Hexagon Transportation Consultants, Inc.

Memorandum

Date: March 25, 2024

To: Mr. Chris Ghione, City of Morgan Hill

From: Shikha Jain
Robert Del Rio

Subject: Morgan Hill TMP – Level of Service Analysis, Policy and Congestion Research

Hexagon Transportation Consultants, Inc. has completed a level of service (LOS) analysis for the Morgan Hill Transportation Master Plan (TMP). This memo describes the City's LOS standards, methodology, and intersection and segment operations under existing and year 2050 conditions. The intent of the operations analysis is to identify locations on the City's roadway network at which current and/or projected operations warrant a review of potential improvement. It should be noted that the operations analysis will be considered in conjunction with the evaluation of all other modes of travel and users of the roadway network when identifying any improvements as part of the TMP.

This memo also reviews auto LOS standards and congestion for cities in Santa Clara County that have recently updated their general plan or transportation analysis guidelines. The goal of this review is to provide information in the consideration of potential changes to the City of Morgan Hill's LOS standard.

Traffic Operations Analysis Scope

The traffic operations analysis consists of peak hour intersection level of service and average daily traffic volumes (ADT) roadway segment capacity analysis. The analysis utilizes standards and methodologies that are consistent with those of the City's General Plan, *Morgan Hill 2035 General Plan,* adopted in July 2016 which also utilizes level of service as its primary metric for the evaluation of the projected operation of the City's roadway system.

The analysis includes an analysis of AM and PM peak-hour traffic conditions for 87 intersections and ADT on 98 roadway segments. Figures 1 and 2 indicate the study intersections and roadway segments, respectively, included in the analysis. Traffic conditions were evaluated under the following scenarios.

- *Existing Conditions.* Existing conditions represent the existing traffic volumes on the existing roadway network. Existing conditions are represented by traffic counts collected in 2018- 2023 on the existing roadway network.
- *Year 2050 General Plan Conditions:* Year 2050 GP conditions represent future traffic volumes on the future transportation network. Year 2050 traffic volume forecasts were completed by Hexagon using the updated Morgan Hill's General Plan Transportation Demand Forecasting (TDF) Model. The model includes land use growth assumptions for Bay Area regions for year 2050 as provided by the Association of Bay Area Governments (ABAG) and refined by Santa Clara County Valley Transit Authority (VTA). Within Morgan Hill, the land use data input for the model is the planned development growth and transportation improvements adopted as part of the Morgan Hill 2035 General Plan (GP) that identified anticipated development growth for a Horizon Year of 2035.

Figure 1: Study Intersections

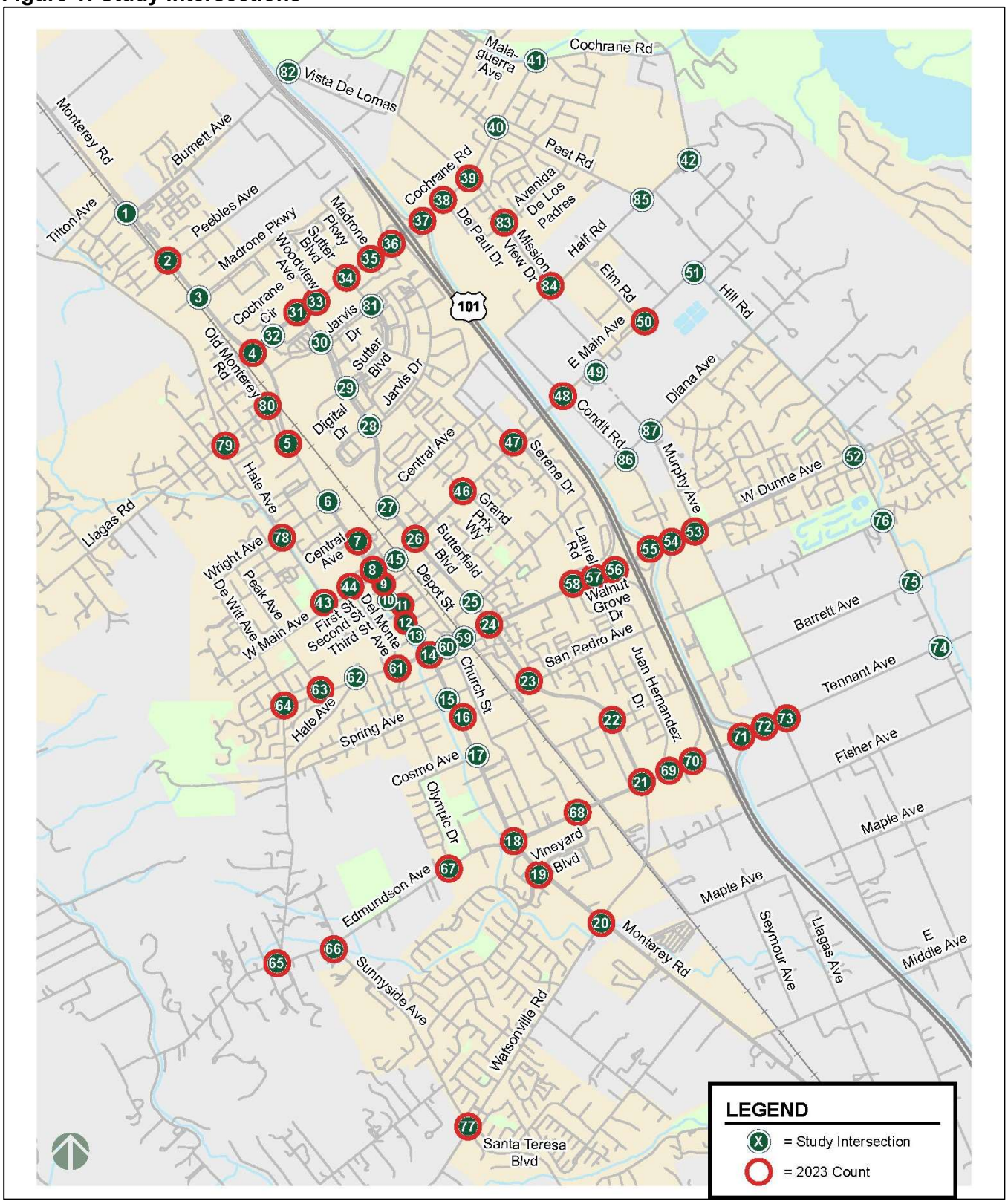
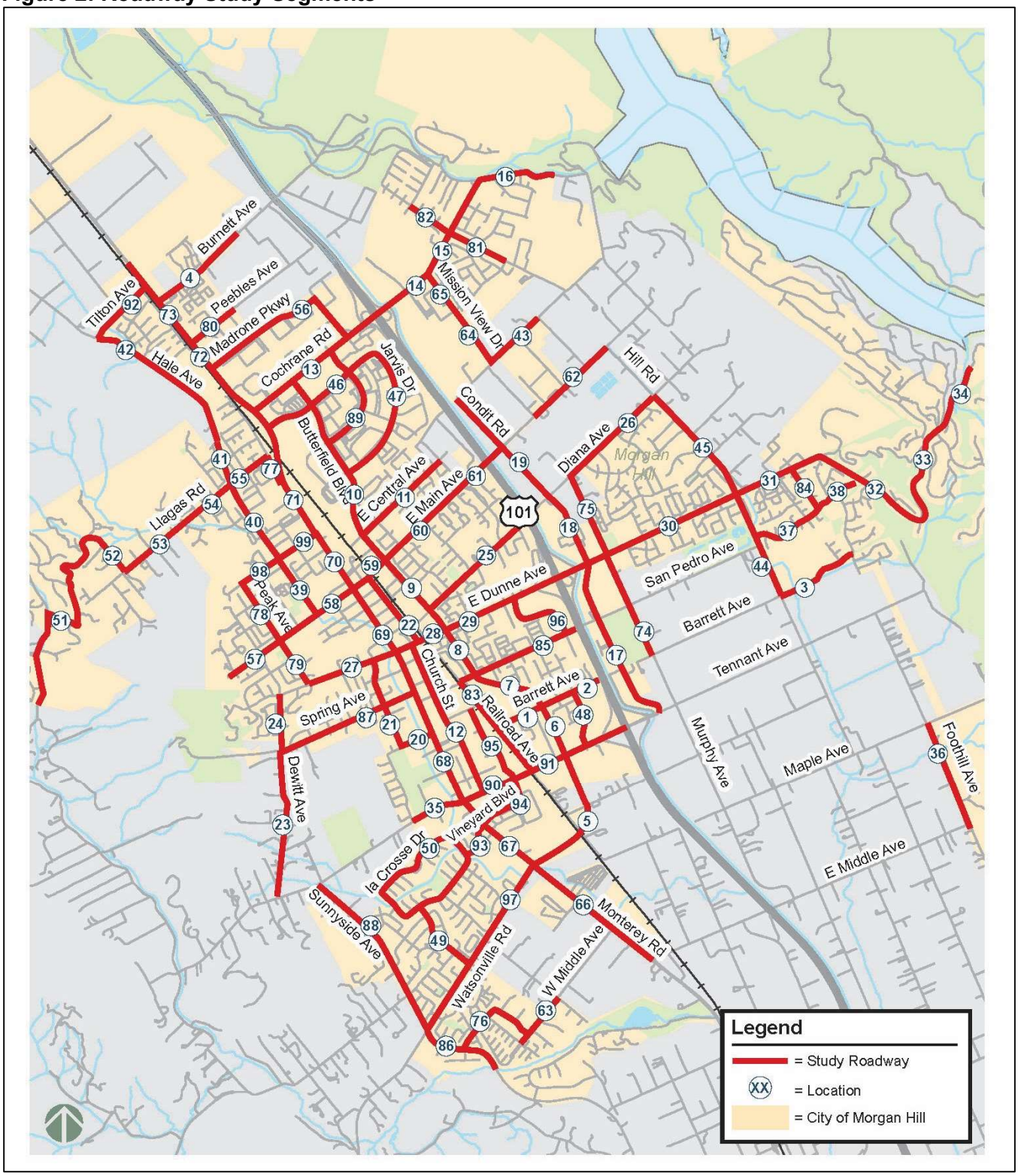


Figure 2: Roadway Study Segments



Morgan Hill Level of Service Standards and Analysis Methodologies

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The analysis methods are described below.

LOS Standards

Per the City of Morgan Hill General Plan, the LOS standard for most intersections and roadway segments in the City is LOS D. In the Downtown area, LOS F is considered acceptable, and at certain intersections, freeway ramps/zones, and segments as identified by Policy TR-3.4, LOS E is acceptable.

Policy TR 3.4: Level of Service Standards. Level of Service (LOS) policy and design criteria for roadway improvements, use a Tiered LOS Standard as follows:

- LOS F in Downtown at Main/Monterey, along Monterey Road between Main and Fifth Street, and along Depot Street at First through Fifth Streets. This LOS standard in the Downtown recognizes the unique nature of and goals for Downtown Morgan Hill as the transit hub of the City and as a center for shopping, business, entertainment, civic and cultural events, and higher-density, mixed-use living opportunities. This standard does not preclude the City, developers, and property owners from voluntarily implementing improvements and employing operational strategies to improve level of service, especially at the Main/Monterey intersection, if and when land uses redevelop.

- LOS D for intersections and segments elsewhere; except

- Allow LOS E for identified freeway ramps/ zones, road segments and intersections that (1) provide a transition to and are located on the periphery of downtown; (2) are freeway zone intersections; and/or (3) where achieving LOS D could result in interim intersection improvements which would be “over-built” once the City’s circulation network has been completed, and/or would involve unacceptable impacts on existing buildings or existing or planned transportation facilities, including roads, sidewalks, bicycle and transit facilities; and/or would involve extraordinary costs to acquire land and existing buildings, and build the improvement in relation to benefits achieved; and/or the facility would be widened beyond requirements to serve local traffic, in that the facility accommodates a significant component of peak-hour subregional and regional through-traffic.

- In order to reduce the incentive for regional travel to be drawn off the freeway and onto local neighborhood streets, protect neighborhoods, avoid overbuilding intersections, and to create an incentive for using alternate modes of travel, LOS E during peak hours of travel is acceptable for the following identified freeway ramps, road segments, and intersections:

    - 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; also until closed: 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/DePaul Drive

- Dunne Avenue Freeway Zone: from Walnut Grove/East Dunne to Condit/East Dunne
- Tennant Avenue Freeway Zone: from Butterfield/Tennant to Condit/Tennant Freeway Ramps

Signalized Intersection Analysis Methodology

The peak hour intersection operations analysis was completed using TRAFFIX software, which utilizes 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 County's Congestion Management Program (CMP)-designated intersection level of service software, 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. The correlation between average delay and level of service for signalized intersections is shown in Table 1.

Table 1
Signalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay per Vehicle (sec.)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	up to 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	Greater than 80.0

Sources: Transportation Research Board, *2000 Highway Capacity Manual* (Santa Clara County and City of Gilroy adopted level of service methodology). *Traffic Level of Service Analysis Guidelines*, Santa Clara County Transportation Authority Congestion Management Program, June 2003.

Unsignalized Intersections

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 the 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 the 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 correlation between average delay and level of service for unsignalized intersections is shown in Table 2.

Signal Warrants

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.

Table 2
Unsignalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay per Vehicle (sec.)
A	Operations with very low delays occurring with favorable progression.	up to 10.0
B	Operations with low delays occurring with good progression.	10.1 to 15.0
C	Operations with average delays resulting from fair progression.	15.1 to 25.0
D	Operation with longer delays due to a combination of unfavorable progression of high V/C ratios.	25.1 to 35.0
E	Operation with high delay values indicating poor progression and high V/C ratios. This is considered to be the limited of acceptable delay.	35.1 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation and poor progression.	Greater than 50.0

Source: Transportation Research Board, 2000 Highway Capacity Manual, (Washington, D.C., 2000).

Roadway Segment Analysis Methodology

Traffic operations for local roadways were evaluated by comparing the average daily volumes (ADT) to the threshold capacities for various roadway types identified in the Highway Capacity Manual, Transportation Research Board 2000 (HCM 2000). The HCM 2000 thresholds are based on the local roadway functional classification and these values provide a planning-level analysis of the relative traffic load and approximate capacity on a particular roadway. It is important to note that daily volume thresholds are used for planning purposes and traffic during the peak commute periods may result in worse operations than illustrated by the daily LOS. The relationship between roadway classifications and maximum ADT to achieve specific LOS levels is summarized in Table 3.

Table 3
Segment Level of Service Definitions Based on ADT

Roadway Type	Maximum Daily Volume (both directions except freeways)				
	LOS A	LOS B	LOS C	LOS D	LOS E
2-Lane Freeway	11,100	20,100	28,800	35,700	40,100
2-Lane Freeway with Auxiliary Lane	14,100	25,500	36,400	44,900	50,300
3-Lane Freeway	17,000	30,800	44,000	54,100	60,600
3-Lane Freeway with Auxiliary Lane	20,100	36,400	51,800	63,500	71,000
4-Lane Freeway	23,200	42,000	59,500	72,800	81,400
4-Lane Freeway with Auxiliary Lane	26,300	47,600	67,300	82,200	91,800
5-Lane Freeway	32,800	53,700	75,500	91,700	102,300
2-Lane Highway	1,200	2,900	7,900	16,000	20,500
4-Lane Multilane Highway	21,400	35,200	50,600	65,600	73,000
6-Lane Multilane Highway	32,100	52,800	76,200	98,000	109,000
2-Lane Undivided Arterial	N/A	N/A	9,100	16,700	17,700
2-Lane Divided Arterial	N/A	N/A	9,700	17,600	18,700
3-Lane Arterial (2 in one direction)	N/A	N/A	13,100	20,600	21,700
4-Lane Undivided Arterial	N/A	N/A	17,500	27,400	28,900
4-Lane Divided Arterial	N/A	N/A	19,200	35,400	37,400
5-Lane Divided Arterial (3 in one direction)	N/A	N/A	22,600	44,300	46,700
6-Lane Divided Arterial	N/A	N/A	27,100	53,200	56,000
8-Lane Divided Arterial	N/A	N/A	37,200	71,100	74,700
1-Lane Ramp	5,000	7,500	10,500	13,000	15,000
2-Lane Rural Road	3,100	6,200	9,400	13,200	15,600
2-Lane Collector	2,600	5,200	7,800	11,000	12,900
2-Lane Local Street	1,900	3,900	5,800	8,200	9,600

Source: City of Morgan Hill General Plan Updated Traffic Impact Analysis dated September 3, 2015.

Data Requirements

The data required for the analysis were obtained from recently completed traffic studies, traffic counts collected in 2023, the City of Morgan Hill, the 2021 CMP Monitoring and Conformance Report, and field observations. The following data were collected from these sources:

- lane configurations
- existing traffic volumes
- signal timing and phasing
- average speeds on freeway segments

Lane Configurations

Existing Conditions

The existing lane configurations at the study intersections and roadway segments were determined by observations in the field.

Year 2050 General Plan Conditions

The Year 2050 forecasts include land use growth and transportation improvements associated with the buildout of the City's General Plan. Several new roadways are planned in the General Plan conditions to provide for enhanced connectivity and circulation throughout the City. The roadway improvements presented in Table 4 are planned and assumed to be completed under Year 2050.

Table 4
General Plan Roadway Improvements

#	General Plan Roadway Improvements
1	Extension of Butterfield Blvd as a 2-lane collector between Madrone Pkwy and Cochrane Rd
2	Extension of Hale Ave/Santa Teresa Blvd as a 2-lane multi-modal arterial between Main Ave and Spring Ave
3	Extension of Walnut Grove as a 2-lane collector between Dunne Ave and Diana Ave
4	Tennant Ave widening as a 4-lane arterial between Condit Rd and Murphy Ave
5	Monterey Rd widened to a 4-lane arterial between Cochrane Rd and Old Monterey Rd / Llagas Creek Dr
6	Extension of Llagas Creek Dr as a 2-lane collector between Hale Ave and Monterey Rd
7	Realignment of Old Monterey Rd to intersect with Llagas Creek Dr extension
8	Dunne Ave widened to a 4-lane arterial between Monterey Rd and Del Monte Ave
9	Modifications to intersection control and access at San Pedro Ave and Monterey Rd
10	Realignment of DeWitt Ave as a 2-lane arterial with Sunnyside Ave
11	Extension of Mission View Dr as a 2-lane collector between Cochrane Rd and Vista del Lomas Ave
12	Mission View Dr upgraded to a 2-lane multi-modal arterial between Cochrane Rd and Half Rd
13	Extension of Murphy Ave/Mission View Dr as a 2-lane multi-modal arterial between Half Rd and Diana Ave
14	Cochrane Rd widened to a 6-lane arterial between Monterey Rd and Mission View Dr
15	Main Ave widened to a 4-lane arterial between Depot St and Butterfield Blvd
16	Watsonville Rd widened to a 4-lane arterial between La Alameda and Monterey Rd
17	Extension of Serene Dr as a 2-lane collector between Jarvis Dr and Central Ave
18	Extension of McKevly Lane as a 2-lane collector between West Edmundson Ave and La Crosse Dr
19	Tennant Ave widened to a 6-lane arterial between US 101 and Butterfield Blvd
20	Extension of Hill Rd/Peet Rd as a 2-lane collector between Half Rd and Main Ave

Traffic Volumes

Existing Traffic Volumes

Existing conditions represent the existing peak-hour traffic volumes on the existing roadway network utilizing traffic counts collected in 2018-2023. A comparison of traffic counts collected in 2018-2019 (pre-COVID) to those collected in 2023 indicate that traffic patterns have normalized to pre-COVID conditions.

Year 2050 General Plan Traffic Volumes

Year 2050 traffic volume forecasts were completed by Hexagon based on the updated Morgan Hill's General Plan Transportation Demand Forecasting (TDF) Model. This model is a refinement of VTA's bi-county TDF model with a horizon year of 2050 i.e. it includes land use growth assumptions for Bay Area regions for year 2050 as provided by the Association of Bay Area Governments (ABAG) and refined by VTA. Within Morgan Hill, the land use data input for the model is the planned development growth adopted as part of the *Morgan Hill 2035 General Plan (GP), December 2017*, that identified anticipated development growth for a Horizon Year of 2035. The process of developing the updated TDF model is described in the *Morgan Hill TDF Model Update Memorandum, March 2024.*

Intersection Operations Analysis

The results of the intersection level of service and signal warrant analyses under existing and cumulative 2050 conditions are summarized in Table 5 and Figures 3 and 4.

Existing Conditions

The results of the level of service analysis indicate that the following two intersections operate at unacceptable levels of service during at least one peak hour under existing conditions when measured against the City of Morgan Hill's level of service standards:

16. Monterey Road and San Pedro Avenue (PM Peak Hour)
78. Hale Avenue and Wright Avenue (PM Peak Hour)

All of the remaining study intersections operate at acceptable levels of service during each of the peak hours under existing conditions.

The results of the signal warrant analysis indicate that the following unsignalized intersection operates unacceptably and has traffic volumes during at least one peak hour that meet thresholds that warrant signalization.

16. Monterey Road and San Pedro Avenue (PM Peak Hour)

Year 2050 General Plan Conditions

The results of the level of service analysis indicate that the following 24 intersections are projected to operate at unacceptable levels of service during at least one peak hour under Year 2050 GP conditions when measured against the City of Morgan Hill's level of service standards:

5. Monterey Road and Old Monterey Road (PM Peak Hour)
7. Monterey Road and Central Avenue (AM and PM Peak Hour)
16. Monterey Road and San Pedro Avenue (AM and PM Peak Hour)
20. Monterey Road and Watsonville Road/Butterfield Boulevard (AM Peak Hour)
21. Butterfield Boulevard and Tennant Avenue (PM Peak Hour)
24. Butterfield Boulevard and Dunne Avenue (PM Peak Hour)
25. Butterfield Boulevard and Diana Avenue (AM Peak Hour)
40. Peet Road and Cochrane Road (AM Peak Hour)
47. Serene Drive and Main Avenue (AM and PM Peak Hour)
48. Condit Road and Main Avenue (PM Peak Hour)
49. Murphy Avenue and Main Avenue (AM and PM Peak Hour)
51. Hill Road and Main Avenue (AM Peak Hour)
63. Peak Avenue and Dunne Avenue (PM Peak Hour)
66. Sunnyside Avenue and Edmundson Avenue (AM and PM Peak Hour)
72. Condit Road and Tennant Avenue (AM and PM Peak Hour)
73. Murphy Avenue and Tennant Avenue (AM and PM Peak Hour)
74. Hill Road and Tennant Avenue (AM and PM Peak Hour)
75. Hill Road and Barrett Avenue (AM Peak Hour)
77. Santa Teresa Boulevard/Sunnyside Avenue and Watsonville Road (AM and PM Peak Hour)
78. Hale Avenue and Wright Avenue (AM and PM Peak Hour)
81. Sutter Boulevard and Jarvis Drive (AM and PM Peak Hour)
83. Mission View Drive and Avenida De Los Padres (PM Peak Hour)
84. Mission View Drive and Half Road (AM and PM Peak Hour)
87. Murphy Avenue and Diana Avenue (AM and PM Peak Hour)

The results of the signal warrant analysis indicate that the following unsignalized intersections are projected to operate unacceptably and have traffic volumes during at least one peak hour that meet thresholds that warrant signalization.

7. Monterey Road and Central Avenue (AM Peak Hour)
16. Monterey Road and San Pedro Avenue (PM Peak Hour)
47. Serene Drive and Main Avenue (AM and PM Peak Hour)
49. Murphy Avenue and Main Avenue (AM and PM Peak Hour)
63. Peak Avenue and Dunne Avenue (PM Peak Hour)
72. Condit Road and Tennant Avenue (AM and PM Peak Hour)
73. Murphy Avenue and Tennant Avenue (AM and PM Peak Hour)
74. Hill Road and Tennant Avenue (AM and PM Peak Hour)
75. Hill Road and Barrett Avenue (AM Peak Hour)
77. Santa Teresa Boulevard/Sunnyside Avenue and Watsonville Road (AM and PM Peak Hour)
78. Hale Avenue and Wright Avenue (AM and PM Peak Hour)
81. Sutter Boulevard and Jarvis Drive (AM and PM Peak Hour)
84. Mission View Drive and Half Road (AM Peak Hour)
87. Murphy Avenue and Diana Avenue (AM PM Peak Hour)

Table 5
Intersection Level of Service Summary

Int. #	Intersection	LOS Standard	2023 Control	2050 Control	Peak Hour	Count Date	Year 2023 Warrant Met?	Year 2023 Delay[1]	Year 2023 LOS	Year 2050 Warrant Met?	Year 2050 Delay[1]	Year 2050 LOS
1	Monterey Road and Burnett Avenue	D	Signal	Signal	AM	03/28/19	--	15.0	B	--	16.4	B
					PM	03/28/19	--	9.7	A	--	21.4	C
2	Monterey Road and Peebles Avenue	D	Signal	Signal	AM	09/26/23	--	8.7	A	--	12.7	B
					PM	09/26/23	--	7.3	A	--	11.9	B
3	Monterey Road and Madrone Parkway	D	Signal	Signal	AM	02/28/19	--	9.4	A	--	18.7	B
					PM	02/28/19	--	9.8	A	--	54.2	D
4	Monterey Road and Cochrane Road	E	Signal	Signal	AM	09/26/23	--	30.3	C	--	33.1	C
					PM	09/26/23	--	33.0	C	--	45.1	D
5	Monterey Road and Old Monterey Road	D	Signal	Signal	AM	09/26/23	--	17.7	B	--	25.4	C
					PM	09/26/23	--	31.5	C	--	**58.0**	**E**
6	Monterey Road and Wright Avenue	D	Signal	Signal	AM	03/28/19	--	13.9	B	--	17.1	B
					PM	03/28/19	--	14.2	B	--	20.0	B
7	Monterey Road and Central Avenue	D	TWSC	TWSC	AM	09/26/23	No	18.5	C	**Yes**	**>120**	**F**
					PM	09/26/23	No	19.5	C	No	**>120**	**F**
8	Monterey Road and Main Avenue	F	Signal	Signal	AM	09/26/23	--	43.7	D	--	44.8	D
					PM	09/26/23	--	39.0	D	--	43.0	D
9	Monterey Road and First Street	F	TWSC	TWSC	AM	09/26/23	No	11.0	B	No	13.8	B
					PM	09/26/23	No	12.0	B	No	16.0	C
10	Monterey Road and Second Street	F	Signal	Signal	AM	03/28/19	--	10.6	B	--	11.1	B
					PM	03/28/19	--	12.6	B	--	11.4	B
11	Monterey Road and Third Street	F	TWSC	TWSC	AM	09/26/23	No	11.3	B	No	13.2	B
					PM	09/26/23	No	12.4	B	No	16.4	C
12	Monterey Road and Fourth Street	F	Signal	Signal	AM	09/26/23	--	7.9	A	--	7.8	A
					PM	09/26/23	--	8.9	A	--	8.8	A
13	Monterey Road and Fifth Street	F	TWSC	TWSC	AM	06/06/18	No	18.2	C	No	33.7	D
					PM	06/06/18	No	34.1	D	No	>120	F
14	Monterey Road and Dunne Avenue	E	Signal	Signal	AM	09/19/23	--	36.7	D	--	42.6	D
					PM	09/19/23	--	36.2	D	--	39.6	D
15	Monterey Road and Spring Avenue	D	Signal	Signal	AM	03/14/19	--	10.4	B	--	8.8	A
					PM	03/14/19	--	9.7	A	--	13.1	B
16	Monterey Road and San Pedro Avenue	D	OWSC	OWSC	AM	09/19/23	No	27.4	D	No	**>120**	**F**
					PM	09/19/23	**Yes**	**75.9**	**F**	**Yes**	**>120**	**F**
17	Monterey Road and Cosmo Avenue	D	Signal	Signal	AM	03/14/19	--	10.0	A	--	10.8	B
					PM	03/14/19	--	10.9	B	--	13.1	B
18	Monterey Road and Tennant Avenue/Edmundson Avenue	E	Signal	Signal	AM	09/19/23	--	29.5	C	--	32.1	C
					PM	09/19/23	--	41.8	D	--	43.3	D
19	Monterey Road and Vineyard Boulevard	D	Signal	Signal	AM	09/26/23	--	31.8	C	--	29.4	C
					PM	09/26/23	--	37.9	D	--	33.3	C
20	Monterey Road and Watsonville Road/Butterfield Boulevard	D	Signal	Signal	AM	09/19/23	--	42.0	D	--	**113.6**	**F**
					PM	09/19/23	--	35.8	D	--	41.2	D
21	Butterfield Boulevard and Tennant Avenue	E	Signal	Signal	AM	09/19/23	--	52.4	D	--	74.5	E
					PM	09/19/23	--	56.0	E	--	**102.4**	**F**
22	Butterfield Boulevard and Barrett Avenue	D	Signal	Signal	AM	09/19/23	--	11.4	B	--	18.2	B
					PM	09/19/23	--	11.0	B	--	14.6	B

Table 5 (Continued)
Intersection Level of Service Summary

Int. #	Intersection	LOS Standard	2023 Control	2050 Control	Peak Hour	Count Date	Year 2023 Warrant Met?	Year 2023 Delay[1]	Year 2023 LOS	Year 2050 Warrant Met?	Year 2050 Delay[1]	Year 2050 LOS
23	Butterfield Boulevard and San Pedro Avenue	D	Signal	Signal	AM	09/19/23	--	13.1	B	--	15.6	B
					PM	09/19/23	--	16.5	B	--	14.7	B
24	Butterfield Boulevard and Dunne Avenue	D	Signal	Signal	AM	09/19/23	--	44.1	D	--	53.5	D
					PM	09/19/23	--	41.9	D	--	**56.1**	**E**
25	Butterfield Boulevard and Diana Avenue	D	Signal	Signal	AM	05/08/18	--	21.3	C	--	**71.2**	**E**
					PM	05/08/18	--	20.4	C	--	39.3	D
26	Butterfield Boulevard and Main Avenue	D	Signal	Signal	AM	09/19/23	--	33.4	C	--	43.7	D
					PM	09/19/23	--	36.5	D	--	38.1	D
27	Butterfield Boulevard and Central Avenue	D	Signal	Signal	AM	05/08/18	--	17.3	B	--	18.9	B
					PM	05/08/18	--	11.0	B	--	11.1	B
28	Butterfield Boulevard and Jarvis Drive/Digital Drive	D	Signal	Signal	AM	05/08/18	--	11.7	B	--	27.4	C
					PM	05/08/18	--	12.8	B	--	13.9	B
29	Butterfield Boulevard and Sutter Boulevard	D	Signal	Signal	AM	05/08/18	--	7.6	A	--	23.1	C
					PM	05/08/18	--	18.1	B	--	52.6	D
30	Butterfield Boulevard and Jarvis Drive (North)	D	TWSC	TWSC	AM	05/08/18	No	11.9	B	No	14.0	B
					PM	05/08/18	No	12.1	B	No	14.7	B
31	Butterfield Boulevard and Cochrane Road	D	Signal	Signal	AM	09/26/23	--	16.4	B	--	26.2	C
					PM	09/26/23	--	10.9	B	--	38.5	D
32	Cochrane Circle and Cochrane Road	D	Signal	Signal	AM	05/08/18	--	10.5	B	--	10.2	B
					PM	05/08/18	--	10.9	B	--	10.2	B
33	Woodview Avenue and Cochrane Road	D	Signal	Signal	AM	03/07/23	--	15.5	B	--	21.3	C
					PM	03/07/23	--	12.4	B	--	21.9	C
34	Sutter Boulevard and Cochrane Road	D	Signal	Signal	AM	03/07/23	--	17.1	B	--	38.9	D
					PM	03/07/23	--	18.1	B	--	28.7	C
35	Madrone Parkway/Cochrane Plaza and Cochrane Road	E	Signal	Signal	AM	09/26/23	--	19.6	B	--	17.8	B
					PM	09/26/23	--	33.7	C	--	31.5	C
36	US 101 SB Ramps and Cochrane Road	E	Signal	Signal	AM	09/26/23	--	12.8	B	--	15.0	B
					PM	09/26/23	--	15.9	B	--	22.8	C
37	US 101 NB Ramps and Cochrane Road	E	Signal	Signal	AM	09/21/23	--	8.1	A	--	7.8	A
					PM	09/21/23	--	10.5	B	--	9.0	A
38	De Paul Drive and Cochrane Road	E	Signal	Signal	AM	09/21/23	--	17.9	B	--	20.9	C
					PM	09/21/23	--	19.0	B	--	45.8	D
39	Mission View Drive and Cochrane Road	D	Signal	Signal	AM	09/21/23	--	20.2	C	--	20.2	C
					PM	09/21/23	--	16.0	B	--	21.2	C
40	Peet Road and Cochrane Road	D	TWSC	TWSC	AM	09/14/21	No	13.0	B	No	**41.0**	**E**
					PM	09/14/21	No	12.0	B	No	12.7	B
41	Malaguerra Avenue and Cochrane Road	D	OWSC	OWSC	AM	09/14/21	No	9.3	A	No	9.9	A
					PM	09/14/21	No	8.9	A	No	8.9	A
42	Cochrane Road and Half Road	D	OWSC	OWSC	AM	09/14/21	No	8.8	A	No	9.6	A
					PM	09/14/21	No	8.7	A	No	8.7	A
43	Hale Avenue and Main Avenue	D	AWSC	Signal	AM	09/26/23	No	10.6	B	No	27.0	C
					PM	09/26/23	No	12.5	B	**Yes**	25.6	C
44	Del Monte Avenue and Main Avenue	E	TWSC	TWSC	AM	09/26/23	No	12.8	B	No	17.2	C
					PM	09/26/23	No	13.8	B	No	18.7	C

Table 5 (Continued)
Intersection Level of Service Summary

Int. #	Intersection	LOS Standard	2023 Control	2050 Control	Peak Hour	Count Date	Year 2023 Warrant Met?	Year 2023 Delay[1]	Year 2023 LOS	Year 2050 Warrant Met?	Year 2050 Delay[1]	Year 2050 LOS
45	Depot Street and Main Avenue	E	TWSC	TWSC	AM	06/06/18	No	20.3	C	**Yes**	26.5	D
					PM	06/06/18	No	21.0	C	**Yes**	37.4	E
46	Grand Prix Way and Main Avenue	D	TWSC	TWSC	AM	09/26/23	No	16.4	C	No	24.0	C
					PM	09/26/23	No	12.5	B	No	15.8	C
47	Serene Drive and Main Avenue	D	TWSC	TWSC	AM	09/26/23	No	17.2	C	**Yes**	**>120**	**F**
					PM	09/26/23	No	13.2	B	**Yes**	**>120**	**F**
48	Condit Road and Main Avenue	D	Signal	Signal	AM	09/26/23	--	35.3	D	--	41.0	D
					PM	09/26/23	--	24.6	C	--	**59.9**	**E**
49	Murphy Avenue and Main Avenue (Future)	D	Future	AWSC	AM	--	--	--	--	**Yes**	**71.0**	**F**
					PM	--	--	--	--	**Yes**	**87.0**	**F**
50	Elm Road and Main Avenue	D	AWSC	AWSC	AM	09/26/23	No	11.5	B	No	14.6	B
					PM	09/26/23	No	9.0	A	No	10.2	B
51	Hill Road and Main Avenue	D	AWSC	AWSC	AM	06/04/19	No	12.6	B	No	**43.2**	**E**
					PM	06/04/19	No	8.4	A	**Yes**	16.0	C
52	Hill Road and Dunne Avenue	D	Signal	Signal	AM	06/04/19	--	19.8	B	--	24.2	C
					PM	06/04/19	--	18.3	B	--	19.5	B
53	Murphy Avenue and Dunne Avenue	D	Signal	Signal	AM	09/21/23	--	17.5	B	--	22.3	C
					PM	09/21/23	--	18.0	B	--	21.9	C
54	Condit Road and Dunne Avenue	E	Signal	Signal	AM	09/19/23	--	36.7	D	--	42.4	D
					PM	09/19/23	--	36.3	D	--	36.1	D
55	US 101 NB Ramps and Dunne Avenue	E	Signal	Signal	AM	09/21/23	--	5.2	A	--	6.8	A
					PM	09/21/23	--	10.0	A	--	8.4	A
56	US 101 SB Ramps and Dunne Avenue	E	Signal	Signal	AM	09/19/23	--	20.8	C	--	22.5	C
					PM	09/19/23	--	16.8	B	--	21.8	C
57	Laurel Road and Dunne Avenue	E	TWSC	TWSC	AM	09/21/23	No	13.6	B	No	15.9	C
					PM	09/21/23	No	14.1	B	No	14.5	B
58	Walnut Grove Drive and Dunne Avenue	E	Signal	Signal	AM	09/19/23	--	19.7	B	--	20.9	C
					PM	09/19/23	--	33.7	C	--	32.6	C
59	Depot Street and Dunne Avenue	D	Closed	Closed	AM	--	--	--	--	--	--	--
					PM	--	--	--	--	--	--	--
60	Church Street and Dunne Avenue	E	Signal	Signal	AM	06/06/18	--	13.2	B	--	16.4	B
					PM	06/06/18	--	15.4	B	--	19.2	B
61	Del Monte Avenue and Dunne Avenue	E	TWSC	TWSC	AM	09/26/23	No	14.1	B	No	14.2	B
					PM	09/26/23	No	13.4	B	No	22.4	C
62	Hale Avenue and Dunne Avenue (Future)	D	Future	Roundabout	AM	--	--	--	--	--	5.9	A
					PM	--	--	--	--	--	6.7	A
63	Peak Avenue and Dunne Avenue	D	AWSC	AWSC	AM	09/26/23	No	10.7	B	**Yes**	23.9	C
					PM	09/26/23	No	17.1	C	**Yes**	**>120**	**F**
64	Dewitt Avenue and Dunne Avenue	D	AWSC	AWSC	AM	09/26/23	No	8.8	A	No	8.1	A
					PM	09/26/23	No	8.3	A	No	8.2	A
65	Dewitt Avenue and Edmundson Avenue	D	AWSC	Closed	AM	09/26/23	No	12.5	B	--	--	--
					PM	09/26/23	**Yes**	14.0	B	--	--	--
66	Sunnyside Avenue and Edmundson Avenue	D	AWSC	AWSC	AM	09/26/23	No	19.7	C	No	**81.5**	**F**
					PM	09/26/23	No	15.9	C	**Yes**	**69.6**	**F**

Table 5 (Continued)
Intersection Level of Service Summary

Int. #	Intersection	LOS Standard	2023 Control	2050 Control	Peak Hour	Count Date	Year 2023 Warrant Met?	Year 2023 Delay[1]	Year 2023 LOS	Year 2050 Warrant Met?	Year 2050 Delay[1]	Year 2050 LOS
67	Olympic Drive and Edmundson Avenue	D	OWSC	OWSC	AM	09/26/23	No	10.1	B	No	12.4	B
					PM	09/26/23	No	10.7	B	No	12.1	B
68	Vineyard Boulevard and Tennant Avenue	D	Signal	Signal	AM	09/19/23	--	18.4	B	--	20.0	B
					PM	09/19/23	--	21.2	C	--	20.9	C
69	Juan Hernandez Drive and Tennant Avenue	E	Signal	Signal	AM	09/19/23	--	8.5	A	--	16.7	B
					PM	09/19/23	--	8.1	A	--	14.6	B
70	US 101 SB Ramps and Tennant Avenue	E	Signal	Signal	AM	09/19/23	--	17.0	B	--	48.0	D
					PM	09/19/23	--	14.7	B	--	20.5	C
71	US 101 NB Ramps and Tennant Avenue	E	Signal	Signal	AM	09/19/23	--	11.4	B	--	11.6	B
					PM	09/19/23	--	9.5	A	--	9.1	A
72	Condit Road and Tennant Avenue	E	OWSC	OWSC	AM	09/19/23	**Yes**	17.5	C	**Yes**	**>120**	**F**
					PM	09/19/23	**Yes**	17.9	C	**Yes**	**>120**	**F**
73	Murphy Avenue and Tennant Avenue	D	AWSC	AWSC	AM	09/19/23	**Yes**	21.4	C	**Yes**	**>120**	**F**
					PM	09/19/23	No	11.6	B	**Yes**	**>120**	**F**
74	Hill Road and Tennant Avenue	D	AWSC	AWSC	AM	06/04/19	**Yes**	12.5	B	**Yes**	**104.4**	**F**
					PM	06/04/19	No	10.1	B	**Yes**	**>120**	**F**
75	Hill Road and Barrett Avenue	D	TWSC	TWSC	AM	06/06/18	No	18.6	C	**Yes**	**48.8**	**E**
					PM	06/06/18	No	13.1	B	No	33.6	D
76	Hill Road and San Pedro Avenue	D	OWSC	OWSC	AM	06/04/19	No	13.3	B	No	20.2	C
					PM	06/04/19	No	10.4	B	No	18.3	C
77	Santa Teresa Boulevard/Sunnyside Avenue and Watsonville Road	D	AWSC	AWSC	AM	09/26/23	**Yes**	20.8	C	**Yes**	**>120**	**F**
					PM	09/26/23	**Yes**	25.7	D	**Yes**	**>120**	**F**
78	Hale Avenue and Wright Avenue	D	AWSC	AWSC	AM	09/26/23	No	15.4	C	**Yes**	**70.3**	**F**
					PM	09/26/23	No	**56.4**	**F**	**Yes**	**>120**	**F**
79	Hale Avenue and Llagas Road	D	Signal	Signal	AM	09/26/23	--	14.7	B	--	18.9	B
					PM	09/26/23	--	16.8	B	--	23.6	C
80	Old Monterey Road and Llagas Road	D	AWSC	AWSC	AM	09/26/23	No	8.2	A	No	13.9	B
					PM	09/26/23	No	8.2	A	**Yes**	17.8	C
81	Sutter Boulevard and Jarvis Drive	D	TWSC	TWSC	AM	05/08/18	No	16.1	C	**Yes**	**38.7**	**E**
					PM	05/08/18	No	19.7	C	**Yes**	**>120**	**F**
82	Vista de Lomas and Burnett Avenue	D	OWSC	OWSC	AM	03/28/19	No	8.6	A	No	13.3	B
					PM	03/28/19	No	8.6	A	No	10.7	B
83	Mission View Drive and Avenida De Los Padres	D	OWSC	OWSC	AM	09/21/23	No	12.6	B	No	34.9	D
					PM	09/21/23	No	13.6	B	No	**>120**	**F**
84	Mission View Drive and Half Road	D	AWSC	AWSC	AM	09/21/23	No	9.4	A	**Yes**	**62.2**	**F**
					PM	09/21/23	No	13.3	B	No	**>120**	**F**
85	Peet Road and Half Road	D	OWSC	TWSC	AM	09/14/21	No	8.5	A	No	15.1	C
					PM	09/14/21	No	8.7	A	No	15.7	C
86	Condit Road and Diana Avenue	D	TWSC	TWSC	AM	06/04/19	**Yes**	14.7	B	**Yes**	25.4	D
					PM	06/04/19	No	13.6	B	**Yes**	22.5	C
87	Murphy Avenue and Diana Avenue	D	OWSC	TWSC	AM	06/04/19	No	11.4	B	**Yes**	**>120**	**F**
					PM	06/04/19	No	9.9	A	No	**73.5**	**F**

Notes:
[1]The reported delay and corresponding level of service for signalized, roundabout, all-way stop-controlled intersections represent the average delay for all approaches at the intersection.
The reported delay and corresponding level of service for one- and two-way stop-controlled intersections are based on the stop-controlled approach with the highest delay.
Bold indicates unacceptable level of service and/or signal warrant met.
AWSC = all-way stop-controlled; TWSC = two-way stop-controlled; OWSC = one-way stop-controlled

Figure 3: Year 2023 Intersection Levels of Service

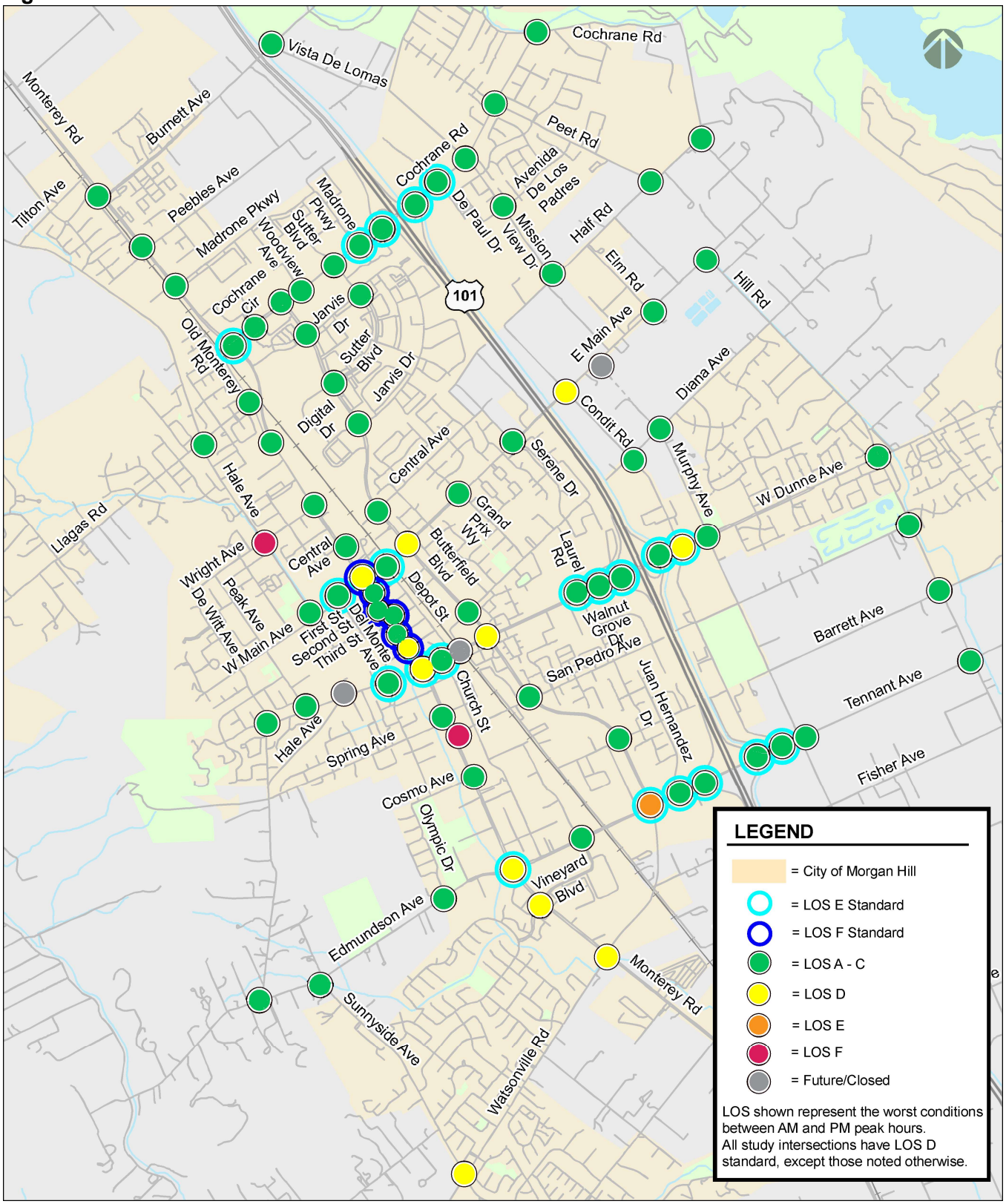
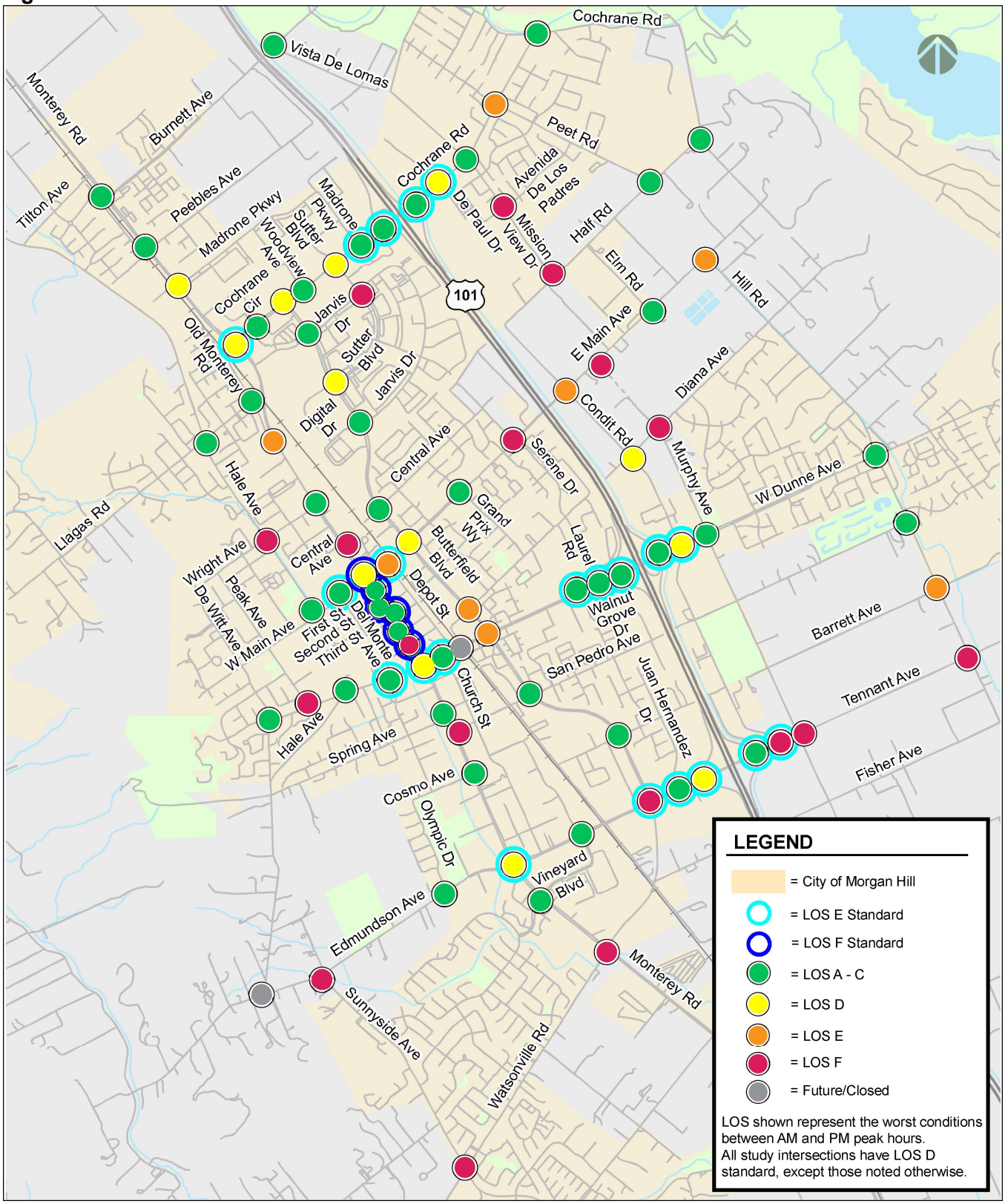


Figure 4: Year 2050 Intersection Levels of Service



Roadway Segment Operations Analysis

The results of the roadway segment level of service under existing and Year 2050 GP conditions are summarized in Table 6 and Figures 5 and 6.

Existing Conditions

The results of the level of service analysis indicate that all segments operate at LOS D or better under existing conditions.

Cumulative 2050 Conditions

The results of the level of service analysis indicate that the following 8 segments are projected to operate at unacceptable levels of service during at least one peak hour under Year 2050 GP conditions when measured against the City of Morgan Hill's level of service standards:

9. Butterfield Boulevard between E. Dunne Avenue and Central Avenue
59. Monterey Road between E. Middle Avenue and Watsonville Road
60. Monterey Road between Watsonville Road and Vineyard Boulevard
63. Monterey Road between Main Avenue and Wright Avenue
64. Monterey Road between Wright Avenue and Cochrane Road
65. Monterey Road between Cochrane Road and Peebles Avenue
66. Monterey Road between Peebles Avenue and City Limit
80. Sutter Boulevard between Cochrane Road and Butterfield Boulevard

Table 6
Roadway Segment Level of Service Summary

#	Roadway	From		To	LOS Standard	Roadway Type (2023/2030/2040)	Year 2023			Year 2050		
							Date	ADT [1]	LOS	Roadway Type	ADT [1]	LOS
1	Barrett Avenue	Railroad Avenue	to	Butterfield Boulevard	D	2-Lane Collector	9/28/2023	1,050	A	2-Lane Collector	2,992	B
2	Barrett Avenue	Butterfield Boulevard	to	US 101	D	2-Lane Collector	9/14/2023	1,295	A	2-Lane Collector	4,479	B
3	Barrett Avenue	Trail Drive	to	Hill Road	D	2-Lane Collector	9/28/2023	1,596	A	2-Lane Collector	3,120	B
4	Burnett Avenue	Monterey Road	to	City Limit	D	2-Lane Collector	8/29/2023	5,089	B	2-Lane Collector	9,594	D
5	Butterfield Boulevard	Tennant Avenue	to	Monterey Road	D	4-Lane Divided Arterial	8/29/2023	16,818	C	4-Lane Divided Arterial	33,208	D
6	Butterfield Boulevard	Barrett Avenue	to	Tennant Avenue	D	4-Lane Divided Arterial	8/29/2023	14,621	C	4-Lane Divided Arterial	26,884	D
7	Butterfield Boulevard	Barrett Avenue	to	San Pedro Avenue	D	4-Lane Divided Arterial	8/29/2023	14,740	C	4-Lane Divided Arterial	30,438	D
8	Butterfield Boulevard	San Pedro Avenue	to	E. Dunne Avenue	D	4-Lane Divided Arterial	8/29/2023	15,122	C	4-Lane Divided Arterial	31,074	D
9	Butterfield Boulevard	E. Dunne Avenue	to	Central Avenue	D	4-Lane Divided Arterial	8/29/2023	18,705	C	4-Lane Divided Arterial	**37,002**	**E**
10	Butterfield Boulevard	Central Avenue	to	Cochrane Road	D	4-Lane Divided Arterial	8/29/2023	16,979	C	4-Lane Divided Arterial	30,226	D
11	E Central Avenue	Butterfield Boulevard	to	Serene Drive	D	2-Lane Collector	9/12/2023	633	A	2-Lane Collector	633	A
12	Church Street	Tennant Avenue	to	E. Dunne Avenue	D	2-Lane Collector	8/31/2023	2,488	A	2-Lane Collector	3,594	B
13	Cochrane Road	Monterey Road	to	US 101	D/E	5-Lane Divided Arterial	8/29/2023	16,800	C	6-Lane Divided Arterial	26,029	C
14	Cochrane Road	US 101	to	Mission View Drive	D/E	4-Lane Divided Arterial	8/29/2023	13,811	C	6-Lane Divided Arterial	16,867	C
15	Cochrane Road	Mission View Drive	to	Malaguerra Avenue	D	2-Lane Collector	8/29/2023	3,421	B	2-Lane Collector	3,444	B
16	Cochrane Road	Malaguerra Avenue	to	City Limit	D	2-Lane Rural Road	10/4/2023	1,792	A	2-Lane Rural Road	1,803	A
17	Condit Road	E. Dunne Avenue	to	Tennant Avenue	D	2-Lane Collector	9/14/2023	4,968	B	2-Lane Collector	5,587	C
18	Condit Road	Diana Avenue	to	E. Dunne Avenue	D	2-Lane Collector	9/28/2023	7,334	C	2-Lane Collector	9,408	D
19	Condit Road	Diana Avenue	to	City Limit	D	2-Lane Collector	9/14/2023	7,066	C	2-Lane Collector	8,324	D
20	Cosmo Avenue	Del Monte Avenue	to	Monterey Road	D	2-Lane Collector	9/26/2023	1,511	A	2-Lane Collector	1,511	A
21	Del Monte Avenue	Cosmo Avenue	to	E. Dunne Avenue	D	2-Lane Collector	9/26/2023	1,297	A	2-Lane Collector	1,957	A
22	Depot Street	E. Main Avenue	to	E. Dunne Avenue	D	2-Lane Collector	8/31/2023	2,261	A	2-Lane Collector	3,593	B
23	Left Blank for Future Use											
24	Dewitt Avenue	Spring Avenue	to	W. Dunne Avenue	D	2-Lane Undivided Arterial	8/31/2023	3,249	C	2-Lane Local Street	1,593	A
25	Diana Avenue	Butterfield Boulevard	to	US 101	D	2-Lane Collector	9/28/2023	2,489	A	2-Lane Collector	3,743	B
26	Diana Avenue	Murphy Avenue	to	Hill Road	D	2-Lane Collector	9/28/2023	963	A	2-Lane Collector	2,797	B
27	W. Dunne Avenue	Peak Avenue	to	Monterey Road	D	2-Lane Undivided Arterial	8/31/2023	6,705	C	4-Lane Undivided Arterial	7,064	C
28	E. Dunne Avenue	Monterey Road	to	Butterfield Boulevard	D	4-Lane Divided Arterial	8/29/2023	13,884	C	4-Lane Divided Arterial	17,994	C
29	E. Dunne Avenue	Butterfield Boulevard	to	Condit Road	D/E	4-Lane Divided Arterial	9/14/2023	22,448	D	4-Lane Divided Arterial	23,262	D
30	E. Dunne Avenue	Condit Road	to	Hill Road	D	4-Lane Divided Arterial	8/29/2023	10,347	C	4-Lane Divided Arterial	11,210	C
31	E. Dunne Avenue	Hill Road	to	Thomas Grade	D	2-Lane Undivided Arterial	9/28/2023	9,205	D	2-Lane Undivided Arterial	9,958	D
32	E. Dunne Avenue	Thomas Grade	to	Rustling Oak Court	D	2-Lane Collector	9/28/2023	6,375	C	2-Lane Collector	6,606	C
33	E. Dunne Avenue	Rustling Oak Court	to	Holiday Drive	D	2-Lane Collector	9/28/2023	6,027	C	2-Lane Collector	6,258	C
34	E. Dunne Avenue	Holiday Drive	to	Anderson Lake	D	2-Lane Collector	9/28/2023	231	A	2-Lane Collector	231	A
35	W. Edmundson Avenue	Olympic Drive	to	Monterey Road	D	2-Lane Divided Arterial	9/26/2023	5,108	C	2-Lane Divided Arterial	6,912	C
36	Foothill Avenue	Maple Avenue	to	City Limit	D	2-Lane Collector	9/28/2023	2,892	B	2-Lane Collector	4,090	B
37	Fountain Oaks Drive [2]	Hill Road	to	Saddleback Drive	D	2-Lane Collector	--	1,769	A	2-Lane Collector	2,029	A
38	Fountain Oaks Drive [2]	Saddleback Drive	to	Trail	D	2-Lane Collector	--	1,426	A	2-Lane Collector	1,473	A
39	Hale Avenue	W. Main Street	to	Wright Avenue	D	2-Lane Undivided Arterial	8/31/2023	4,701	C	2-Lane Undivided Arterial	7,105	C
40	Hale Avenue	Wright Avenue	to	Llagas Road	D	2-Lane Undivided Arterial	8/31/2023	10,258	D	2-Lane Undivided Arterial	12,385	D
41	Hale Avenue	Llagas Road	to	Via Loma	D	2-Lane Undivided Arterial	8/31/2023	8,861	C	2-Lane Undivided Arterial	13,554	D
42	Hale Avenue	Via Loma	to	Tilton Avenue	D	2-Lane Undivided Arterial	9/12/2023	8,857	C	2-Lane Undivided Arterial	13,716	D
43	Half Road	Mission View Drive	to	Elm Road	D	2-Lane Collector	9/28/2023	3,804	B	2-Lane Collector	4,058	B
44	Hill Road	Barrett Avenue	to	E. Dunne Avenue	D	2-Lane Undivided Arterial	9/28/2023	6,304	C	2-Lane Undivided Arterial	13,377	D
45	Hill Road	E. Dunne Avenue	to	E. Main Avenue	D	2-Lane Undivided Arterial	9/28/2023	5,320	C	2-Lane Undivided Arterial	9,523	D
46	Jarvis Drive	Monterey Road	to	Sutter Boulevard	D	2-Lane Local Street	9/12/2023	907	A	2-Lane Local Street	1,943	B
47	Jarvis Drive	Sutter Boulevard	to	Butterfield Boulevard	D	2-Lane Local Street	9/12/2023	1,620	A	2-Lane Local Street	1,620	A
48	Juan Hernandez Drive	Barrett Avenue	to	Tennant Avenue	D	2-Lane Collector	9/14/2023	1,484	A	2-Lane Collector	7,487	C
49	La Alameda Drive	Watsonville Road	to	La Crosse Drive	D	2-Lane Collector	9/26/2023	655	A	2-Lane Collector	655	A
50	La Crosse Drive	Vineyard Boulevard	to	Vineyard Boulevard	D	2-Lane Collector	9/26/2023	3,425	B	2-Lane Collector	3,425	B
51	Llagas Road	Woodland Avenue	to	Castle Lake Drive	D	2-Lane Collector	8/31/2023	638	A	2-Lane Collector	773	A
52	Llagas Road	Castle Lake Drive	to	Teresa Lane	D	2-Lane Collector	8/31/2023	1,280	A	2-Lane Collector	1,301	A
53	Llagas Road	Teresa Lane	to	Llagas Court	D	2-Lane Collector	8/31/2023	1,836	A	2-Lane Collector	2,049	A
54	Llagas Road	Llagas Court	to	Hale Avenue	D	2-Lane Collector	8/31/2023	3,077	B	2-Lane Collector	3,522	B
55	Llagas Road	Hale Avenue	to	Old Monterey Road	D	2-Lane Collector	8/31/2023	3,160	B	2-Lane Collector	2,889	B

Table 6
Roadway Segment Level of Service Summary

#	Roadway	From	To	LOS Standard	Roadway Type (2023/2030/2040)	Year 2023 Date	Year 2023 ADT [1]	Year 2023 LOS	Year 2050 Roadway Type	Year 2050 ADT [1]	Year 2050 LOS
56	Madrone Parkway	Monterey Road	to Cochrane Road	D	2-Lane Collector	9/12/2023	4,791	B	2-Lane Collector	7,223	C
57	W. Main Avenue	John Telfer Drive	to Hale Avenue	D	2-Lane Undivided Arterial	8/31/2023	6,112	C	2-Lane Undivided Arterial	6,270	C
58	W. Main Avenue	Hale Avenue	to Monterey Road	D	2-Lane Undivided Arterial	8/31/2023	7,822	C	2-Lane Undivided Arterial	10,221	D
59	E. Main Avenue	Monterey Road	to Butterfield Boulevard	D	2-Lane Undivided Arterial	8/31/2023	11,257	D	4-Lane Undivided Arterial	14,499	C
60	E. Main Avenue	Butterfield Boulevard	to Serene Drive	D	2-Lane Undivided Arterial	9/14/2023	6,744	C	2-Lane Undivided Arterial	8,889	C
61	E. Main Avenue	Serene Drive	to Condit Road	D	2-Lane Undivided Arterial	9/14/2023	7,113	C	2-Lane Undivided Arterial	13,283	D
62	E. Main Avenue	Live Oak HS	to Elm Road	D	2-Lane Undivided Arterial	9/28/2023	2,511	C	2-Lane Undivided Arterial	4,380	C
63	W. Middle Avenue	Amberwood Lane	to Walnut Drive	D	2-Lane Local Street	9/26/2023	1,037	A	2-Lane Local Street	1,064	A
64	Mission View Drive	Half Road	to Avenida De Los Padres	D	2-Lane Collector	10/4/2023	6,686	C	2-Lane Undivided Arterial	12,695	D
65	Mission View Drive	Avenida de los Padres	to Cochrane Road	D	2-Lane Collector	10/4/2023	7,058	C	2-Lane Undivided Arterial	12,879	D
66	Monterey Road	E. Middle Avenue	to Watsonville Road	D	4-Lane Undivided Arterial	9/26/2023	18,484	D	4-Lane Undivided Arterial	**37,303**	**F**
67	Monterey Road	Watsonville Road	to Vineyard Boulevard	D	4-Lane Undivided Arterial	8/31/2023	18,850	D	4-Lane Undivided Arterial	**31,545**	**F**
68	Monterey Road	Vineyard Boulevard	to Dunne Avenue	D	4-Lane Undivided Arterial	8/31/2023	20,893	D	4-Lane Undivided Arterial	**33,207**	**F**
69	Monterey Road	Dunne Avenue	to Main Avenue	D/F	4-Lane Undivided Arterial	11/14/23	17,257	C	4-Lane Undivided Arterial	**30,761**	**F**
70	Monterey Road	Main Avenue	to Wright Avenue	D	4-Lane Undivided Arterial	8/31/2023	17,097	C	4-Lane Undivided Arterial	**33,396**	**F**
71	Monterey Road	Wright Avenue	to Cochrane Road	D	3-Lane Arterial	9/12/2023	15,822	D	4-Lane Undivided Arterial	**28,464**	**E**
72	Monterey Road	Cochrane Road	to Peebles Avenue	D	4-Lane Undivided Arterial	8/29/2023	19,915	D	4-Lane Undivided Arterial	**40,918**	**F**
73	Monterey Road	Peebles Avenue	to City Limit	D	4-Lane Undivided Arterial	9/12/2023	19,073	D	4-Lane Undivided Arterial	**39,132**	**F**
74	Murphy Avenue	Barrett Avenue	to E. Dunne Avenue	D	2-Lane Undivided Arterial	9/28/2023	4,031	C	2-Lane Undivided Arterial	6,620	C
75	Murphy Avenue	E. Dunne Avenue	to Diana Avenue	D	2-Lane Undivided Arterial	9/28/2023	1,720	C	2-Lane Undivided Arterial	3,951	C
76	Native Dancer Drive	W. Middle Avenue	to Santa Teresa Boulevard	D	2-Lane Collector	9/26/2023	317	A	2-Lane Collector	331	A
77	Old Monterey Road	Llagas Road	to Monterey Road	D	2-Lane Collector	8/31/2023	4,651	B	2-Lane Collector	4,350	B
78	Peak Avenue	Wright Avenue	to W. Main Avenue	D	2-Lane Collector	8/31/2023	3,320	B	2-Lane Collector	3,392	B
79	Peak Avenue	W. Main Avenue	to W. Dunne Avenue	D	2-Lane Collector	8/31/2023	5,991	C	2-Lane Collector	6,638	C
80	Peebles Avenue	Monterey Road	to City Limit	D	2-Lane Local Street	9/12/2023	1,449	A	2-Lane Local Street	3,397	B
81	Peet Road	Avenida de los Padres	to Cochrane Road	D	2-Lane Undivided Arterial	10/4/2023	1,053	C	2-Lane Undivided Arterial	4,268	C
82	Peet Road	Cochrane Road	to Morning Star Drive	D	2-Lane Local Street	10/4/2023	1,487	A	2-Lane Local Street	1,487	A
83	Railroad Avenue	San Pedro Avenue	to Tennant Avenue	D	2-Lane Local Street	9/26/2023	1,167	A	2-Lane Local Street	1,421	A
84	Saddleback Drive	E. Dunne Avenue	to Fountain Oaks Drive	D	2-Lane Local Street	9/28/2023	1,046	A	2-Lane Local Street	1,046	A
85	San Pedro Avenue	US 101	to Railroad Avenue	D	2-Lane Collector	9/14/2023	2,864	B	2-Lane Collector	3,298	B
86	Santa Teresa Boulevard	Watsonville Road	to City Limit	D	2-Lane Rural Road	9/26/2023	9,262	C	2-Lane Rural Road	11,152	D
87	Spring Avenue	Dewitt Avenue	to Monterey Road	D	2-Lane Collector	8/31/2023	1,761	A	2-Lane Collector	1,907	A
88	Sunnyside Avenue	Edmundson Avenue	to Watsonville Road	D	2-Lane Undivided Arterial	9/26/2023	6,616	C	2-Lane Undivided Arterial	9,124	D
89	Sutter Boulevard[3]	Cochrane Road	to Butterfield Boulevard	D	2-Lane Collector	8/29/2023	6,544	C	2-Lane Collector	**12,435**	**E**
90	Tennant Avenue	Monterey Road	to Vineyard Boulevard	D	4-Lane Divided Arterial	9/28/2023	12,906	C	4-Lane Divided Arterial	13,516	C
91	Tennant Avenue	Vineyard Boulevard	to US 101	D/E	4-Lane Divided Arterial	8/29/2023	19,170	C	4-Lane Divided Arterial	19,835	D
92	Tilton Avenue	Hale Avenue	to Monterey Road	D	2-Lane Collector	9/12/2023	6,040	C	2-Lane Collector	6,624	C
93	Vineyard Boulevard	La Crosse Drive	to Monterey Road	D	2-Lane Collector	8/31/2023	6,528	C	2-Lane Collector	6,528	C
94	Vineyard Boulevard	Monterey Road	to Tennant Avenue	D	2-Lane Collector	8/31/2023	7,152	C	2-Lane Collector	7,152	C
95	Vineyard Boulevard	Tennant Avenue	to Mast Street	D	2-Lane Local Street	9/28/2023	1,718	A	2-Lane Local Street	1,718	A
96	Walnut Grove Drive	E. Dunne Avenue	to San Pedro Avenue	D	2-Lane Collector	8/29/2023	2,769	B	2-Lane Collector	3,005	B
97	Watsonville Road	Santa Teresa Boulevard	to Monterey Road	D	2-Lane Undivided Arterial	9/26/2023	14,395	D	4-Lane Undivided Arterial	16,722	C
98	Wright Avenue	Peak Avenue	to Hale Avenue	D	2-Lane Collector	8/31/2023	4,893	B	2-Lane Collector	5,127	B
99	Wright Avenue	Hale Avenue	to Monterey Road	D	2-Lane Collector	8/31/2023	5,837	C	2-Lane Collector	6,317	C

Notes:
[1] Includes both directions
[2] Counts were not available. Model forecasts were used.

Figure 5: Year 2023 Roadway Segment Capacity

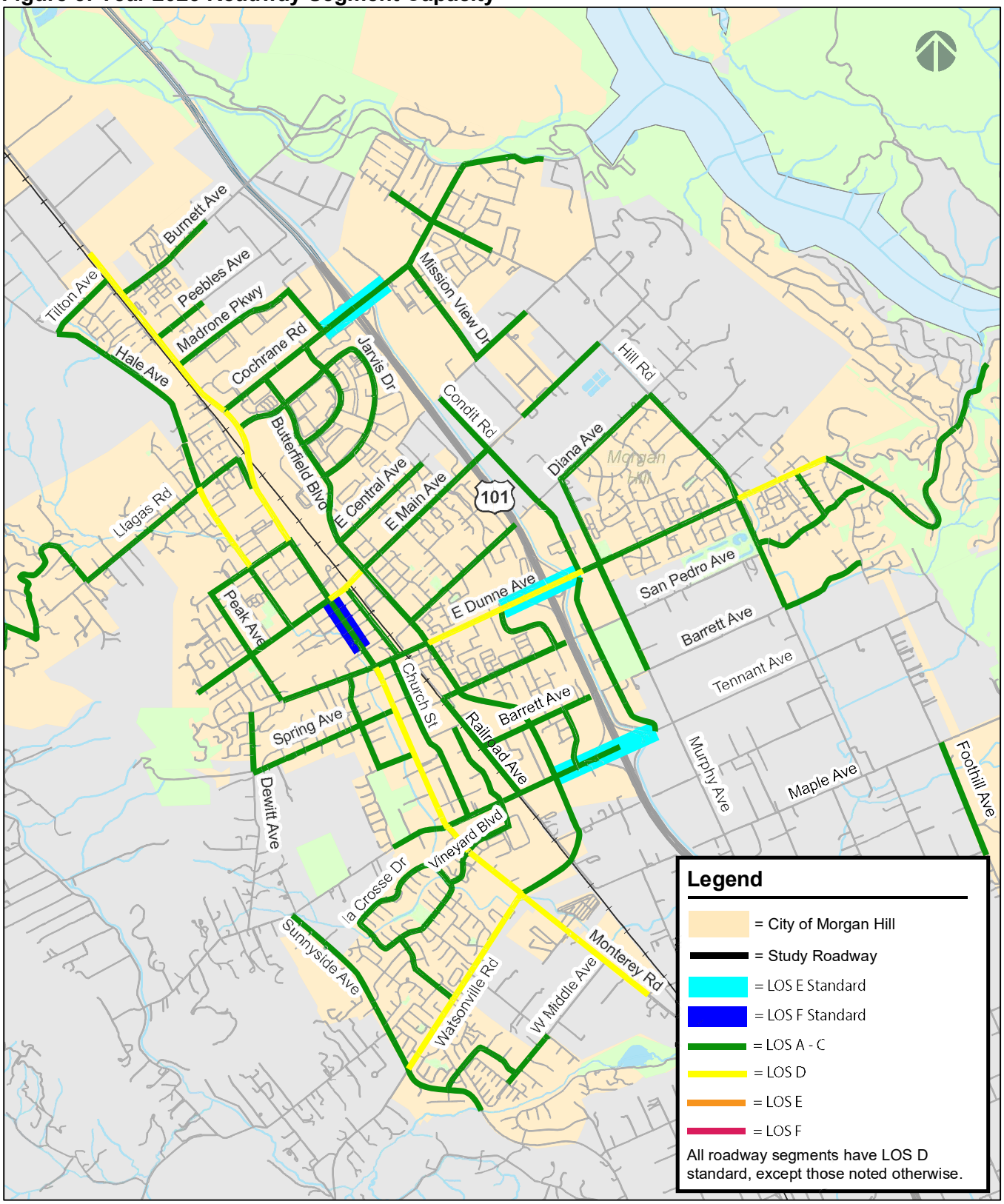
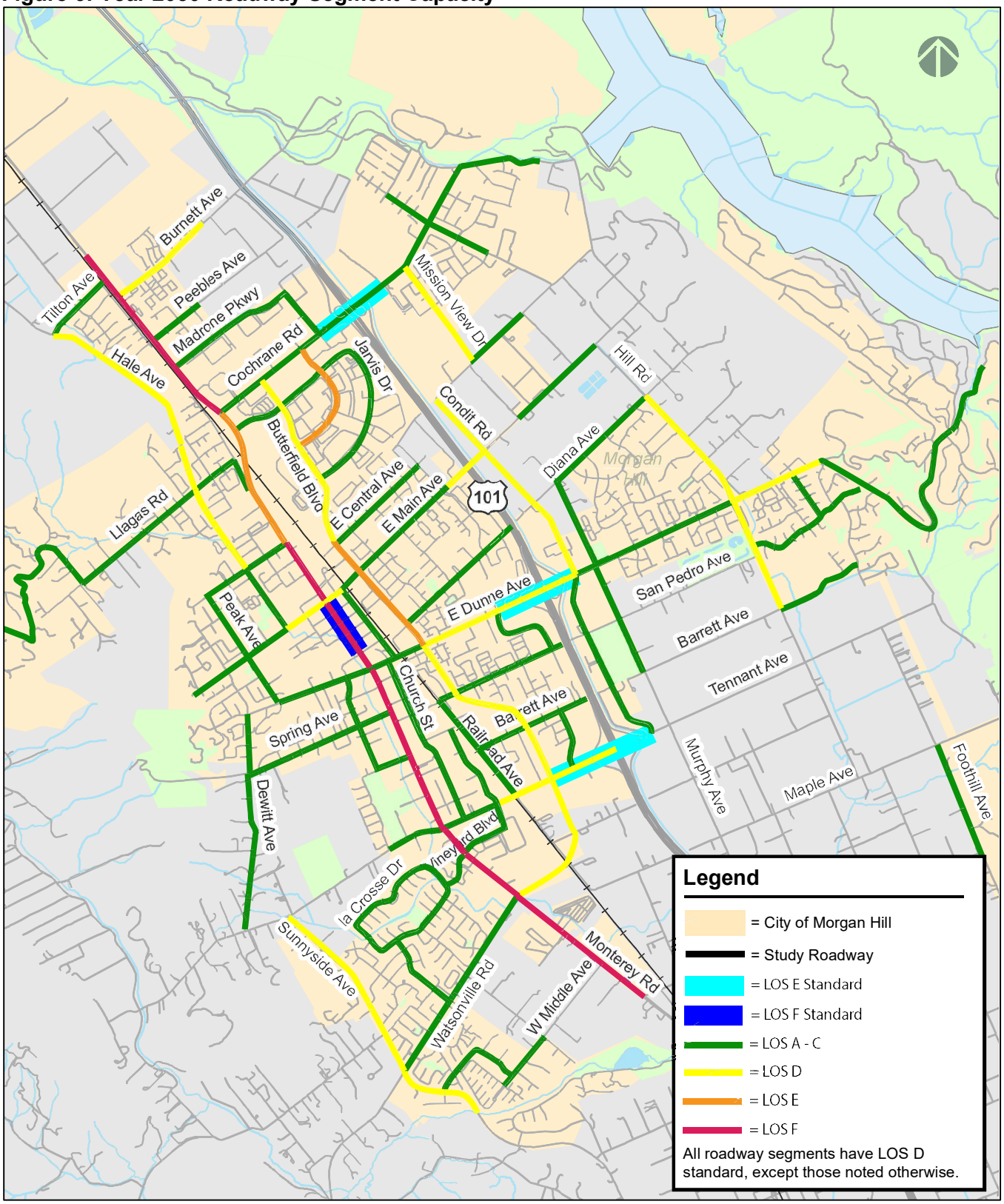


Figure 6: Year 2050 Roadway Segment Capacity



Review of level of Service Standards and Congestion in Other Cities

Hexagon has completed a review of the Santa Clara Valley Transit Authority (VTA), *Congestion Management Program (CMP), 2021* and the level of service standards and congestion for cities in Santa Clara County that have recently updated their general plan or transportation analysis guidelines. Multi-modal level of service performance measures in the CMP and policies as part of cities transportation analysis guidelines were also reviewed. The goal of this research is to support any potential changes to the City of Morgan Hill's LOS standard.

Santa Clara Valley Transit Authority (VTA), *Congestion Management Program (CMP), 2021*

VTA, as the designated Congestion Management Agency (CMA) in Santa Clara County, leads the county's Congestion Management Program (CMP). The CMP's goal is to develop a transportation improvement program to improve multimodal transportation system performance, land use decision-making and air quality among local jurisdictions. The purpose of multimodal performance measures is to evaluate how well Santa Clara County's transportation system serves the public and contributes to economic development, environmental sustainability and quality of life. The 2021 CMP includes multimodal transportation system performance measures like auto level of service, vehicle miles travelled, modal split, pedestrian and bicycle quality of service, transit vehicle delay, transit accessibility, air quality, duration of congestion, hours of delay per person per trip, travel time and travel time index, transit service guidelines, and travel pattern.

Other Cities LOS Standards

Table 7 provides the LOS policy and the percentage of intersections/roadway segments operating below the LOS threshold under general plan buildout conditions for Gilroy, Los Gatos, Sunnyvale, Milpitas, and Mountain View in Santa Clara County. The intersections operations analysis for the General Plan update for Milpitas was not available. The table also includes the City of Morgan Hill's LOS policy, and percentage of intersections that would operate below the LOS threshold under year 2050 conditions. As noted in the table, the general plans for these cities have different horizon years, however, the amount of projected growth for the general plan land uses (approximately 20 to 25 years) is similar to other jurisdictions.

As shown in Table 7, similar to Morgan Hill, the LOS threshold for Los Gatos, Sunnyvale, Milpitas, and Mountain View is LOS D. Furthermore, Sunnyvale, Milpitas, and Mountain View also allow LOS E or LOS F at some intersections. The LOS threshold for Gilroy is LOS C with LOS D acceptable at some intersections near commercial areas.

As described in the previous section, 28 percent of the study intersections in Morgan Hill are projected to operate at substandard levels of service under 2050 conditions. 38 percent of the study intersections in Gilroy, 30 percent of the study intersections in Sunnyvale, and 19 percent of the study roadway segments in Mountain View, are also projected to operate at a substandard level of service under each City's general plan buildout conditions. In case of operational deficiencies due to new development projects, Los Gatos, Sunnyvale, Milpitas, and Mountain View require intersection improvements if feasible, and if those improvements would not negatively impact multimodal facilities. These cities also allow multimodal improvements or use of transportation demand management (TDM) measures in lieu of intersection operational improvements. Gilroy allows an exception to the standard only if the City Council determines that operational improvements at the deficient intersection are infeasible.

Mountain View also requires an analysis of a proposed development project's impacts on pedestrian, bicycle, and transit operations. This includes inconsistency with existing and planned facilities and guidelines as well as addition of vehicle trips to roadways operating at poor pedestrian levels of service or high bicycle level of traffic stress as identified by the City. For transit, this includes an increase in transit delay or decrease in housing or jobs near active stops. These criteria are described in detail in the table below.

Table 7
Level of Service Policies within of the Cities in Santa Clara County

City	Policy	Percent Intersections operating below threshold under GP Buildout conditions
Morgan Hill	***Policy TR 3.4:*** As the Level of Service (LOS) policy and design criteria for roadway improvements, use a Tiered LOS Standard as follows: •LOS F in the Downtown at Main/Monterey, along Monterey Road between Main and Fifth Street, and along Depot Street at First through Fifth Streets. •LOS D for intersections and segments elsewhere; except •Allow LOS E for identified freeway ramps/ zones, road segments and intersections that (1) provide a transition to and are located on the periphery of downtown; (2) are freeway zone intersections; and/or (3) where achieving LOS D could result in interim intersection improvements which would be "over-built" once the City's circulation network has been completed, and/or would involve unacceptable impacts on existing buildings or existing or planned transportation facilities, including roads, sidewalks, bicycle and transit facilities; and/or would involve extraordinary costs to acquire land and existing buildings, and build the improvement in relation to benefits achieved; and/or the facility would be widened beyond requirements to serve local traffic, in that the facility accommodates a significant component of peak-hour subregional and regional through-traffic.	28% (Year 2050)
Gilroy	***Policy M 5.1***: Maintain traffic conditions at LOS C or better at Gilroy intersections and roadways, allowing some commercial and industrial areas (e.g., downtown Gilroy, First Street corridor) to operate at LOS D or better. Existing LOS D areas within City include the Gilroy Premium outlets, Gilroy Crossings, and Regency Commercial areas. Exceptions to this standard will be allowed only where the City Council determines that the improvements needed to maintain the City's standard level of service at specific locations are infeasible.	38% (Year 2040)
Los Gatos	***MOB-10.2***: If a project will cause the current LOS for any project-affected intersection to drop by more than one level for an intersection currently at LOS A, B, or C, or to drop at all if the intersection is at LOS D or below, the project shall construct improvements and/or put TDM measures in place, as directed by the Town Engineer, so that the operation will remain at an acceptable level. These measures shall be implemented and maintained as a condition of approval of the project.	0% (Year 2040)
Sunnyvale	***Council Policy 1.2.8 Transportation Policy***: The acceptable LOS standard for intersection operations is LOS "D" or better for Sunnyvale intersections, LOS "E" for locally designated intersections along regionally significant roadways and Regional transportation facilities as defined by the Congestion Management Program (CMP). To address an operational deficiency, a project must propose an improvement to the intersection which may include: 1. Traffic signal modifications, construction of additional turn lanes 2. Improvements to the pedestrian, bicycle facilities within the intersection or proximate to the intersection 3. Improved access to transit or transit facility proximate to the intersection 4. Transportation demand management (TDM) measures that will reduce the project traffic at the intersection and improve the deficiency	30% (Year 2035)

City	Policy	Percent Roadway Segments operating below threshold under GP Buildout conditions
Milpitas	***Transportation Analysis Guidelines, March 2022***: The City's acceptable intersection operations standard is LOS "D". Develop offsetting improvements that recognize where traffic congestion cannot be mitigated and accept congestions levels that do not meet the citywide LOS or queueing standards. Examples of such standards may include, but are not necessarily limited to: • Where constructing facilities with enough capacity to meet the LOS standard is found to be unreasonably expensive, as determined collaboratively by Engineering and Planning. • Where conditions are worse than the adopted LOS standard and are caused primarily by traffic from adjacent jurisdictions. • Where maintaining the adopted LOS standard will be a disincentive to use transit and active transportation modes (i.e., walking and bicycling) or to the implementation of new transportation modes that would reduce vehicle travel.	--
Mountain View	**Multi-Modal Transportation Analysis Handbook, February 2021:** *Intersection Operations (LOS)*: Intersection operations analysis measures traffic operations and delay at signalized intersections and is usually expressed in LOS. The City's acceptable intersection operations standard is LOS "D" except in the Downtown and San Antonio areas, where the intersection operations standard is LOS "E." There are three possible approaches to address adverse effects at signalized intersections: • Reduce project vehicle-trips to eliminate the adverse effect and bring the intersections back to the background or baseline condition. The Santa Clara Countywide VMT Evaluation Tool (VMT Tool) can be used to select measures that would achieve the reduction of vehicle-trips. • Construct improvements to the affected intersection or other roadway segments of the Citywide transportation system to improve operations provided the proposed improvements are consistent with Mountain View plans and policies and do not result in other impacts or adverse effects. • Construct multi-modal improvements to increase transportation capacity for pedestrian, bicycle, and transit modes, and/or improve access to transit. *Pedestrian Operations*: 1. The project fails to provide accessible and safe pedestrian connections between buildings and adjacent streets and transit facilities. 2. A project disrupts existing or planned pedestrian facilities or conflicts with adopted City non-auto plans, guidelines, policies, or standards. 3. The project adds trips to an existing transportation facility (e.g., sidewalk) that does not meet current design standards. 4. The project increases vehicle trips to a roadway with a Pedestrian Quality of Service (PQOS) score of 3 or more. 5. For larger projects, the project does not result in improved Pedestrian Quality of Service (QOS) in the immediate vicinity and along routes to key destinations within the sphere of analysis. *Bicycle Operations:* 1. The project disrupts existing or planned bicycle facilities or conflicts with adopted City non-auto plans, guidelines, policies, or standards. 2. The project adds trips to an existing transportation facility (e.g. ,bikeway) that does not meet current design standards. The project increases vehicle trips to a roadway with a BLTS score of 3 or 4. 3. The project does not connect to the City's low-stress (LTS 1 to 2) bike network. 4. For larger projects, key network facilities (e.g., bikeways from project to major transit nodes) within the two-mile project sphere have a BLTS of 3 or 4. *Transit Operations:* 1. A project decreases the number of housing or jobs within one-half mile of existing active transit stop or transit corridor. This applies to all active transit stops in Mountain View. 2. The project disrupts existing or planned transit facilities and services or conflicts with adopted City non-auto plans, guidelines, policies, or standards. 3. For large projects, if the project results in transit delay on transit corridor travel time. 4. For larger projects, the project does not increase ridership on public transit services.	19% (Year 2030)