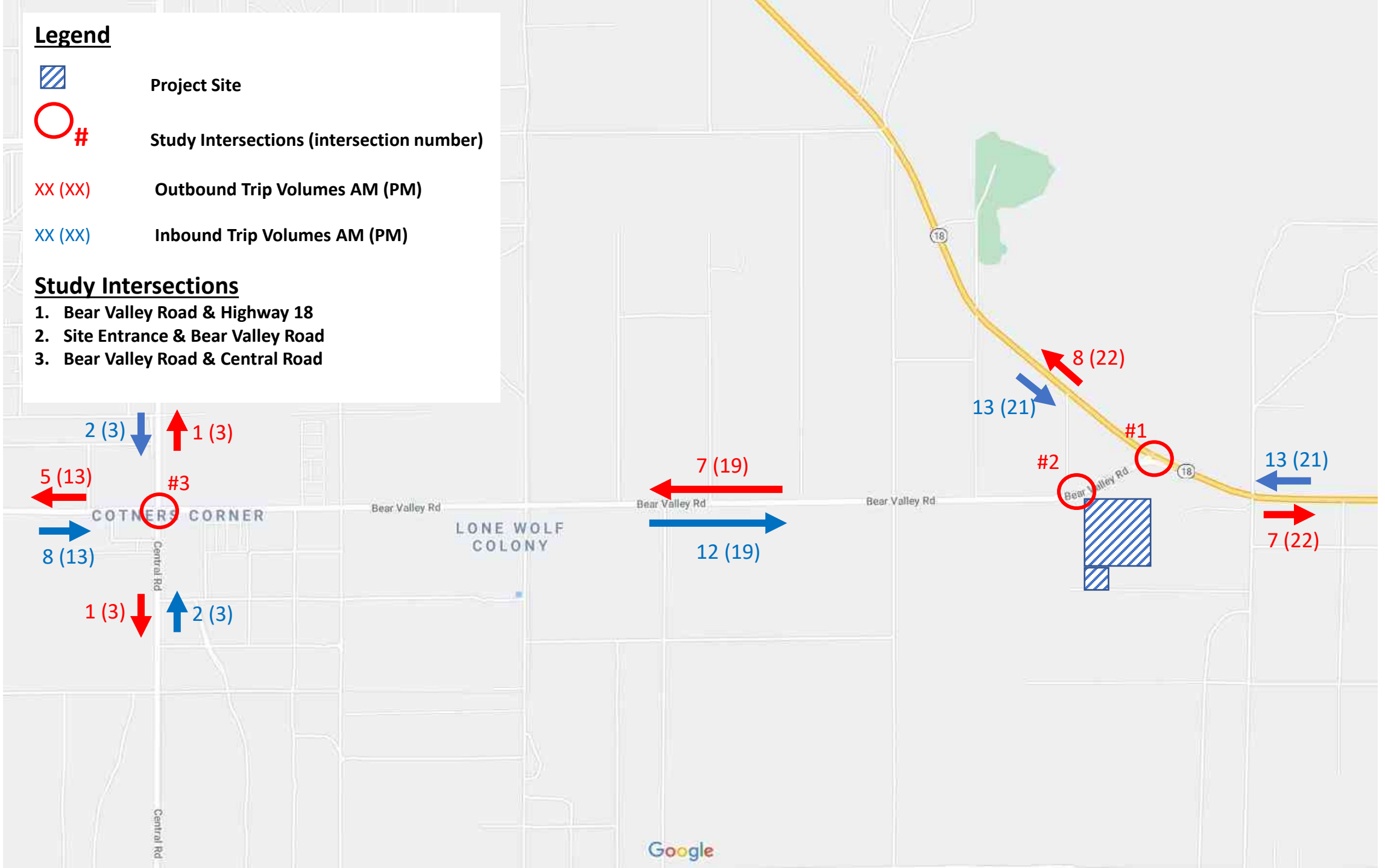
Outbound Trip Volumes AM (PM)

XX (XX)

Inbound Trip Volumes AM (PM)

Study Intersections

1. Bear Valley Road & Highway 18
2. Site Entrance & Bear Valley Road
3. Bear Valley Road & Central Road



APPENDIX B

EXISTING TRAFFIC COUNTS

County of San Bernardino
 N/S: SR-18
 E/W: Bear Valley Road
 Weather: Clear

File Name : 01_CSB_SR-18_Bear AM
 Site Code : 99921388
 Start Date : 8/11/2021
 Page No : 1

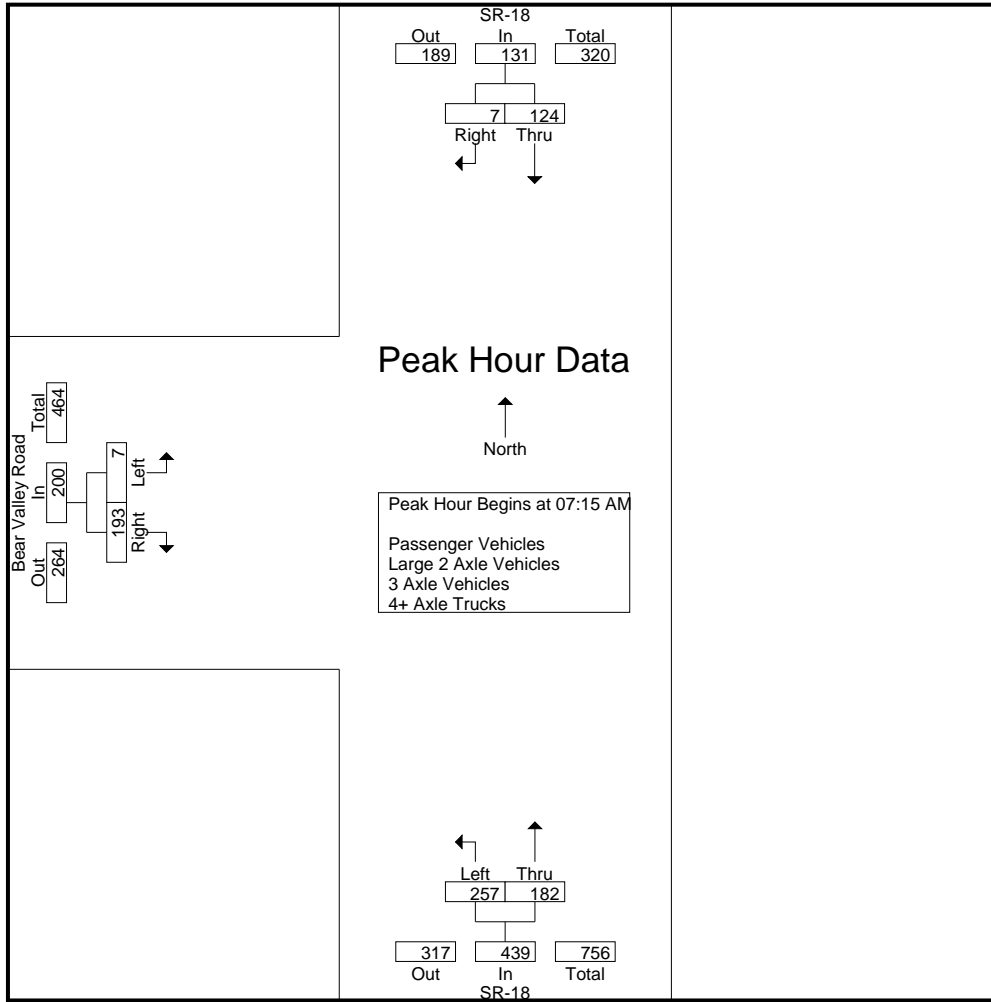
Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

Start Time	SR-18 Southbound			SR-18 Northbound			Bear Valley Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
07:00 AM	26	1	27	40	30	70	0	44	44	141
07:15 AM	36	3	39	67	50	117	2	54	56	212
07:30 AM	38	4	42	72	47	119	1	48	49	210
07:45 AM	28	0	28	56	39	95	3	47	50	173
Total	128	8	136	235	166	401	6	193	199	736
08:00 AM	22	0	22	62	46	108	1	44	45	175
08:15 AM	30	1	31	62	48	110	0	49	49	190
08:30 AM	19	0	19	62	41	103	0	57	57	179
08:45 AM	28	3	31	52	38	90	0	39	39	160
Total	99	4	103	238	173	411	1	189	190	704
Grand Total	227	12	239	473	339	812	7	382	389	1440
Apprch %	95	5		58.3	41.7		1.8	98.2		
Total %	15.8	0.8	16.6	32.8	23.5	56.4	0.5	26.5	27	
Passenger Vehicles	177	12	189	422	306	728	6	327	333	1250
% Passenger Vehicles	78	100	79.1	89.2	90.3	89.7	85.7	85.6	85.6	86.8
Large 2 Axle Vehicles	12	0	12	8	9	17	1	9	10	39
% Large 2 Axle Vehicles	5.3	0	5	1.7	2.7	2.1	14.3	2.4	2.6	2.7
3 Axle Vehicles	3	0	3	12	1	13	0	17	17	33
% 3 Axle Vehicles	1.3	0	1.3	2.5	0.3	1.6	0	4.5	4.4	2.3
4+ Axle Trucks	35	0	35	31	23	54	0	29	29	118
% 4+ Axle Trucks	15.4	0	14.6	6.6	6.8	6.7	0	7.6	7.5	8.2

Start Time	SR-18 Southbound			SR-18 Northbound			Bear Valley Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	36	3	39	67	50	117	2	54	56	212
07:30 AM	38	4	42	72	47	119	1	48	49	210
07:45 AM	28	0	28	56	39	95	3	47	50	173
08:00 AM	22	0	22	62	46	108	1	44	45	175
Total Volume	124	7	131	257	182	439	7	193	200	770
% App. Total	94.7	5.3		58.5	41.5		3.5	96.5		
PHF	.816	.438	.780	.892	.910	.922	.583	.894	.893	.908

County of San Bernardino
 N/S: SR-18
 E/W: Bear Valley Road
 Weather: Clear

File Name : 01_CSB_SR-18_Bear AM
 Site Code : 99921388
 Start Date : 8/11/2021
 Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM			07:15 AM			07:45 AM		
+0 mins.	26	1	27	67	50	117	3	47	50
+15 mins.	36	3	39	72	47	119	1	44	45
+30 mins.	38	4	42	56	39	95	0	49	49
+45 mins.	28	0	28	62	46	108	0	57	57
Total Volume	128	8	136	257	182	439	4	197	201
% App. Total	94.1	5.9		58.5	41.5		2	98	
PHF	.842	.500	.810	.892	.910	.922	.333	.864	.882

County of San Bernardino
 N/S: SR-18
 E/W: Bear Valley Road
 Weather: Clear

File Name : 01_CSB_SR-18_Bear PM
 Site Code : 99921388
 Start Date : 8/11/2021
 Page No : 1

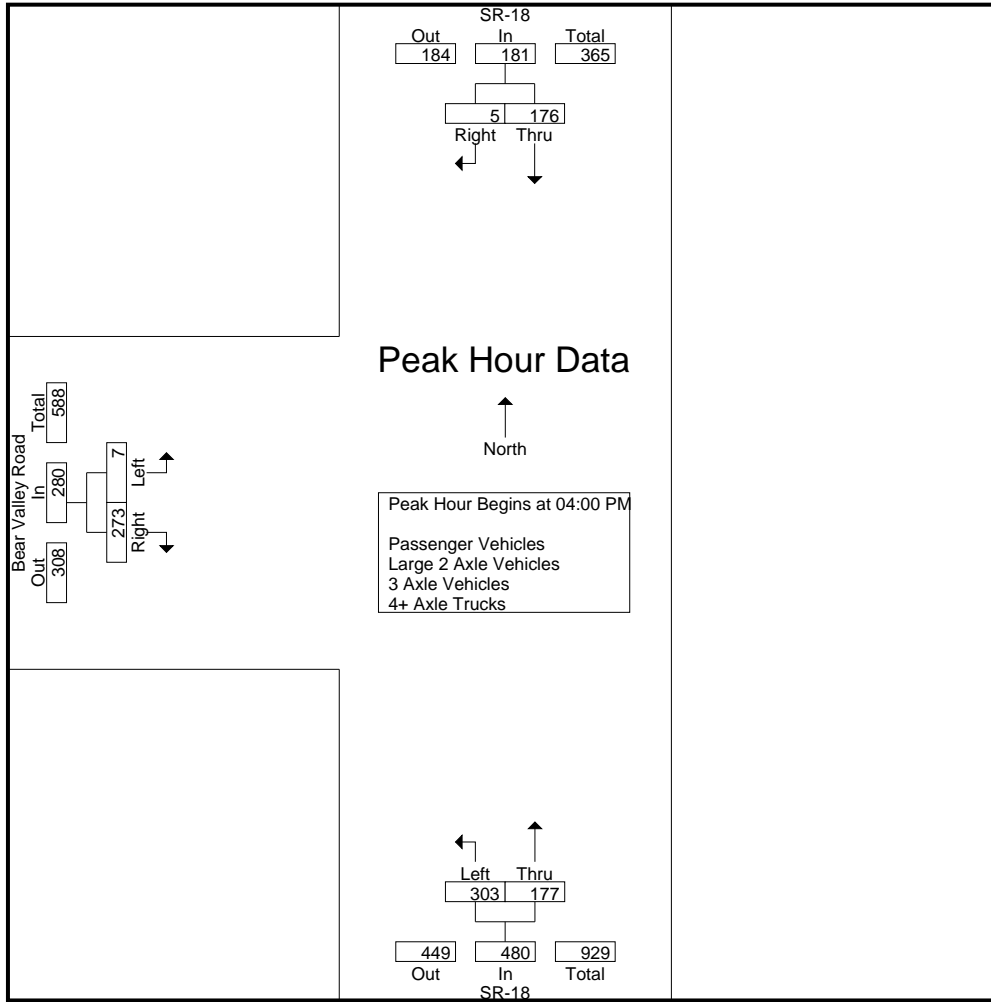
Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

Start Time	SR-18 Southbound			SR-18 Northbound			Bear Valley Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
04:00 PM	42	1	43	61	37	98	3	81	84	225
04:15 PM	47	2	49	99	48	147	0	73	73	269
04:30 PM	43	1	44	81	39	120	1	64	65	229
04:45 PM	44	1	45	62	53	115	3	55	58	218
Total	176	5	181	303	177	480	7	273	280	941
05:00 PM	46	2	48	49	32	81	1	70	71	200
05:15 PM	44	3	47	55	28	83	1	69	70	200
05:30 PM	38	2	40	54	47	101	0	80	80	221
05:45 PM	50	0	50	76	41	117	4	69	73	240
Total	178	7	185	234	148	382	6	288	294	861
Grand Total	354	12	366	537	325	862	13	561	574	1802
Apprch %	96.7	3.3		62.3	37.7		2.3	97.7		
Total %	19.6	0.7	20.3	29.8	18	47.8	0.7	31.1	31.9	
Passenger Vehicles	330	12	342	495	288	783	12	525	537	1662
% Passenger Vehicles	93.2	100	93.4	92.2	88.6	90.8	92.3	93.6	93.6	92.2
Large 2 Axle Vehicles	5	0	5	11	4	15	0	6	6	26
% Large 2 Axle Vehicles	1.4	0	1.4	2	1.2	1.7	0	1.1	1	1.4
3 Axle Vehicles	1	0	1	12	4	16	0	3	3	20
% 3 Axle Vehicles	0.3	0	0.3	2.2	1.2	1.9	0	0.5	0.5	1.1
4+ Axle Trucks	18	0	18	19	29	48	1	27	28	94
% 4+ Axle Trucks	5.1	0	4.9	3.5	8.9	5.6	7.7	4.8	4.9	5.2

Start Time	SR-18 Southbound			SR-18 Northbound			Bear Valley Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	42	1	43	61	37	98	3	81	84	225
04:15 PM	47	2	49	99	48	147	0	73	73	269
04:30 PM	43	1	44	81	39	120	1	64	65	229
04:45 PM	44	1	45	62	53	115	3	55	58	218
Total Volume	176	5	181	303	177	480	7	273	280	941
% App. Total	97.2	2.8		63.1	36.9		2.5	97.5		
PHF	.936	.625	.923	.765	.835	.816	.583	.843	.833	.875

County of San Bernardino
 N/S: SR-18
 E/W: Bear Valley Road
 Weather: Clear

File Name : 01_CSB_SR-18_Bear PM
 Site Code : 99921388
 Start Date : 8/11/2021
 Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:15 PM			04:00 PM			05:00 PM		
+0 mins.	47	2	49	61	37	98	1	70	71
+15 mins.	43	1	44	99	48	147	1	69	70
+30 mins.	44	1	45	81	39	120	0	80	80
+45 mins.	46	2	48	62	53	115	4	69	73
Total Volume	180	6	186	303	177	480	6	288	294
% App. Total	96.8	3.2		63.1	36.9		2	98	
PHF	.957	.750	.949	.765	.835	.816	.375	.900	.919

City of Apple Valley
 N/S: Central Road
 E/W: Bear Valley Road
 Weather: Clear

File Name : 02_APV_Central_Bear AM
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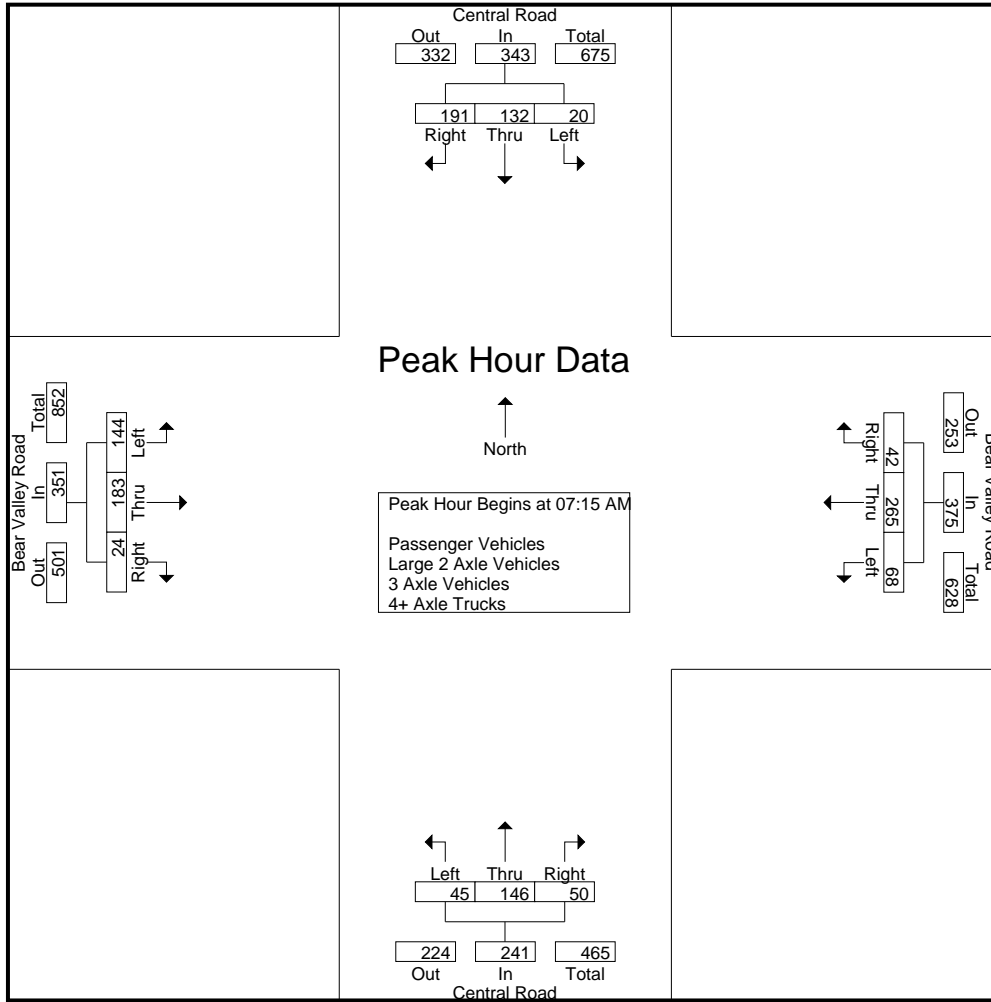
Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

Start Time	Central Road Southbound				Bear Valley Road Westbound				Central Road Northbound				Bear Valley Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	9	26	31	66	11	51	6	68	9	20	14	43	18	30	10	58	235
07:15 AM	3	43	30	76	13	72	13	98	9	32	8	49	39	54	6	99	322
07:30 AM	3	29	44	76	25	70	14	109	9	47	17	73	48	38	5	91	349
07:45 AM	8	42	77	127	18	66	11	95	11	37	11	59	33	47	6	86	367
Total	23	140	182	345	67	259	44	370	38	136	50	224	138	169	27	334	1273
08:00 AM	6	18	40	64	12	57	4	73	16	30	14	60	24	44	7	75	272
08:15 AM	5	16	24	45	13	65	16	94	14	25	12	51	24	49	10	83	273
08:30 AM	7	19	27	53	7	64	12	83	13	33	7	53	19	54	7	80	269
08:45 AM	9	16	29	54	7	65	8	80	8	26	3	37	35	53	7	95	266
Total	27	69	120	216	39	251	40	330	51	114	36	201	102	200	31	333	1080
Grand Total	50	209	302	561	106	510	84	700	89	250	86	425	240	369	58	667	2353
Apprch %	8.9	37.3	53.8		15.1	72.9	12		20.9	58.8	20.2		36	55.3	8.7		
Total %	2.1	8.9	12.8	23.8	4.5	21.7	3.6	29.7	3.8	10.6	3.7	18.1	10.2	15.7	2.5	28.3	
Passenger Vehicles	37	208	291	536	100	455	73	628	87	246	81	414	232	311	56	599	2177
% Passenger Vehicles	74	99.5	96.4	95.5	94.3	89.2	86.9	89.7	97.8	98.4	94.2	97.4	96.7	84.3	96.6	89.8	92.5
Large 2 Axle Vehicles	12	0	8	20	4	12	11	27	1	3	4	8	7	13	0	20	75
% Large 2 Axle Vehicles	24	0	2.6	3.6	3.8	2.4	13.1	3.9	1.1	1.2	4.7	1.9	2.9	3.5	0	3	3.2
3 Axle Vehicles	1	1	2	4	2	11	0	13	0	1	1	2	0	17	1	18	37
% 3 Axle Vehicles	2	0.5	0.7	0.7	1.9	2.2	0	1.9	0	0.4	1.2	0.5	0	4.6	1.7	2.7	1.6
4+ Axle Trucks	0	0	1	1	0	32	0	32	1	0	0	1	1	28	1	30	64
% 4+ Axle Trucks	0	0	0.3	0.2	0	6.3	0	4.6	1.1	0	0	0.2	0.4	7.6	1.7	4.5	2.7

Start Time	Central Road Southbound				Bear Valley Road Westbound				Central Road Northbound				Bear Valley Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	3	43	30	76	13	72	13	98	9	32	8	49	39	54	6	99	322
07:30 AM	3	29	44	76	25	70	14	109	9	47	17	73	48	38	5	91	349
07:45 AM	8	42	77	127	18	66	11	95	11	37	11	59	33	47	6	86	367
08:00 AM	6	18	40	64	12	57	4	73	16	30	14	60	24	44	7	75	272
Total Volume	20	132	191	343	68	265	42	375	45	146	50	241	144	183	24	351	1310
% App. Total	5.8	38.5	55.7		18.1	70.7	11.2		18.7	60.6	20.7		41	52.1	6.8		
PHF	.625	.767	.620	.675	.680	.920	.750	.860	.703	.777	.735	.825	.750	.847	.857	.886	.892

City of Apple Valley
 N/S: Central Road
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:00 AM				07:15 AM				07:30 AM				07:45 AM			
+0 mins.	9	26	31	66	13	72	13	98	9	47	17	73	39	54	6	99
+15 mins.	3	43	30	76	25	70	14	109	11	37	11	59	48	38	5	91
+30 mins.	3	29	44	76	18	66	11	95	16	30	14	60	33	47	6	86
+45 mins.	8	42	77	127	12	57	4	73	14	25	12	51	24	44	7	75
Total Volume	23	140	182	345	68	265	42	375	50	139	54	243	144	183	24	351
% App. Total	6.7	40.6	52.8		18.1	70.7	11.2		20.6	57.2	22.2		41	52.1	6.8	
PHF	.639	.814	.591	.679	.680	.920	.750	.860	.781	.739	.794	.832	.750	.847	.857	.886

City of Apple Valley
 N/S: Central Road
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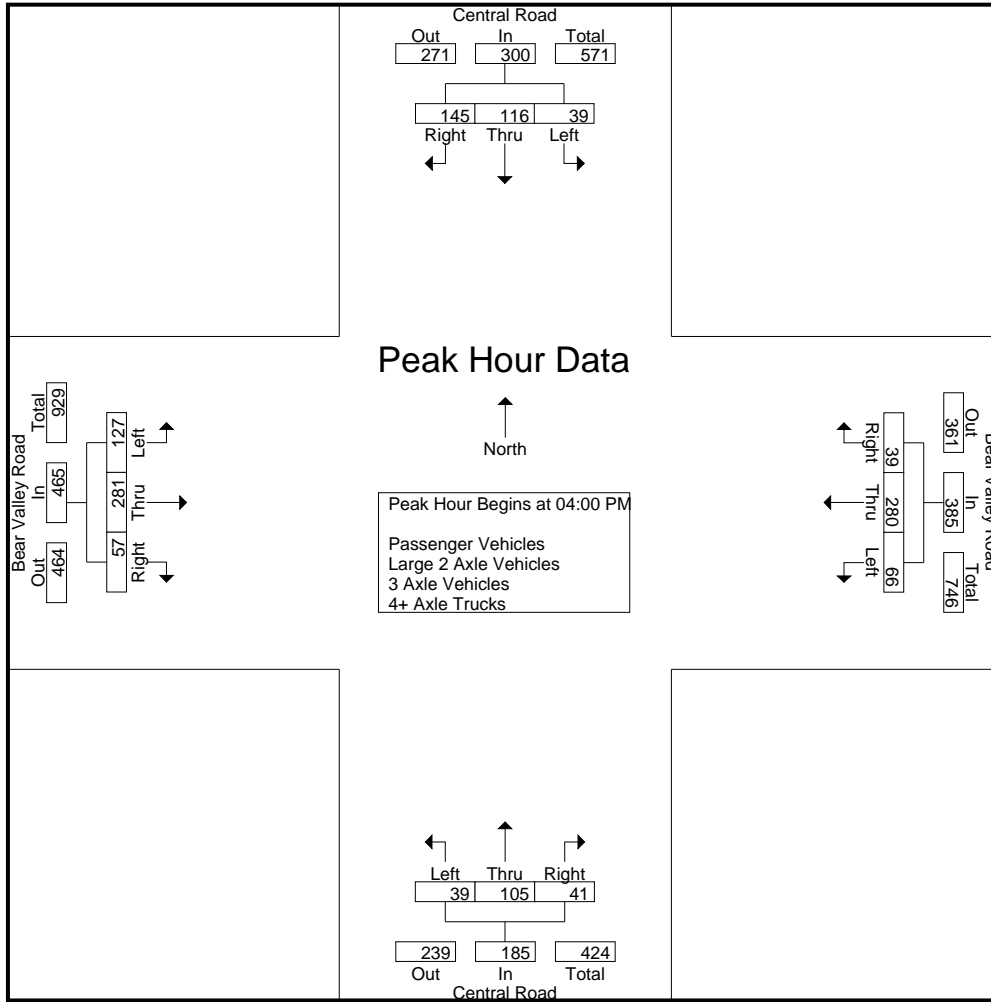
Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

Start Time	Central Road Southbound				Bear Valley Road Westbound				Central Road Northbound				Bear Valley Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	10	37	54	101	11	62	19	92	14	29	13	56	34	82	18	134	383
04:15 PM	8	30	37	75	21	77	6	104	7	27	12	46	27	73	11	111	336
04:30 PM	14	21	29	64	18	74	7	99	8	22	11	41	31	60	12	103	307
04:45 PM	7	28	25	60	16	67	7	90	10	27	5	42	35	66	16	117	309
Total	39	116	145	300	66	280	39	385	39	105	41	185	127	281	57	465	1335
05:00 PM	6	34	30	70	16	58	10	84	8	22	15	45	33	67	20	120	319
05:15 PM	6	41	24	71	16	57	7	80	11	27	13	51	43	75	24	142	344
05:30 PM	7	43	28	78	12	46	7	65	19	28	13	60	42	82	15	139	342
05:45 PM	8	23	27	58	11	75	3	89	9	32	9	50	30	73	20	123	320
Total	27	141	109	277	55	236	27	318	47	109	50	206	148	297	79	524	1325
Grand Total	66	257	254	577	121	516	66	703	86	214	91	391	275	578	136	989	2660
Apprch %	11.4	44.5	44		17.2	73.4	9.4		22	54.7	23.3		27.8	58.4	13.8		
Total %	2.5	9.7	9.5	21.7	4.5	19.4	2.5	26.4	3.2	8	3.4	14.7	10.3	21.7	5.1	37.2	
Passenger Vehicles	65	256	248	569	117	480	61	658	85	212	88	385	270	543	134	947	2559
% Passenger Vehicles	98.5	99.6	97.6	98.6	96.7	93	92.4	93.6	98.8	99.1	96.7	98.5	98.2	93.9	98.5	95.8	96.2
Large 2 Axle Vehicles	1	1	4	6	3	9	1	13	1	1	2	4	5	3	1	9	32
% Large 2 Axle Vehicles	1.5	0.4	1.6	1	2.5	1.7	1.5	1.8	1.2	0.5	2.2	1	1.8	0.5	0.7	0.9	1.2
3 Axle Vehicles	0	0	0	0	1	11	2	14	0	1	1	2	0	2	0	2	18
% 3 Axle Vehicles	0	0	0	0	0.8	2.1	3	2	0	0.5	1.1	0.5	0	0.3	0	0.2	0.7
4+ Axle Trucks	0	0	2	2	0	16	2	18	0	0	0	0	0	30	1	31	51
% 4+ Axle Trucks	0	0	0.8	0.3	0	3.1	3	2.6	0	0	0	0	0	5.2	0.7	3.1	1.9

Start Time	Central Road Southbound				Bear Valley Road Westbound				Central Road Northbound				Bear Valley Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	10	37	54	101	11	62	19	92	14	29	13	56	34	82	18	134	383
04:15 PM	8	30	37	75	21	77	6	104	7	27	12	46	27	73	11	111	336
04:30 PM	14	21	29	64	18	74	7	99	8	22	11	41	31	60	12	103	307
04:45 PM	7	28	25	60	16	67	7	90	10	27	5	42	35	66	16	117	309
Total Volume	39	116	145	300	66	280	39	385	39	105	41	185	127	281	57	465	1335
% App. Total	13	38.7	48.3		17.1	72.7	10.1		21.1	56.8	22.2		27.3	60.4	12.3		
PHF	.696	.784	.671	.743	.786	.909	.513	.925	.696	.905	.788	.826	.907	.857	.792	.868	.871

City of Apple Valley
 N/S: Central Road
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File Name : 02_APV_Central_Bear PM
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Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				05:00 PM				05:00 PM			
+0 mins.	10	37	54	101	11	62	19	92	8	22	15	45	33	67	20	120
+15 mins.	8	30	37	75	21	77	6	104	11	27	13	51	43	75	24	142
+30 mins.	14	21	29	64	18	74	7	99	19	28	13	60	42	82	15	139
+45 mins.	7	28	25	60	16	67	7	90	9	32	9	50	30	73	20	123
Total Volume	39	116	145	300	66	280	39	385	47	109	50	206	148	297	79	524
% App. Total	13	38.7	48.3		17.1	72.7	10.1		22.8	52.9	24.3		28.2	56.7	15.1	
PHF	.696	.784	.671	.743	.786	.909	.513	.925	.618	.852	.833	.858	.860	.905	.823	.923

APPENDIX C

HCM ANALYSIS WORKSHEETS

EXISTING CONDITION

Intersection						
Int Delay, s/veh	5.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	193	257	182	124	7
Future Vol, veh/h	7	193	257	182	124	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	212	282	200	136	8

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	904	140	144	0	0
Stage 1	140	-	-	-	-
Stage 2	764	-	-	-	-
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	307	908	1438	-	-
Stage 1	887	-	-	-	-
Stage 2	460	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	247	908	1438	-	-
Mov Cap-2 Maneuver	247	-	-	-	-
Stage 1	713	-	-	-	-
Stage 2	460	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1438	-	247	908	-	-
HCM Lane V/C Ratio	0.196	-	0.031	0.234	-	-
HCM Control Delay (s)	8.1	-	20	10.2	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.7	-	0.1	0.9	-	-

HCM 6th Signalized Intersection Summary

2: Cenral/Central & Bear Valley

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	183	24	68	265	42	45	146	50	20	132	191
Future Volume (veh/h)	144	183	24	68	265	42	45	146	50	20	132	191
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	206	27	76	298	47	51	164	56	22	148	215
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	455	386	98	351	297	71	894	758	42	318	462
Arrive On Green	0.11	0.24	0.24	0.06	0.19	0.19	0.04	0.48	0.48	0.02	0.46	0.46
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	689	1001
Grp Volume(v), veh/h	162	206	27	76	298	47	51	164	56	22	0	363
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1690
Q Serve(g_s), s	8.0	8.4	1.2	3.8	13.9	2.2	2.5	4.5	1.7	1.1	0.0	13.3
Cycle Q Clear(g_c), s	8.0	8.4	1.2	3.8	13.9	2.2	2.5	4.5	1.7	1.1	0.0	13.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.59
Lane Grp Cap(c), veh/h	198	455	386	98	351	297	71	894	758	42	0	780
V/C Ratio(X)	0.82	0.45	0.07	0.77	0.85	0.16	0.72	0.18	0.07	0.53	0.00	0.47
Avail Cap(c_a), veh/h	287	571	484	188	468	396	129	894	758	109	0	780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.1	29.0	26.2	42.0	35.3	30.6	42.7	13.4	12.7	43.4	0.0	16.6
Incr Delay (d2), s/veh	11.5	0.7	0.1	12.1	10.8	0.2	12.5	0.5	0.2	9.8	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	3.8	0.4	2.0	7.2	0.9	1.4	1.9	0.6	0.6	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.6	29.7	26.3	54.1	46.1	30.9	55.2	13.9	12.9	53.3	0.0	18.6
LnGrp LOS	D	C	C	D	D	C	E	B	B	D	A	B
Approach Vol, veh/h		395			421			271				385
Approach Delay, s/veh		38.0			45.9			21.5				20.6
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.6	47.5	9.5	26.4	8.1	46.0	14.5	21.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	29.5	9.5	27.5	6.5	28.5	14.5	22.5				
Max Q Clear Time (g_c+I1), s	3.1	6.5	5.8	10.4	4.5	15.3	10.0	15.9				
Green Ext Time (p_c), s	0.0	1.0	0.0	1.1	0.0	1.9	0.2	1.0				
Intersection Summary												
HCM 6th Ctrl Delay				32.7								
HCM 6th LOS				C								

HCM 6th TWSC
1: Hwy 18 & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	6.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	273	303	177	176	5
Future Vol, veh/h	7	273	303	177	176	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	310	344	201	200	6

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1092	203	206	0	-	0
Stage 1	203	-	-	-	-	-
Stage 2	889	-	-	-	-	-
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	237	838	1365	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	177	838	1365	-	-	-
Mov Cap-2 Maneuver	177	-	-	-	-	-
Stage 1	622	-	-	-	-	-
Stage 2	402	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	5.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1365	-	177	838	-	-
HCM Lane V/C Ratio	0.252	-	0.045	0.37	-	-
HCM Control Delay (s)	8.5	-	26.3	11.8	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	1	-	0.1	1.7	-	-

HCM 6th Signalized Intersection Summary

2: Cenral/Central & Bear Valley

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	281	57	66	280	39	39	105	41	39	116	145
Future Volume (veh/h)	127	281	57	66	280	39	39	105	41	39	116	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	323	66	76	322	45	45	121	47	45	133	167
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	466	395	98	379	321	67	857	726	67	345	434
Arrive On Green	0.10	0.25	0.25	0.06	0.20	0.20	0.04	0.46	0.46	0.04	0.46	0.46
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	754	946
Grp Volume(v), veh/h	146	323	66	76	322	45	45	121	47	45	0	300
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1700
Q Serve(g_s), s	7.2	14.1	2.9	3.8	14.9	2.1	2.2	3.4	1.5	2.2	0.0	10.4
Cycle Q Clear(g_c), s	7.2	14.1	2.9	3.8	14.9	2.1	2.2	3.4	1.5	2.2	0.0	10.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	181	466	395	98	379	321	67	857	726	67	0	779
V/C Ratio(X)	0.81	0.69	0.17	0.77	0.85	0.14	0.67	0.14	0.06	0.67	0.00	0.39
Avail Cap(c_a), veh/h	297	644	546	188	530	449	129	857	726	129	0	779
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.6	30.7	26.5	42.0	34.6	29.4	42.8	14.1	13.6	42.8	0.0	16.0
Incr Delay (d2), s/veh	8.2	1.9	0.2	12.1	9.1	0.2	11.1	0.3	0.2	11.1	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	6.4	1.1	2.0	7.6	0.8	1.2	1.5	0.5	1.2	0.0	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.8	32.5	26.7	54.1	43.7	29.6	53.9	14.5	13.8	53.9	0.0	17.5
LnGrp LOS	D	C	C	D	D	C	D	B	B	D	A	B
Approach Vol, veh/h		535			443			213				345
Approach Delay, s/veh		36.0			44.0			22.6				22.2
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	45.7	9.5	26.9	7.9	45.7	13.6	22.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	25.0	9.5	31.0	6.5	25.0	15.0	25.5				
Max Q Clear Time (g_c+I1), s	4.2	5.4	5.8	16.1	4.2	12.4	9.2	16.9				
Green Ext Time (p_c), s	0.0	0.7	0.0	1.9	0.0	1.5	0.2	1.3				
Intersection Summary												
HCM 6th Ctrl Delay			33.4									
HCM 6th LOS			C									

PROJECT OPENING YEAR

HCM 6th TWSC
1: Hwy 18 & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	5.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	197	262	186	126	7
Future Vol, veh/h	7	197	262	186	126	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	216	288	204	138	8

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	922	142	146	0	0
Stage 1	142	-	-	-	-
Stage 2	780	-	-	-	-
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	300	906	1436	-	-
Stage 1	885	-	-	-	-
Stage 2	452	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	240	906	1436	-	-
Mov Cap-2 Maneuver	240	-	-	-	-
Stage 1	707	-	-	-	-
Stage 2	452	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1436	-	240	906	-	-
HCM Lane V/C Ratio	0.2	-	0.032	0.239	-	-
HCM Control Delay (s)	8.1	-	20.5	10.2	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.7	-	0.1	0.9	-	-

HCM 6th Signalized Intersection Summary
 2: Cenral/Central & Bear Valley

08/24/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	187	24	69	270	43	46	149	51	20	135	195
Future Volume (veh/h)	147	187	24	69	270	43	46	149	51	20	135	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	165	210	27	78	303	48	52	167	57	22	152	219
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	461	390	101	355	301	72	886	751	42	316	456
Arrive On Green	0.11	0.25	0.25	0.06	0.19	0.19	0.04	0.47	0.47	0.02	0.46	0.46
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	693	998
Grp Volume(v), veh/h	165	210	27	78	303	48	52	167	57	22	0	371
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1691
Q Serve(g_s), s	8.2	8.6	1.2	3.9	14.1	2.3	2.6	4.6	1.8	1.1	0.0	13.7
Cycle Q Clear(g_c), s	8.2	8.6	1.2	3.9	14.1	2.3	2.6	4.6	1.8	1.1	0.0	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.59
Lane Grp Cap(c), veh/h	201	461	390	101	355	301	72	886	751	42	0	772
V/C Ratio(X)	0.82	0.46	0.07	0.77	0.85	0.16	0.72	0.19	0.08	0.53	0.00	0.48
Avail Cap(c_a), veh/h	287	571	484	188	468	396	129	886	751	109	0	772
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	28.8	26.0	41.9	35.2	30.4	42.7	13.7	12.9	43.4	0.0	17.0
Incr Delay (d2), s/veh	12.0	0.7	0.1	11.9	11.2	0.2	12.8	0.5	0.2	9.8	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	3.9	0.4	2.0	7.4	0.9	1.4	2.0	0.6	0.6	0.0	5.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.0	29.5	26.1	53.8	46.4	30.7	55.4	14.2	13.1	53.3	0.0	19.1
LnGrp LOS	D	C	C	D	D	C	E	B	B	D	A	B
Approach Vol, veh/h		402			429			276			393	
Approach Delay, s/veh		38.1			46.0			21.7			21.1	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.6	47.1	9.6	26.7	8.1	45.6	14.6	21.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	29.5	9.5	27.5	6.5	28.5	14.5	22.5				
Max Q Clear Time (g_c+I1), s	3.1	6.6	5.9	10.6	4.6	15.7	10.2	16.1				
Green Ext Time (p_c), s	0.0	1.1	0.0	1.1	0.0	1.9	0.2	1.0				
Intersection Summary												
HCM 6th Ctrl Delay				32.9								
HCM 6th LOS				C								

HCM 6th TWSC
1: Hwy 18 & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	6.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	278	309	181	180	5
Future Vol, veh/h	7	278	309	181	180	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	316	351	206	205	6

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1116	208	211	0	-	0
Stage 1	208	-	-	-	-	-
Stage 2	908	-	-	-	-	-
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	230	832	1360	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	393	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	171	832	1360	-	-	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	393	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	5.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1360	-	171	832	-	-
HCM Lane V/C Ratio	0.258	-	0.047	0.38	-	-
HCM Control Delay (s)	8.6	-	27.1	12	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	1	-	0.1	1.8	-	-

HCM 6th Signalized Intersection Summary
 2: Cenral/Central & Bear Valley

08/24/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	286	40	67	286	40	40	107	42	40	118	148
Future Volume (veh/h)	67	286	40	67	286	40	40	107	42	40	118	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	329	46	77	329	46	46	123	48	46	136	170
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	100	389	330	100	389	330	68	932	790	68	376	471
Arrive On Green	0.06	0.21	0.21	0.06	0.21	0.21	0.04	0.50	0.50	0.04	0.50	0.50
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	756	945
Grp Volume(v), veh/h	77	329	46	77	329	46	46	123	48	46	0	306
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1700
Q Serve(g_s), s	3.8	15.2	2.1	3.8	15.2	2.1	2.3	3.2	1.4	2.3	0.0	9.9
Cycle Q Clear(g_c), s	3.8	15.2	2.1	3.8	15.2	2.1	2.3	3.2	1.4	2.3	0.0	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	100	389	330	100	389	330	68	932	790	68	0	847
V/C Ratio(X)	0.77	0.85	0.14	0.77	0.85	0.14	0.68	0.13	0.06	0.68	0.00	0.36
Avail Cap(c_a), veh/h	198	571	484	198	571	484	133	932	790	133	0	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.9	34.3	29.1	41.9	34.3	29.1	42.8	12.1	11.7	42.8	0.0	13.8
Incr Delay (d2), s/veh	12.0	7.6	0.2	12.0	7.6	0.2	11.3	0.3	0.1	11.3	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	7.6	0.8	2.0	7.6	0.8	1.2	1.3	0.5	1.2	0.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	41.9	29.3	53.9	41.9	29.3	54.1	12.4	11.8	54.1	0.0	15.0
LnGrp LOS	D	D	C	D	D	C	D	B	B	D	A	B
Approach Vol, veh/h		452			452			217				352
Approach Delay, s/veh		42.6			42.6			21.1				20.1
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	49.3	9.5	23.2	7.9	49.3	9.5	23.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.7	27.8	10.0	27.5	6.7	27.8	10.0	27.5				
Max Q Clear Time (g_c+I1), s	4.3	5.2	5.8	17.2	4.3	11.9	5.8	17.2				
Green Ext Time (p_c), s	0.0	0.8	0.0	1.5	0.0	1.7	0.0	1.5				
Intersection Summary												
HCM 6th Ctrl Delay			34.1									
HCM 6th LOS			C									

PROJECT OPENING YEAR PLUS PROJECT

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	205	275	186	126	20
Future Vol, veh/h	15	205	275	186	126	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	225	302	204	138	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	957	149	160	0	-	0
Stage 1	149	-	-	-	-	-
Stage 2	808	-	-	-	-	-
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	286	898	1419	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	225	898	1419	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	692	-	-	-	-	-
Stage 2	438	-	-	-	-	-

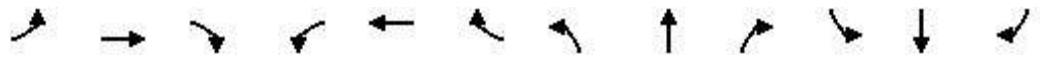
Approach	EB	NB	SB
HCM Control Delay, s	11.1	4.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1419	-	225	898	-	-
HCM Lane V/C Ratio	0.213	-	0.073	0.251	-	-
HCM Control Delay (s)	8.2	-	22.3	10.3	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.8	-	0.2	1	-	-

HCM 6th Signalized Intersection Summary

2: Cenral/Central & Bear Valley

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	195	24	70	284	44	46	149	53	22	135	195
Future Volume (veh/h)	147	195	24	70	284	44	46	149	53	22	135	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	165	219	27	79	319	49	52	167	60	25	152	219
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	476	404	102	373	316	72	865	733	46	310	447
Arrive On Green	0.11	0.25	0.25	0.06	0.20	0.20	0.04	0.46	0.46	0.03	0.45	0.45
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	693	998
Grp Volume(v), veh/h	165	219	27	79	319	49	52	167	60	25	0	371
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1691
Q Serve(g_s), s	8.2	8.9	1.2	3.9	14.8	2.3	2.6	4.7	1.9	1.2	0.0	14.0
Cycle Q Clear(g_c), s	8.2	8.9	1.2	3.9	14.8	2.3	2.6	4.7	1.9	1.2	0.0	14.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.59
Lane Grp Cap(c), veh/h	201	476	404	102	373	316	72	865	733	46	0	757
V/C Ratio(X)	0.82	0.46	0.07	0.77	0.86	0.16	0.72	0.19	0.08	0.54	0.00	0.49
Avail Cap(c_a), veh/h	287	588	498	192	488	414	109	865	733	109	0	757
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.0	28.3	25.4	41.9	34.8	29.8	42.7	14.3	13.5	43.3	0.0	17.6
Incr Delay (d2), s/veh	12.0	0.7	0.1	11.7	11.2	0.2	12.8	0.5	0.2	9.6	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	4.0	0.4	2.0	7.7	0.9	1.4	2.1	0.7	0.7	0.0	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.0	29.0	25.5	53.6	46.0	30.0	55.4	14.8	13.7	52.9	0.0	19.9
LnGrp LOS	D	C	C	D	D	C	E	B	B	D	A	B
Approach Vol, veh/h		411			447			279				396
Approach Delay, s/veh		37.6			45.6			22.1				21.9
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.8	46.1	9.7	27.4	8.1	44.8	14.6	22.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	28.5	9.7	28.3	5.5	28.5	14.5	23.5				
Max Q Clear Time (g_c+I1), s	3.2	6.7	5.9	10.9	4.6	16.0	10.2	16.8				
Green Ext Time (p_c), s	0.0	1.1	0.0	1.2	0.0	1.9	0.2	1.1				
Intersection Summary												
HCM 6th Ctrl Delay				33.1								
HCM 6th LOS				C								

HCM 6th TWSC
3: Project Dwy & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	204	11	27	262	7	15
Future Vol, veh/h	204	11	27	262	7	15
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	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	224	12	30	288	8	16

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	236	0	578 230
Stage 1	-	-	-	-	230 -
Stage 2	-	-	-	-	348 -
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	-	-	1331	-	478 809
Stage 1	-	-	-	-	808 -
Stage 2	-	-	-	-	715 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1331	-	465 809
Mov Cap-2 Maneuver	-	-	-	-	465 -
Stage 1	-	-	-	-	808 -
Stage 2	-	-	-	-	696 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	655	-	-	1331	-
HCM Lane V/C Ratio	0.037	-	-	0.022	-
HCM Control Delay (s)	10.7	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

HCM 6th TWSC
1: Hwy 18 & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	7.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	300	330	181	180	26
Future Vol, veh/h	29	300	330	181	180	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	341	375	206	205	30

























Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1176	220	235	0	-	0
Stage 1	220	-	-	-	-	-
Stage 2	956	-	-	-	-	-
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	211	820	1332	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	373	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	151	820	1332	-	-	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	373	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.5	5.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1332	-	151	820	-	-
HCM Lane V/C Ratio	0.282	-	0.218	0.416	-	-
HCM Control Delay (s)	8.8	-	35.4	12.5	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	1.2	-	0.8	2.1	-	-

HCM 6th Signalized Intersection Summary
 2: Cenral/Central & Bear Valley

08/24/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	298	40	70	299	43	40	107	45	43	118	148
Future Volume (veh/h)	67	298	40	70	299	43	40	107	45	43	118	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	343	46	80	344	49	46	123	52	49	136	170
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	99	404	343	103	408	346	68	910	771	70	369	461
Arrive On Green	0.06	0.22	0.22	0.06	0.22	0.22	0.04	0.49	0.49	0.04	0.49	0.49
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	756	945
Grp Volume(v), veh/h	77	343	46	80	344	49	46	123	52	49	0	306
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	0	1700
Q Serve(g_s), s	3.8	15.8	2.1	4.0	15.9	2.2	2.3	3.3	1.6	2.4	0.0	10.1
Cycle Q Clear(g_c), s	3.8	15.8	2.1	4.0	15.9	2.2	2.3	3.3	1.6	2.4	0.0	10.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.56
Lane Grp Cap(c), veh/h	99	404	343	103	408	346	68	910	771	70	0	830
V/C Ratio(X)	0.77	0.85	0.13	0.77	0.84	0.14	0.68	0.14	0.07	0.70	0.00	0.37
Avail Cap(c_a), veh/h	190	592	502	192	594	504	133	910	771	133	0	830
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.9	33.9	28.5	41.8	33.7	28.4	42.8	12.7	12.3	42.7	0.0	14.4
Incr Delay (d2), s/veh	12.0	7.6	0.2	11.6	7.3	0.2	11.3	0.3	0.2	12.0	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	7.9	0.8	2.1	7.8	0.9	1.2	1.4	0.6	1.3	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	41.5	28.6	53.4	41.0	28.6	54.1	13.0	12.4	54.7	0.0	15.7
LnGrp LOS	D	D	C	D	D	C	D	B	B	D	A	B
Approach Vol, veh/h		466			473			221				355
Approach Delay, s/veh		42.3			41.8			21.4				21.0
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.0	48.3	9.7	24.0	7.9	48.4	9.5	24.1				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.7	27.1	9.7	28.5	6.7	27.1	9.6	28.6				
Max Q Clear Time (g_c+I1), s	4.4	5.3	6.0	17.8	4.3	12.1	5.8	17.9				
Green Ext Time (p_c), s	0.0	0.8	0.0	1.6	0.0	1.6	0.0	1.6				
Intersection Summary												
HCM 6th Ctrl Delay			34.1									
HCM 6th LOS			C									

HCM 6th TWSC
3: Project Dwy & Bear Valley

08/24/2021

Intersection						
Int Delay, s/veh	1.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	286	18	43	309	19	44
Future Vol, veh/h	286	18	43	309	19	44
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	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	325	20	49	351	22	50

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	345	0	784
Stage 1	-	-	-	-	335
Stage 2	-	-	-	-	449
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1214	-	362
Stage 1	-	-	-	-	725
Stage 2	-	-	-	-	643
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1214	-	344
Mov Cap-2 Maneuver	-	-	-	-	344
Stage 1	-	-	-	-	725
Stage 2	-	-	-	-	611

Approach	EB	WB	NB
HCM Control Delay, s	0	1	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	536	-	-	1214	-
HCM Lane V/C Ratio	0.134	-	-	0.04	-
HCM Control Delay (s)	12.7	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-