



# HEXAGON TRANSPORTATION CONSULTANTS, INC.

## Memorandum

**Date:** May 4, 2021  
**To:** Nick Pappani, Raney Planning & Management, Inc.  
**From:** Robert Del Rio, T.E., Luis Descanzo  
**Subject:** Trip Generation and Operations Analysis for the Proposed Manzanita Residential Development in Morgan Hill, California

Hexagon Transportation Consultants, Inc. has completed a trip generation and operations analysis for the proposed Manzanita Park residential development project located at the northeast corner of the intersection of Monterey Road and Tilton Avenue in Morgan Hill, California (APN: 725-01-018) (see Figure 1). The project as proposed consists of the construction of 67 residential units spread between 12 three-story buildings on a vacant site (see Figure 2 for site plan). The project would extend Tilton Avenue eastward from its existing terminus at Monterey Road, thereby bisecting the project site into a north parcel consisting of 43 residential units and a south parcel consisting of 24 residential units. Access to the north parcel would be provided via one full access driveway and one egress-only driveway along the Tilton Avenue extension. Access to the south parcel would be provided via one full access driveway and one ingress-only driveway along the Tilton Avenue extension. The methodology, results, and recommendations of the analysis are discussed below.

## Scope of Study

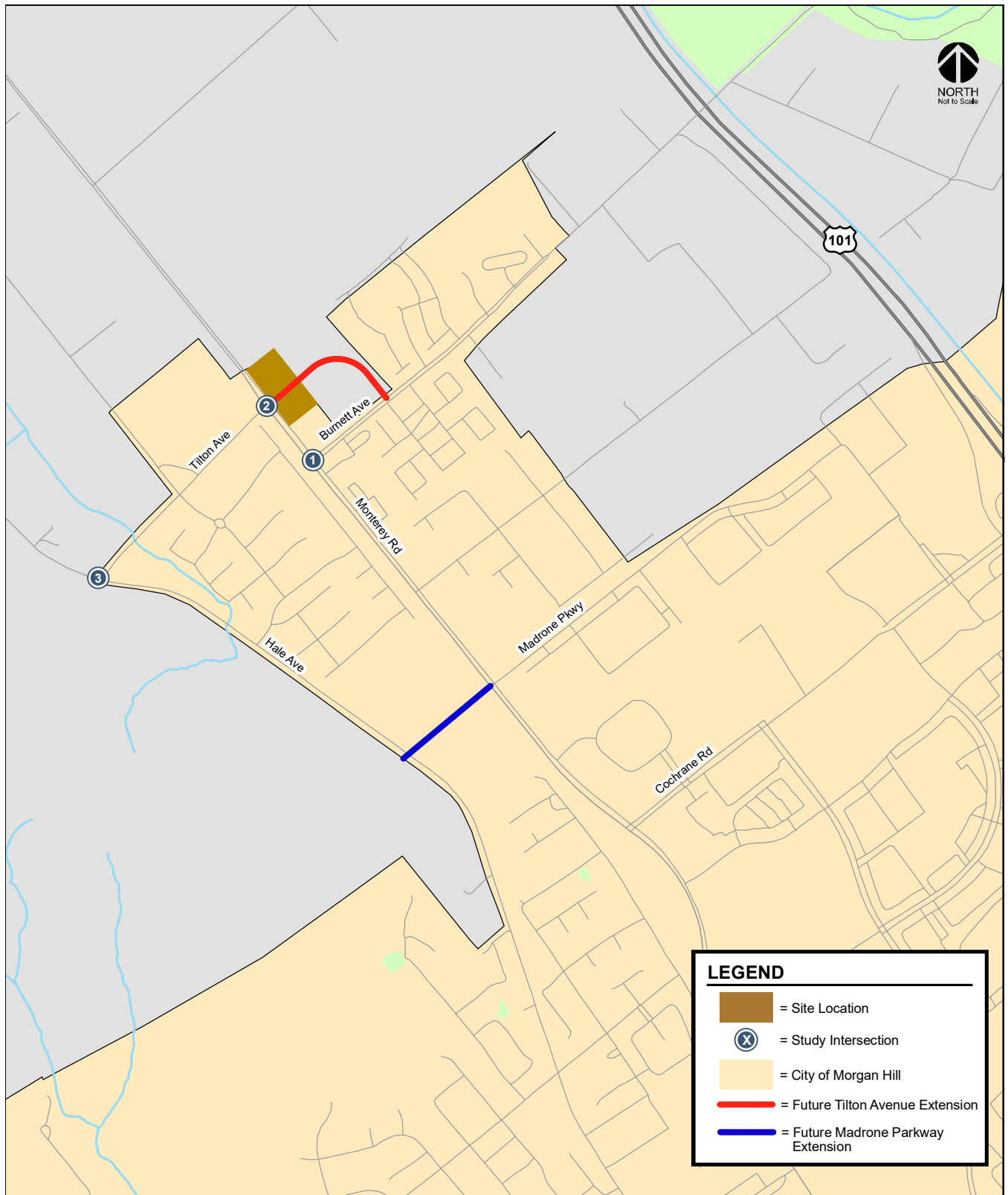
The current General Plan, *Morgan Hill 2035 General Plan*, adopted in July 2016 uses Level of Service (LOS) as its primary metric for the evaluation of the projected operation of the City's roadway system. Therefore, this traffic operations analysis based upon peak hour intersection level of service analysis is included for consistency with the General Plan goals and policies. The traffic operations analysis supplements the CEQA required VMT analysis provided in a separate memorandum. However, the determination of project impacts per CEQA requirements is based solely on the VMT analysis.

The purposes of the trip generation and operations analysis are to evaluate the magnitude of traffic that would be added to the roadway system due to the proposed project and to determine whether a comprehensive traffic study is required for the proposed project. The analysis consists of an evaluation of trip generation and peak-hour intersection level of service analysis at intersections in the immediate vicinity of the project site. Traffic conditions were evaluated for the scenarios listed below.

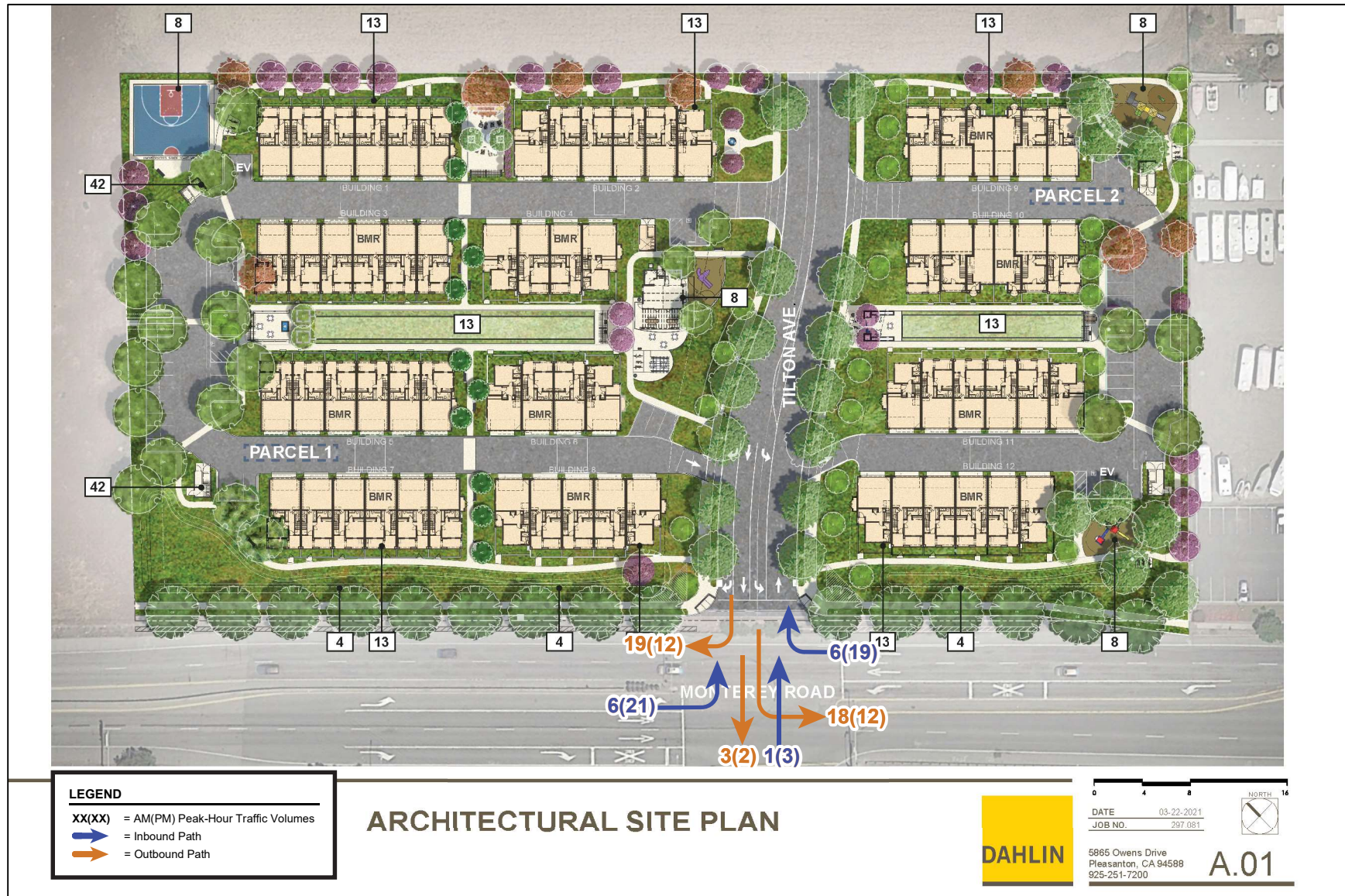
**Existing Conditions.** Existing conditions represent the existing peak-hour traffic volumes on the existing roadway network. New traffic counts are not currently being collected due to the current COVID-19 pandemic and its effects on normal traffic conditions. Therefore, existing traffic volumes were represented by pre-pandemic traffic counts with a 1.5% compound annual growth factor applied to counts more than two years old.

**Existing Plus Project Conditions.** Existing plus project peak-hour traffic volumes were estimated by adding to the existing traffic volumes the additional traffic that would be generated by the

**Figure 1**  
**Site Location and Study Intersections**



**Figure 2**  
**Site Plan and Project Trips at Driveways**





proposed project. Existing plus project conditions were evaluated relative to existing conditions in order to determine the effects of the proposed project on existing traffic conditions.

**Year 2035 General Plan Conditions (With the Madrone Extension).** Year 2035 General Plan conditions represent future traffic volumes on the future transportation network. The future transportation network assumes completion of the planned General Plan roadway network including the extension of Madrone Parkway between Monterey Road and Hale Avenue.

**Year 2035 General Plan with Project Conditions (With Madrone Parkway Extension).** Year 2035 General Plan with Project conditions consists of Year 2035 General Plan traffic conditions with the addition of project traffic and proposed extensions of Madrone Parkway and Tilton Avenue. Tilton Avenue is planned to be extended between Monterey Road and Burnett Avenue/Greenwood Circle.

The Madrone Parkway extension would require the construction of either an at-grade crossing or a grade-separated crossing across Union Pacific right-of-way. The feasibility of either option is not certain. If the planned Madrone Parkway extension is not constructed, the projected Year 2035 General Plan traffic patterns would change due to the increased usage of Tilton Avenue as an alternative access point between Monterey Road and Hale Avenue. Therefore, the evaluation of the following Year 2035 General Plan conditions without the Madrone Parkway extension scenarios is provided to reflect the adjustment of the projected Year 2035 General Plan traffic volumes.

**Year 2035 General Plan Conditions (Without Madrone Parkway Extension).** Year 2035 General Plan conditions consists of Year 2035 General Plan traffic conditions without the proposed Madrone Parkway extension between Monterey Road and Hale Avenue.

**Year 2035 General Plan with Project Conditions (Without Madrone Parkway Extension).** Year 2035 General Plan with Project conditions consists of Year 2035 General Plan traffic conditions with the addition of project traffic and without the proposed Madrone Parkway extension.

## Project Trip Generation Estimates and Assignment

In determining the project trip generation, the magnitude of traffic entering and existing the site is estimated for the AM and PM peak hours. Through empirical research, data have been collected that quantify the amount of traffic produced by many types of land uses. The research is compiled in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition (2017)*. The standard trip generation rates can be applied to help predict the future traffic increases that would result from a new development. As proposed, the site would consist of 67 attached single-family residential units. The ITE trip generation manual does not provide trip rates specifically for attached single-family units. Therefore, the rates for “Single-Family Detached Housing” (ITE Land Use 210) were used to estimate the trips generated by the proposed project. It is expected that the trip-making characteristics of the proposed attached single-family units would be similar to those of detached single-family units since each of the proposed units will include a private two-car garage and the limited availability of transit services in the project area.

After applying the ITE trip rates, it is estimated that the project would generate 52 vehicle trips (13 inbound and 39 outbound) during the AM peak hour and 69 vehicle trips (43 inbound and 26 outbound) during the PM peak hour (see Table 1).

**Table 1**  
**Trip Generation Summary**

Trip Generation Summary										
Land Use	ITE Land Use Code <sup>1</sup>	Size	AM Peak Hour				PM Peak Hour			
			Pk-Hr Rate	Trip			Pk-Hr Rate	Trip		
				In	Out	Total		In	Out	Total
Proposed Land Use										
Single-Family Detached Housing	210	67 Dwelling Units	0.782	13	39	52	1.03	43	26	69
Notes:										
<sup>1</sup> Source: ITE <i>Trip Generation Manual</i> , 10th Edition 2017.										

The directional distribution of site-generated traffic to and from the project site was estimated based on the existing travel patterns on the surrounding roadway network that reflect typical weekday AM and PM peak commute patterns, the location of the project driveways, freeway access points, and the locations of complementary land uses. The peak-hour project trips associated with the proposed project were added to the transportation network in accordance with the distribution pattern. The project trip distribution pattern and assignment of project trips at the study intersections are shown on Figure 3.

## Year 2035 Conditions Project Trip Generation Estimates

Year 2035 General Plan conditions traffic volumes were developed based on traffic forecasts produced for the City of Morgan Hill 2035 General Plan using the City's Traffic Demand Forecasting (TDF) model. The Year 2035 General Plan traffic forecasts include land use growth and transportation improvements associated with buildout of the City's General Plan.

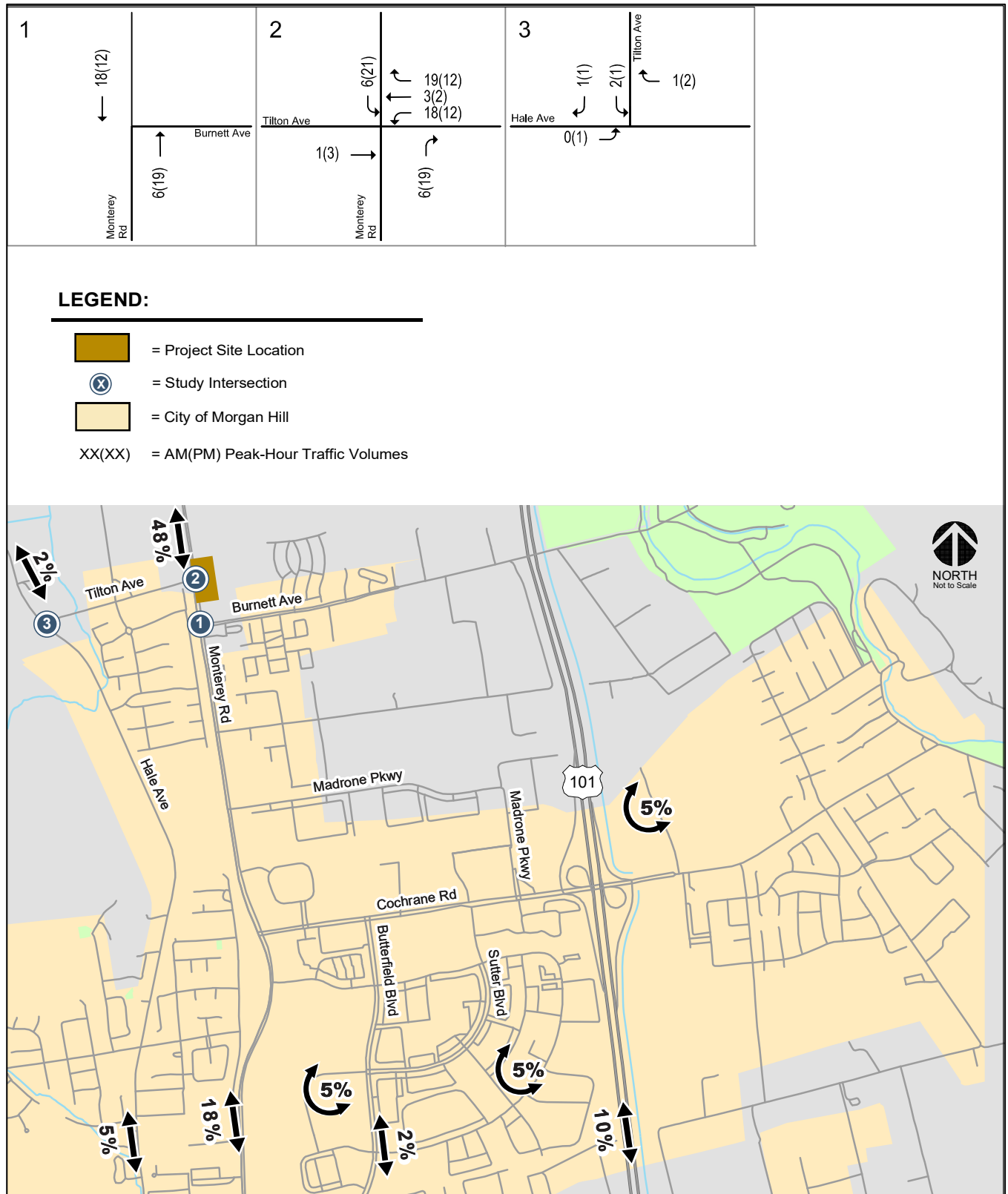
The 2035 General Plan forecasts also include trips associated with the adopted General Plan land uses for the project site. Therefore, the trips associated with the adopted General Plan land uses for the project site were removed to develop Year 2035 General Plan no project traffic volumes. Hexagon prepared trip estimates for the project site GP land uses which were estimated to consist of approximately 17 multi-family dwelling units, 1,000 s.f. of retail and service use, and 1,000 s.f. of office use and the proposed development plan. The trip estimates indicate that the proposed development plan is of greater intensity than that assumed in the General Plan traffic model for the project site. The proposed development plan would result in 42 additional AM peak-hour trips and 54 PM peak-hour trips at the project site, when compared with the land, uses included in the City's current General Plan traffic model. The comparison of trip generation per the General Plan traffic model and proposed project are presented in Table 2.

Additionally, it should be noted that per the City's General Plan Land Use Map, the 5.8-acre project site is a designated Mixed Use Flex land-use zone which supports between 7 to 24 dwelling units per acre. Per the land use designation and maximum allowable development standards, the project site may support up to 140 dwelling units per the General Plan.

## Intersection Level of Service Methodology

Traffic conditions at the study intersections were analyzed for the weekday AM and PM peak hours of traffic. The weekday AM peak hour of traffic generally falls within the 7:00 AM to 9:00 AM period and the weekday PM peak hour is typically in the 4:00 PM to 6:00 PM period. It is during these times that the most congested traffic conditions occur on a typical weekday.

**Figure 3**  
**Project Trip Distribution and Assignment**



**Table 2**  
**General Plan Project Trip Generation Estimates Comparison**

Land Use	ITE Land Use Code <sup>1</sup>	Size	AM Peak Hour				PM Peak Hour			
			Pk-Hr Rate	Trip			Pk-Hr Rate	Trip		
				In	Out	Total		In	Out	Total
Proposed Land Use										
Single-Family Detached Housing	210	67 Dwelling Units	0.782	13	39	52	1.03	43	26	69
Approved Land Uses <sup>2</sup>										
Multifamily Housing (Low-Rise)	220	17 Dwelling Units	0.460	2	6	8	0.56	6	4	10
Shopping Center	820	1,000 Square Feet	0.940	1	0	1	3.81	2	2	4
General Office Building	710	1,000 Square Feet	1.160	1	0	1	1.15	0	1	1
Sub-Total				4	6	10		8	7	15
Net Project Trips				9	33	42		35	19	54
Notes:										
<sup>1</sup> Source: ITE <i>Trip Generation Manual</i> , 10th Edition 2017.										

## Signalized Intersection Methodology and Standards

Signalized study intersections are subject to the City of Morgan Hill's level of service standards. The City of Morgan Hill's level of service methodology is TRAFFIX, which is based on the 2000 *Highway Capacity Manual* (HCM) method for signalized intersections. TRAFFIX evaluates signalized intersections operations based on average delay time for all vehicles at the intersection. Since TRAFFIX is also the CMP-designated intersection level of service methodology, the City of Morgan Hill methodology employs the CMP defaults values for the analysis parameters, which include adjusted saturation flow rates to reflect conditions in Santa Clara County. All intersections within the City of Morgan Hill are required to meet the City's LOS standard of LOS D, with the exception of the following:

- **LOS F** for Downtown intersections and segments including at Main/Monterey, along Monterey Road between Main and Fifth Street, and along Depot Street at First through Fifth Street;
- **LOS E** for the following intersections and freeway zones:
  - Main Avenue and Del Monte Avenue
  - Main Avenue and Depot Street
  - Dunne Avenue and Del Monte Avenue
  - Dunne Avenue and Monterey Avenue
  - Dunne Avenue and Church Street
  - Dunne Avenue and Depot Street
  - Cochrane Road and Monterey Road
  - Tennant Avenue and Monterey Road
  - Tennant Avenue and Butterfield Boulevard
  - Cochrane Road Freeway Zone: from Madrone Parkway/Cochrane Plaza to Cochrane Road/DePaul Drive
  - Dunne Avenue Freeway Zone: from Walnut Grove Drive/East Dunne Avenue to Condit Road/East Dunne Avenue
  - Tennant Avenue Freeway Zone: from Butterfield Boulevard/Tennant Avenue to Condit Road/Tennant Avenue

According to the City of Morgan Hill level of service guidelines, a development is said to create a significant adverse effect on traffic conditions at a signalized intersection if for either peak hour:

1. The level of service at the intersection degrades from an acceptable level (LOS D or LOS E as identified above) under no project conditions to an unacceptable level (LOS E or F) under project conditions, or
2. The level of service at the intersection is an unacceptable level (LOS E or F as identified above) under no project conditions and the addition of project trips causes the average critical delay to increase by four (4) or more seconds *and* the volume-to-capacity ratio (V/C) to increase by 0.01.

An exception to this rule applies when the addition of project traffic reduces the amount of average delay for critical movements (i.e., the change in average delay for critical movements is negative). In this case, the threshold of significance is an increase in the critical V/C value by 0.01 or more.

### Unsignalized Intersections Methodology and Standards

The methodology used to determine the level of service for unsignalized intersections is also TRAFFIX and the 2000 HCM methodology for unsignalized intersection analysis. This method is applicable for both two-way and all-way stop-controlled intersections. For the analysis of stop-controlled intersections, the 2000 HCM methodology evaluates intersection operations on the basis of average control delay time for all vehicles on the stop-controlled approaches. For the purpose of reporting level of service for one- and two-way stop-controlled intersections, the delay and corresponding level of service for the stop-controlled minor street approach with the highest delay is reported. For all-way stop-controlled intersections, the reported average delay and corresponding level of service is the average for all approaches at the intersection. The City uses a minimum acceptable level of service standard of LOS D for unsignalized intersections, in accordance with its adopted threshold of significance in its Guidelines for Preparation of Transportation Impact Reports.

The level of service analysis at unsignalized intersections is supplemented with an assessment of the need for signalization of the intersection. The need for signalization of unsignalized intersections is assessed based on the Peak Hour Volume Warrant (Warrant 3) described in the *California Manual on Uniform Traffic Control Devices for Streets and Highways (CA MUTCD)*, Part 4, Highway Traffic Signals, 2014. This method makes no evaluation of the intersection level of service but simply provides an indication of whether vehicular peak hour traffic volumes are, or would be, sufficient to justify the installation of a traffic signal. The decision to install a traffic signal should not be based purely on the warrants alone. Instead, the installation of a signal should be considered, and further analysis performed when one or more of the warrants are met. Additionally, engineering judgment is exercised on a case-by-case basis to evaluate the effect a traffic signal will have on certain types of accidents and traffic conditions at the subject intersection as well as at adjacent intersections. Intersections that meet the peak hour warrant are subject to further analysis before determining that a traffic signal is necessary. Other options such as traffic control devices, signage, or geometric changes may be preferable based on existing field conditions.

### Intersection Operations Analysis Results

The results of the intersection level of service and signal warrant analyses under existing conditions are summarized in Table 3. The results of the intersection level of service and signal warrant analyses under Year 2035 General Plan conditions are summarized in Table 4.

#### Existing and Existing Plus Project Conditions

The results of the level of service analysis show that all study intersections currently operate at an acceptable LOS C or better under existing conditions. All study intersections would continue to operate at LOS C or better conditions with the addition of project traffic during the AM and PM peak hours.



The signal warrant analysis also indicates that the intersection of Hale Avenue/Tilton Avenue would have traffic volumes that would meet volume thresholds that warrant signalization during both the AM and PM peak-hours without and with project traffic. However, the intersection is projected to operate at an acceptable LOS C or better during both peak hours. Therefore, the project would not have an adverse effect at the Hale Avenue/Tilton Avenue intersection under existing plus project conditions.

### **Future Intersection Lane Geometry**

The project will extend Tilton Avenue eastward from its existing terminus at Monterey Road and bisecting the project site. Tilton Avenue would be extended from the project's eastern boundary to Burnett Avenue as part of future development. Therefore, Year 2035 conditions level of service analysis at the intersection of Monterey Road and Tilton Avenue assumes the following proposed changes to the existing lane configurations:

- Northbound Monterey Road: Addition of a separate right turn lane
- Eastbound Tilton Avenue: Conversion of the right-turn lane to a shared through-right turn lane
- New Westbound Tilton Avenue: One left turn lane, one through lane, one right turn lane

Additionally, it is assumed that the eastbound and westbound approaches will operate with protected (concurrent) left-turn phasing given that left-turn pockets would be provided and Monterey Road is an arterial roadway with two through lanes in each direction.

### **Year 2035 General Plan Conditions (With Madrone Parkway Extension)**

Under Year 2035 General Plan conditions without the project, the intersection of Monterey Road/Tilton Avenue is projected to operate at an acceptable LOS D during the PM peak-hour. The addition of project traffic would cause operations to degrade to LOS E during the PM peak-hour. Therefore, based on the results of the intersection level of service analysis, the proposed project would have an adverse effect on intersection operations during Year 2035 General Plan conditions with the Madrone Parkway extension at the Monterey Road and Tilton Avenue intersection during the PM peak hour.

The signal warrant analysis also indicates that the intersection of Hale Avenue and Tilton Avenue would have traffic volumes that would meet volume thresholds that warrant signalization during both the AM and PM peak-hours without and with project traffic. However, the intersection is projected to operate at an acceptable LOS D during both peak hours. Therefore, the project would not have an adverse effect at the Hale Avenue/Tilton Avenue intersection under Year 2035 General Plan conditions with the Madrone Parkway extension.

### **Year 2035 General Plan Conditions (Without Madrone Parkway Extension)**

Under Year 2035 General Plan conditions without the project, the intersection of Monterey Road/Tilton Avenue is projected to operate at an unacceptable LOS E during the PM peak-hour. The addition of project traffic would cause operations to degrade to LOS F during the PM peak-hour.

Additionally, the intersection of Hale Avenue/Tilton Avenue would operate at an unacceptable LOS F during the AM and PM peak-hours without and with project traffic. The signal warrant analysis indicates that the intersection of Hale Avenue and Tilton Avenue also would have traffic volumes that would meet volume thresholds that warrant signalization during both the AM and PM peak-hours without and with project traffic.

Based on the results of the intersection level of service and signal warrant analysis, the proposed project would have an adverse effect on intersection operations at the following two study intersections during Year 2035 General Plan conditions without the Madrone Parkway extension:

**Table 3**  
**Intersection Level of Service Summary – Existing and Existing Plus Project Conditions**

Int. #	Intersection	Intersection Control	LOS Standard	Peak Hour	Count Date	Existing			Existing + Project				
						Warrant Met?	Delay <sup>1</sup>	LOS	Warrant Met?	Delay <sup>1</sup>	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C
1	Monterey Road and Burnett Avenue	Signal	D	AM	03/28/19	--	15.1	B	--	15.1	B	0.0	0.002
				PM	03/28/19	--	10.0	A	--	10.1	B	0.1	0.004
2	Monterey Road and Tilton Avenue	Signal	D	AM	03/28/19	--	16.3	B	--	28.3	C	10.6	0.005
				PM	03/28/19	--	14.8	B	--	33.8	C	22.1	0.107
3	Hale Avenue and Tilton Avenue	OWSC	D	AM	10/29/13	<b>Yes</b>	15.0	B	<b>Yes</b>	15.1	C	N/A	N/A
				PM	10/29/13	<b>Yes</b>	20.0	C	<b>Yes</b>	20.2	C	N/A	N/A

<sup>1</sup>The reported delay and corresponding level of service for signalized intersections represent the average delay for all approaches at the intersection.  
The reported delay and corresponding level of service for one-way stop-controlled intersection are based on the stop-controlled approach with the highest delay.

**Table 4**  
**Intersection Level of Service Summary – Year 2035 General Plan Conditions**

Int. #	Intersection	Intersection Control	LOS Standard	Peak Hour	With Madrone Extension							Without Madrone Extension						
					Year 2035 GP No Project			Year 2035 GP Plus Project				Year 2035 GP No Project			Year 2035 GP Plus Project			
					Warrant Met?	Delay <sup>1</sup>	LOS	Warrant Met?	Delay <sup>1</sup>	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Warrant Met?	Delay <sup>1</sup>	LOS	Warrant Met?	Delay <sup>1</sup>	LOS
1	Monterey Road and Burnett Avenue	Signal	D	AM	--	18.5	B	--	16.3	B	-2.4	-0.022	--	19.0	B	--	16.6	B
				PM	--	17.4	B	--	17.7	B	0.6	0.004	--	24.7	C	--	25.5	C
2	Monterey Road and Tilton Avenue	Signal	D	AM	--	22.0	C	--	34.8	C	14.0	0.055	--	24.5	C	--	38.1	D
				PM	--	50.7	D	--	<b>64.7</b>	<b>E</b>	<b>14.3</b>	<b>0.080</b>	--	<b>58.8</b>	<b>E</b>	--	<b>129.7</b>	<b>F</b>
3	Hale Avenue and Tilton Avenue	OWSC	D	AM	<b>Yes</b>	24.6	C	<b>Yes</b>	24.9	C	N/A	N/A	<b>Yes</b>	<b>415.0</b>	<b>F</b>	<b>Yes</b>	<b>419.0</b>	<b>F</b>
				PM	<b>Yes</b>	31.9	D	<b>Yes</b>	32.2	D	N/A	N/A	<b>Yes</b>	<b>278.1</b>	<b>F</b>	<b>Yes</b>	<b>282.6</b>	<b>F</b>

<sup>1</sup>The reported delay and corresponding level of service for signalized intersections represent the average delay for all approaches at the intersection.  
The reported delay and corresponding level of service for one-way stop-controlled intersection are based on the stop-controlled approach with the highest delay.  
Bold indicates unacceptable level of service.  
Bold and boxed indicate significant impact.

2. Monterey Road and Tilton Avenue (PM Peak Hour)
3. Hale Avenue and Tilton Avenue (unsignalized) (AM & PM Peak Hours)

### **Adverse Intersection Operations Effects and Potential Improvements**

This section discusses the identified adverse intersection operation effects. Included are descriptions of the adverse effects on intersection operations and potential improvement measures that may be included as part of the project's Conditions of Approval. However, the identified adverse effects on roadway operations and improvements are not required or considered project impacts per CEQA guidelines.

#### **2. Monterey Road and Tilton Avenue (With and Without Madrone Parkway Extension)**

The addition of a third southbound through-movement lane along Monterey Road would improve intersection operations to an acceptable LOS D or better during the PM peak hour under Year 2035 General Plan with project conditions. With the identified improvement, the intersection would operate at acceptable LOS D or better during both peak hours under Year 2035 with project conditions.

However, it should be noted that the poor level of service at the Monterey/Tilton intersection is primarily due to large southbound volumes along Monterey Road during the PM peak-hour. The large southbound volume on Monterey Road is due to the use of Monterey Road as an alternate route to congested segments of US-101 north of Cochrane Road. There were plans to widen US 101 to accommodate one additional southbound and northbound travel lane through Morgan Hill. The widening of US-101 may result in a significant reduction in use of Monterey Road as a bypass to US-101 congestion and projected traffic volumes at the Monterey Road/Tilton Avenue intersection. However, there is no definitive funding or schedule for completion for the widening of US 101. Therefore, it is recommended that the need for future improvement of the Monterey/Tilton intersection be considered upon review of the City's General Plan and potential for the widening of US 101. Per General Plan Action TR-3.F - Fees and Assessments, the project's payment of the City's Traffic Impact Fee (TIF) constitutes its contribution towards its cumulative adverse effects at the Monterey/Tilton intersection.

#### **3. Hale Avenue and Tilton Avenue (Without Madrone Parkway Extension)**

The signalization of the intersection would be necessary to improve intersection operations. Implementation of signal control would improve the intersection's level of service to LOS D or better during the AM and PM peak hours under Year 2035 General Plan with project conditions. Per General Plan Action TR-3.F - Fees and Assessments, the project's payment of the City's Traffic Impact Fee (TIF) constitutes its contribution towards its cumulative adverse effects at the Hale/Tilton intersection.

### **Site Access**

The evaluation of site access is based on the site plan prepared by Dahlin dated March 22, 2021. Site access was evaluated to determine the adequacy of the site's access points with regard to the following: traffic volume, geometric design, and sight distance. Site access was evaluated in accordance with generally accepted traffic engineering standards and transportation planning principles.

The project proposes to extend Tilton Avenue eastward from its existing terminus at Monterey Road. Access to the north parcel of the site would be provided via one full access driveway and one egress-only driveway along the Tilton Avenue extension. Access to the south parcel of the site would be

provided via one full access driveway and one ingress-only driveway along the Tilton Avenue extension.

Based on the project trip generation and trip assignment, it is estimated that a maximum of 43 inbound trips (28 to the north parcel and 15 to the south parcel) and 39 outbound trips (25 from the north parcel and 14 from the south parcel) would enter and exit the site during the peak hours. The estimated project trips are shown on Figure 2.

### Driveway Design and Operations

The City of Morgan Hill Design Standards specify a minimum driveway width of 16 feet and a maximum width of 24 feet. The site plan indicates that both full-access driveways along Tilton Avenue are proposed to be 25 feet wide. The City will determine whether it is necessary to narrow the driveways by 1 foot to meet the maximum driveway width standards. The ingress- and egress-only driveways, shown to be approximately 16 feet wide on the site plan, would meet City standards.

Left-turns into the full-access driveway serving the north parcel would only conflict with outbound left-turns from the driveway serving the south parcel. However, the future extension of Tilton Avenue to Burnett Avenue and development of adjacent parcels will introduce through traffic along the Tilton Avenue extension through the project site. Left-turns into and out of the full-access project driveways would then also conflict with through traffic. However, the minimal number of left-turns at the project driveways would not warrant dedicated left-turn lanes.

The ingress and egress driveways (shown as being angled and channelized on the site plan) would operate as right-in and right-out only driveways and would not conflict with other vehicular movements. However, the driveways would be located in close proximity to Monterey Road, approximately 75 feet. Exiting vehicles from the north parcel driveway would need to cross two travel lanes to access the westbound left-turn lane and may block the lanes on Tilton Avenue at the intersection if more than two vehicles are queued at the intersection.

**Recommendation:** It is recommended that the right-in and right-out only driveways be eliminated. Consolidating all project traffic to the full access four-legged intersection would not create operational issues along the Tilton Avenue extension and would eliminate potential lane blockage on Tilton Avenue at Monterey Road. The driveways can be gated for emergency vehicle access use only if required.

### Sight Distance

The project driveways should be free and clear of any obstructions to provide adequate sight distance, thereby ensuring that exiting vehicles can see pedestrians on the sidewalk and other vehicles traveling on Tilton Avenue. Landscaping and signage should be located in such a way to ensure an unobstructed view for drivers exiting the site. Sight distance generally should be provided in accordance with Caltrans standards. The minimum acceptable sight distance is most often the stopping sight distance.

Upon full buildout, the Tilton Avenue extension to Burnett Avenue would likely have a posted speed limit between 25 mph and 35 mph. For a design speed of 25 mph, the recommended Caltrans stopping sight distance is 150 feet. For a design speed of 35 mph, the recommended Caltrans stopping sight distance is 250 feet. Based on the project site plan, the proposed full-access driveways along Tilton Avenue would be located approximately 350 feet east of Monterey Road. Therefore, sufficient sight distance would be provided along Tilton Avenue.



## Peer Review of Manzanita Park – Monterey Road / Tilton Avenue Intersection Analysis

A separate site access analysis that focused on the required lane configurations at the Monterey Road and Tilton Avenue intersection was completed by Higgins Traffic Consultant, dated December 7, 2020. The Higgins analysis was reviewed, and recommendations were compared with those of this study. A summary of the findings is provided below.

### Lane Configurations and Signal Timing

The Higgins analysis assumes the following lane configurations at the intersection under project conditions (proposed additions and changes to the existing lane configuration are indicated in the underlined text):

- Northbound Monterey Road: One left turn lane, two through lanes, one right turn lane
- Southbound Monterey Road: One left-turn lane, two through lanes, one right turn lane
- Eastbound Tilton Avenue: One left turn lane, one shared through-right turn lane
- Westbound Tilton Avenue: One left turn lane, one through lane, one right turn lane

The assumed intersection lane geometry of the Higgins report is consistent with that assumed in this analysis. However, the Higgins analysis assumes permitted left-turn phasing for the eastbound and westbound approaches, whereas this analysis assumes protected left-turns for the same approaches.

### Trip Generation

The Higgins report indicates the project would generate 50 vehicle trips (13 inbound and 37 outbound) during the AM peak hour and 66 vehicle trips (42 inbound and 24 outbound) during the PM peak hour. Compared to this analysis, the Higgins analysis assumes 2 fewer trips during the AM peak hour and 3 fewer trips during the PM peak hour. The difference in these estimates is attributed to the Higgins analysis using average trip rates for “Single-Family Detached Housing” (ITE Land Use 210), as opposed to the method used in this analysis, which utilizes fitted curve equation rates for the same land use. Based on the Institute of Transportation Engineers’ *Trip Generation Handbook, 3<sup>rd</sup> Edition*, the fitted curve equation rates for a land use should be utilized when the data sample has at least 20 data points and an  $R^2$  value of 0.75 or higher. Land Use 210 meets both of these criteria for both peak hours, and therefore usage of the linear regression curve rates is justifiable.

### Trip Distribution and Assignment

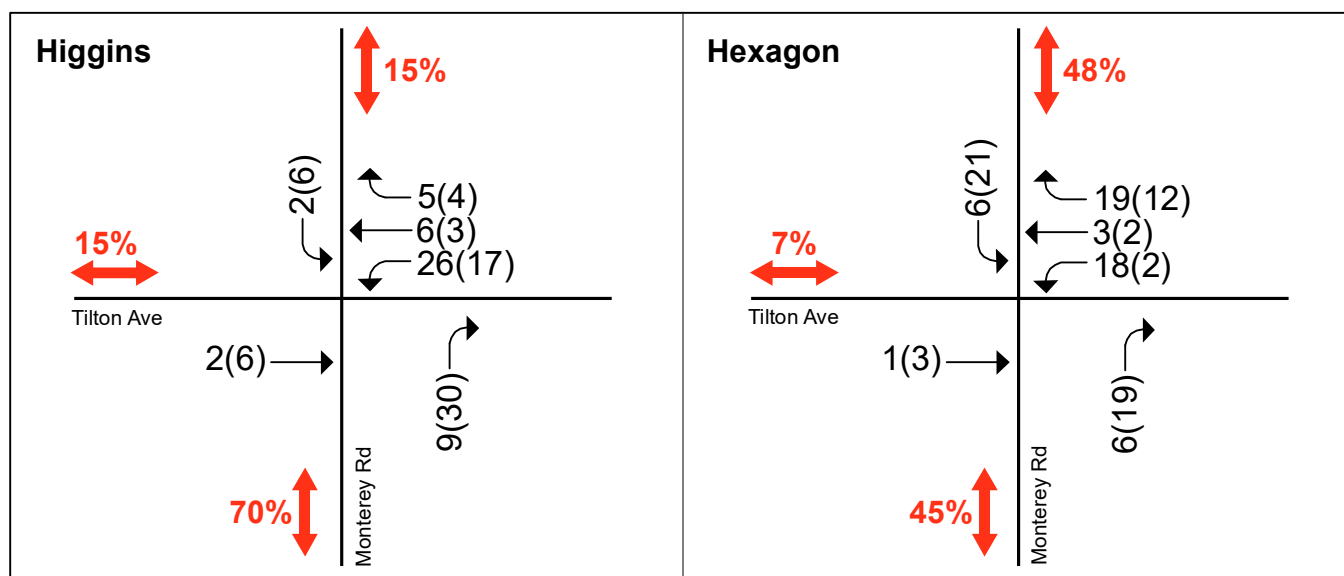
A comparison of the trip distribution and trip assignment used in the Higgins analysis and in this analysis is shown in Figure 4. The Higgins analysis assumes a trip distribution consisting of the following:

- 70% of all project trips to/from south of the proposed project along Monterey Road
- 15% of all project trips to/from north of the proposed project along Monterey Road
- 15% of all project trips to/from west of the proposed project along Tilton Avenue

The Higgins analysis does not provide a distribution beyond the intersection of Monterey Road/Tilton Avenue. However, with a majority of project traffic assigned to/from south of the project site, it is assumed that the Higgins trip assignment presumed the Cochrane Road freeway entrance/exit would be used by a majority of peak-hour traffic bound to/from US-101.

This analysis assumes that freeway traffic would primarily utilize the Bailey Avenue freeway entrance/exit, which results in a shorter route by approximately two miles compared to use of Cochrane

**Figure 4**  
**Comparison of Project Trip Distribution and Assignment**



Road. Overall, the resulting distribution used in this analysis assumes a more balanced usage of Monterey Road to the north and to the south (48% and 45%, respectively) compared to the Higgins distribution (15% and 70% to the north and south, respectively). Usage of Tilton Avenue to access Hale Avenue is approximately double in the Higgins analysis (15%) compared to the percentage assumed in this analysis (7%).

### LOS Results and Improvements

Table 6 provides a comparison of General Plan levels of service as estimated by the Higgins analysis and in this analysis. Note that the Higgins analysis does not provide a level of service estimate for the General Plan No Project without Madrone Parkway extension scenario.

**Table 6**  
**Comparison of Intersection Level of Service at Monterey Road/Tilton Avenue**

Analysis	Peak Hour	With Madrone Extension						Without Madrone Extension					
		Year 2035			Year 2035 GP Plus Project			Year 2035			Year 2035 GP Plus Project		
		GP			GP			GP			GP		
		Delay <sup>1</sup>	LOS		Delay <sup>1</sup>	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Delay <sup>1</sup>	LOS		Delay <sup>1</sup>	LOS
Higgins <sup>1</sup>	AM	15.1	B	22.8	C	N/A	N/A	N/A	N/A	23.9	C	N/A	N/A
	PM	24.1	C	35.6	D	N/A	N/A	N/A	N/A	65.4	E	N/A	N/A
Hexagon	AM	22.0	C	34.8	C	14.0	0.055	24.5	C	38.1	D	13.9	0.053
	PM	50.7	D	64.7	E	14.3	0.080	58.8	E	129.7	F	89.1	0.187

<sup>1</sup>Source: Manzanita Park – Monterey Road / Tilton Avenue Intersection Analysis, Morgan Hill, CA, Higgins Traffic Consultant, December 7, 2020  
 Bold indicates unacceptable level of service.  
 Bold and boxed indicate significant impact.

The results of the Higgins analysis show that the intersection would operate at an unacceptable LOS E during the PM peak-hour under the General Plan Plus Project without Madrone Parkway extension

scenario. In contrast, the analysis in this report shows the intersection would operate at an unacceptable LOS E and F during the PM peak-hour with and without the Madrone Parkway extension, respectively. It should be noted the main factors causing the differences in the level of service results between Higgin's analysis and those in this report are the assumed signal phasing on Tilton Avenue (Hexagon – protected phasing and Higgins – permitted phasing) and the approach of estimating the 2035 GP volumes (Hexagon used the actual 2035 GP model volumes and same adjustment process as the GP, whereas Higgins estimated the 2035 GP model volumes based on volumes from adjacent intersections).

The Higgins report identifies the following improvements would be necessary to improve the level of service to an acceptable level of service (LOS C) during the PM peak-hour:

1. Convert the eastbound and westbound Tilton Avenue left turn signal phasing to protected phasing; and
2. Add a third southbound Monterey Road through lane.

The analysis in this report also identifies the addition of a third southbound lane along Monterey Road as necessary to improve intersection operations to an acceptable level of service (LOS D) during the PM peak hour. Additionally, the analysis in this report already assumes protected left-turn phasing for the eastbound and westbound approaches under project conditions. Therefore, both analyses conclude that, the improvements listed above (protected eastbound and westbound left-turn movements; third southbound through lane) are required for the intersection to operate at an acceptable level of service under Year 2035 project conditions without the Madrone extension.

However, the Higgins analysis indicates that under Year 2035 project conditions, the completion of the Madrone extension would result in an acceptable LOS during both peak-hours and that no intersection improvements would be required. In contrast, this report finds that under Year 2035 project conditions, the intersection would operate at a deficient LOS during the PM peak-hour even if the Madrone extension were constructed. This analysis concludes that the two improvements listed above would be required, with or without the Madrone extension.

## Transit, Pedestrian, and Bicycle Facility Evaluation

The project site is served by VTA bus routes that run along Cochrane Road and Hale Avenue. Frequent Route 68 (Gilroy Transit Center to San Jose Diridon Transit Center) serves bus stops at the intersection of Hale Avenue and Tilton Avenue, approximately 0.4-mile walking distance from the project site. Local Route 87 (Morgan Hill Civic Center to Burnett Avenue) serves a bus stop at Burnett Avenue/Greenwood Circle, approximately 0.3-mile walking distance from the project site. A typical mode split in Morgan Hill would be a three percent transit share. Assuming up to three percent transit mode share for the project equates to no more than three transit riders during each of the peak hours. The transit ridership demands of the proposed project can be accommodated by the existing transit facilities.

Pedestrian generators in the project vicinity include Ann Sobrato High School and bus stops discussed above. In the vicinity of the project site, there are sidewalks along the following roadway segments:

- Southbound Monterey Road, between Tilton Avenue and Burnett Avenue
- Northbound Monterey Road, between 230 feet south and 300 feet north of Burnett Avenue
- Eastbound and westbound Burnett Avenue
- Westbound Tilton Avenue, between Monterey Road and Dougherty Avenue
- Eastbound Tilton Avenue, between Monterey Road and 400 feet west of Dougherty Avenue

Crosswalks with protected crossing phases are provided at the following signalized intersections:

- Monterey Road/Tilton Avenue – west leg
- Monterey Road/Burnett Avenue – north leg and east leg
- Monterey Road/Peebles Avenue – east leg
- Monterey Road/Madrone Parkway – east leg

The project proposes to construct 6-foot wide sidewalks along its Monterey Road frontage and 6- to 8-foot wide sidewalks along both sides of the Tilton Avenue extension. Multiple access points from the sidewalks are provided to on-site walkways. A crosswalk with protected crossing phase and ADA-compliant ramps would be installed along the new eastern leg of the Monterey Road/Tilton Avenue intersection.

Access to nearby pedestrian generators is described below:

- Ann Sobrato High School – Continuous pedestrian route provided via sidewalks along northbound Monterey Road and westbound Burnett Avenue.
- Route 68 Bus Stop at Hale Avenue/Tilton Avenue - No continuous pedestrian route to/from the project site due to missing sidewalk along eastbound Tilton Avenue, between Hale Avenue and 400 feet west of Dougherty Avenue. Note that the project does not propose to install crosswalks across Monterey Road at Tilton Avenue. Therefore, pedestrians would need to utilize the existing crosswalk at the Monterey Road/Burnett Avenue intersection.
- Route 87 Bus Stop at Burnett Avenue/ Greenwood Circle – Continuous pedestrian route provided via sidewalks along northbound Monterey Road and westbound Burnett Avenue.

The implementation of the missing sidewalk segments is beyond the means of the proposed project since their construction would require work within, and possibly acquisition of, right-of-way that is not controlled by the project applicant.

Additionally, none of the curb ramps at the Monterey/Burnett, Monterey/Peebles, and Monterey/Madrone intersections are ADA-compliant. The City may require that the project contribute to the construction of ADA-compliant ramps at the identified intersections.

In the project vicinity, there are bike lanes located along Monterey Road (including along the project frontage) and Burnett Avenue. As shown on Figure 2, the project proposes to upgrade the existing northbound bike lane along the project frontage by providing a 3-foot painted buffer between the bike lane and travel lane. The project is not expected to generate a significant amount of bicycle trips. The demand generated by the proposed project could be accommodated by the existing bicycle facilities in the vicinity of the project site.

## Traffic Study Requirements

The need for the preparation of a comprehensive traffic impact analysis for a particular development is based on its estimated trip generation and its effect on surrounding transportation facilities. The City of Morgan Hill requires the completion of a full traffic impact analysis if one of the following criteria are met:

1. Generates 100 or more net new peak hour trips; except that projects located in the 14-block Downtown Core area are exempt from this requirement. Net new peak hour trips are defined as the number of trips generated by the proposed development minus trips generated by existing development on the project site. (This threshold is consistent with the Valley Transportation Authority (VTA) policy.)



2. Adds 50 to 99 net new peak hour trips to the roadway system where nearby intersections are currently operating at or below the City's LOS standard, or projected to operate at or below the City's LOS standard with traffic added by approved developments; except that projects located in the 14-block Downtown Core area are exempt from this requirement. Adjacent or nearby intersections are defined as intersections to which the proposed development or proposed land use change adds 10 or more vehicle peak hour trips per lane.
3. Creates a transportation issue that City staff requests to have analyzed.

The proposed project will result in the addition of 52 AM peak-hour trips and 69 PM peak-hour trips to the roadway system under existing plus project conditions.

A review of the intersection levels of service at selected study intersections indicates that the proposed project would have an adverse effect on intersection operations during Year 2035 General Plan conditions with the Madrone Parkway extension at the intersection of Monterey Road and Tilton Avenue (PM Peak Hour).

Without the Madrone Parkway extension, the proposed project would have an adverse effect on intersection operations at the following two study intersections during Year 2035 General Plan conditions:

2. Monterey Road and Tilton Avenue (PM Peak Hour)
3. Hale Avenue and Tilton Avenue (unsignalized) (AM & PM Peak Hours)

### **Adverse Intersection Operations Effects and Potential Improvements**

The adverse intersection operation effects identified under Year 2035 General Plan with project conditions are discussed below. Included are descriptions of the adverse effects on intersection operations and potential improvement measures that may be included as part of the project's Conditions of Approval. However, the identified adverse effects on roadway operations and improvements are not required or considered project impacts per CEQA guidelines.

#### **2. Monterey Road and Tilton Avenue (With and Without Madrone Parkway Extension)**

The addition of a third southbound through movement lane along Monterey Road would improve intersection operations to an acceptable LOS D or better during the PM peak hour under Year 2035 General Plan with project conditions. With the identified improvement, the intersection would operate at acceptable LOS D or better during both peak hours under Year 2035 with project conditions.

However, it should be noted that the poor level of service at the Monterey/Tilton intersection is primarily due to large southbound volumes along Monterey Road during the PM peak-hour. The large southbound volume on Monterey Road are due to the use of Monterey Road as an alternate route to congested segments of US-101 north of Cochrane Road. There were plans to widen US 101 to accommodate one additional southbound and northbound travel lane through Morgan Hill. The widening of US-101 may result in a significant reduction in use of Monterey Road as a bypass to US-101 congestion and projected traffic volumes at the Monterey Road/Tilton Avenue intersection. However, there is no definitive funding or schedule for completion for the widening of US 101. Therefore, it is recommended that the need for future improvement of the Monterey/Tilton intersection be considered upon review of the City's General Plan and potential for the widening of US 101. Per General Plan Action TR-3.F - Fees and Assessments, the project's payment of the City's Traffic Impact Fee (TIF) constitutes its contribution towards its cumulative adverse effects at the Monterey/Tilton intersection.

**3. Hale Avenue and Tilton Avenue (Without Madrone Parkway Extension)**

The signalization of the intersection would be necessary to improve intersection operations. Implementation of signal control would improve the intersection's level of service to LOS D or better during the AM and PM peak hours under Year 2035 General Plan with project conditions. Per General Plan Action TR-3.F - Fees and Assessments, the project's payment of the City's Traffic Impact Fee (TIF) constitutes its contribution towards its cumulative adverse effects at the Hale/Tilton intersection.