ATTACHMENT 2

HEXAGON TRANSPORTATION CONSULTANTS, INC.

# City of Sunnyvale

## Draft Traffic Impact Fee Update Study

Prepared for:
**City of Sunnyvale**

**June 8, 2017**

DRAFT

**Hexagon Transportation Consultants, Inc.**
Hexagon Office: 4 North Second Street, Suite 400
San Jose, CA 95113
Hexagon Job Number: 15GB34
Phone: 408.971.6100
Client Name: Mr. Manuel Pineda

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# 1. Introduction

This report presents the results of the study for an update to the Sunnyvale Transportation Strategic Plan, which outlines the process, assumptions, and results associated with implementing the City's traffic impact fee program. The study entailed the following: (1) updating the future traffic forecasts based on most recent land use assumptions in Sunnyvale and travel demand model results, (2) identifying any locations of substandard conditions, (3) updating the list of required improvements, (4) updating the cost of implementing the improvements, (5) recalculating the proposed traffic impact fee by distributing the total improvement costs over anticipated future development in the City of Sunnyvale.

## Study Scenarios

Traffic conditions were evaluated for the following scenarios:

**Scenario 1:** *Existing Conditions.* Existing traffic volumes are based on traffic counts conducted between the years of 2014 and 2015, the 2014 CMP TRAFFIX database, as well as County records for the expressways.

**Scenario 2:** *Future Conditions.* Future conditions are represented by the planned future land uses in Sunnyvale, which include buildout of the proposed 2035 General Plan (GP). Traffic volumes were estimated using the Sunnyvale Travel Demand Forecasting Model, and conditions were evaluated within the context of what is primarily the existing roadway network.

## Methodology

The impacts of the planned future land uses were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the county Congestion Management Program (CMP). The traffic analysis is based on AM and PM peak-hour levels of service for 69 signalized intersections within the City of Sunnyvale. Twelve of the study intersections are CMP intersections. The study intersections are identified below and shown on Figure 1.

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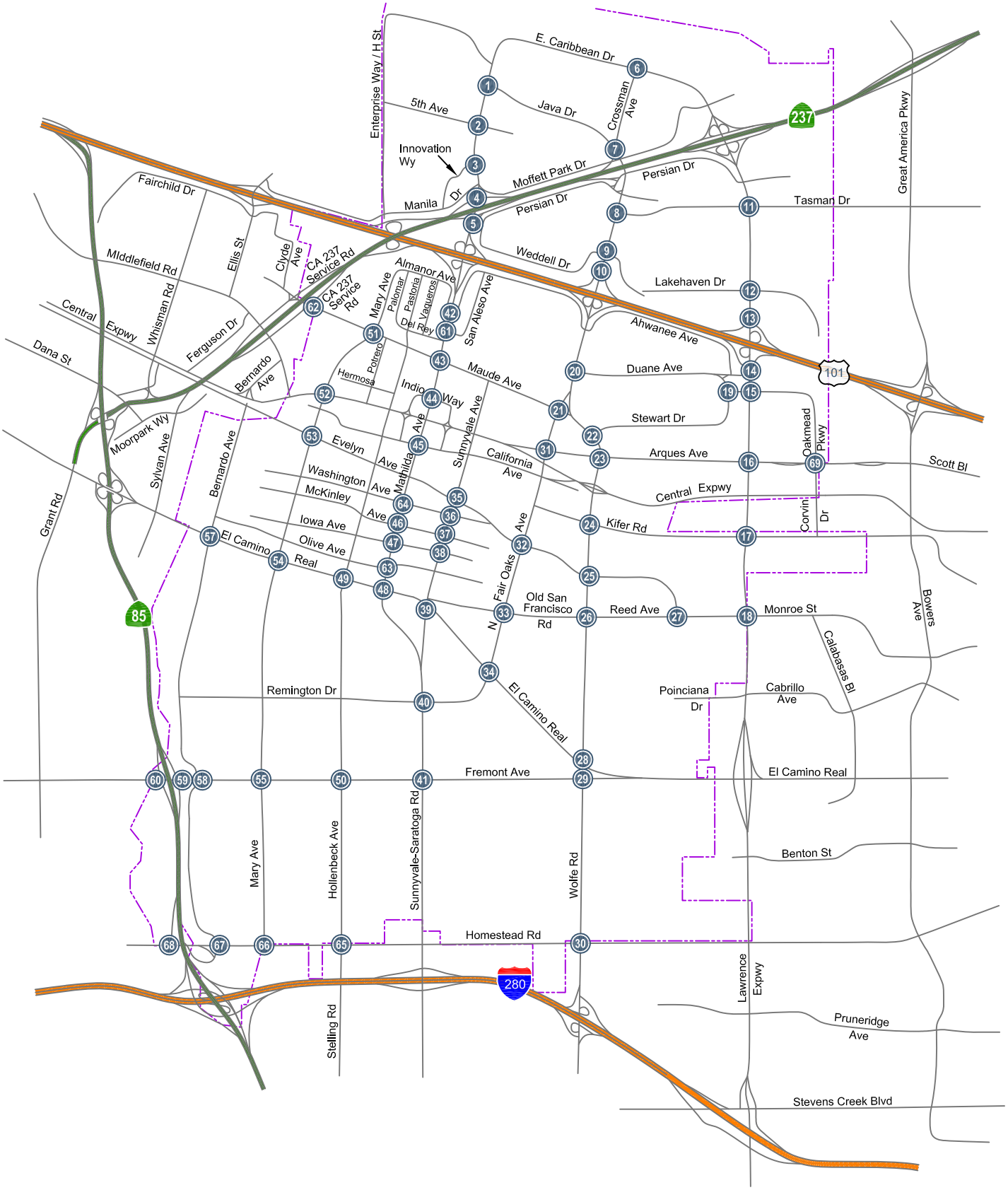


## LEGEND

= City of Sunnyvale Limits

X = Study Intersection

**Figure 1**
**Study Intersections**

NORTH
Not to Scale

## Study Intersections

1. Mathilda Avenue & Java Drive (CMP),
2. Mathilda Avenue & 5th Avenue,
3. Mathilda Avenue & Innovation Way,
4. Mathilda Avenue & SR 237 Westbound Ramps,
5. Mathilda Avenue & SR 237 Eastbound Ramps,
6. Crossman Avenue & Caribbean Drive,
7. Crossman Avenue & Java Drive,
8. Fair Oaks Avenue & Tasman Drive,
9. Fair Oaks Avenue & Weddell Drive,
10. Fair Oaks Avenue & US 101 Northbound Ramps,
11. Lawrence Expressway & Tasman Drive (CMP),
12. Lawrence Expressway & Lakehaven Drive,
13. Lawrence Expressway & US 101 Northbound Ramps,
14. Lawrence Expressway & US 101 Southbound Ramps,
15. Lawrence Expressway & Oakmead Parkway,
16. Lawrence Expressway & Arques Avenue (CMP),
17. Lawrence Expressway & Kifer Road,
18. Lawrence Expressway & Reed Avenue (CMP),
19. Duane Avenue/Stewart Drive & Duane Avenue,
20. Fair Oaks Avenue & Duane Avenue,
21. Fair Oaks Avenue & Maude Avenue,
22. Wolfe Road & Stewart Drive,
23. Wolfe Road & Arques Avenue,
24. Wolfe Road & Kifer Road,
25. Wolfe Road & Evelyn Avenue,
26. Wolfe Road & Reed Avenue,
27. Evelyn Avenue & Reed Avenue,
28. Wolfe Road & El Camino Real (CMP),
29. Wolfe Road & Fremont Avenue,
30. Wolfe Road & Homestead Road,
31. Fair Oaks Avenue & Arques Avenue
32. Fair Oaks Avenue & Evelyn Avenue,
33. Fair Oaks Avenue & Old San Francisco Road,
34. Fair Oaks Avenue & El Camino Real (CMP),
35. Sunnyvale Avenue & Evelyn Avenue,
36. Sunnyvale Avenue & Washington Avenue,
37. Sunnyvale Avenue & McKinley Avenue,
38. Sunnyvale Avenue & Iowa Avenue,
39. Sunnyvale Avenue & El Camino Real,
40. Sunnyvale-Saratoga Road & Remington Drive (CMP),
41. Sunnyvale-Saratoga Road & Fremont Avenue (CMP),
42. Mathilda Avenue & Almanor Avenue,
43. Mathilda Avenue & Maude Avenue (CMP),
44. Mathilda Avenue & Indio Avenue,
45. Mathilda Avenue & California Avenue,
46. Mathilda Avenue & McKinley Avenue,
47. Mathilda Avenue & Iowa Avenue,
48. Mathilda Avenue & El Camino Real (CMP),
49. Hollenbeck Avenue & El Camino Real,

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50. Hollenbeck Avenue & Fremont Avenue,
51. Mary Avenue & Maude Avenue,
52. Mary Avenue & Central Expressway (CMP),
53. Mary Avenue & Evelyn Avenue,
54. Mary Avenue & El Camino Real (CMP),
55. Mary Avenue & Fremont Avenue,
56. Bernardo Avenue & Evelyn Avenue,
57. Bernardo Avenue & El Camino Real,
58. Bernardo Avenue & Fremont Avenue,
59. SR 85 Northbound Ramps & Fremont Avenue,
60. SR 85 Southbound Ramps & Fremont Avenue,
61. Mathilda Avenue & San Aleso Avenue,
62. SR 237 Ramps & Maude Avenue,
63. Mathilda Avenue & Olive Avenue,
64. Mathilda Avenue & Washington Avenue,
65. Hollenbeck Avenue & Homestead Road,
66. Mary Avenue & Homestead Road,
67. Mary Avenue & Homestead Road,
68. SR 85 Southbound Ramp & Homestead Road, and
69. Oakmead Parkway & Arques Avenue.

Traffic conditions at the study intersections were analyzed for the weekday AM and PM peak hours of commute traffic. In the study area, the AM peak hour is typically between 7:00 AM and 9:00 AM, while the PM peak hour is typically between 4:00 PM and 6:00 PM.

## Analysis Methodologies and Level of Service Standards

### Signalized Study Intersections

The City of Sunnyvale level of service methodology for signalized intersections is the 2000 *Highway Capacity Manual* (HCM) method. This method is applied using the TRAFFIX software. The 2000 HCM operations method evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. Since TRAFFIX is also the CMP-designated intersection level of service methodology, the methodologies employ the CMP default values for the analysis parameters.

The City of Sunnyvale level of service standards for signalized intersections is LOS D or better, except on roadways considered “regionally significant” within Sunnyvale, which have a standard of LOS E. Within Sunnyvale, the signalized intersections along Lawrence Expressway, El Camino Real, and Sunnyvale-Saratoga Road with its extensions into Mathilda Avenue and Sunnyvale Avenue are considered regionally significant.

The correlation between average control delay and level of service is shown in Table 1.

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**Table 1**
**Signalized Intersection Level of Service Definition Based on Average Delay**

| Level of Service | Description | Average Control Delay Per Vehicle (sec.) |
|---|---|---|
| A | Signal progression is extremely favorable. Most vehicles arrive during the green phase and do not stop at all. Short cycle lengths may also contribute to the very low vehicle delay. | 10.0 or less |
| B | Operations characterized by good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average vehicle delay. | 10.1 to 20.0 |
| C | Higher delays may result from fair signal progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping. | 20.1 to 35.0 |
| D | The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable signal progression, long cycle lengths, or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable. | 35.1 to 55.0 |
| E | This is considered to be the limit of acceptable delay. These high delay values generally indicate poor signal progression, long cycle lengths, and high volume-to-capacity (V/C) ratios. Individual cycle failures occur frequently. | 55.1 to 80.0 |
| F | This level of delay is considered unacceptable by most drivers. This condition often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may also be major-contributing causes of such delay levels. | greater than 80.0 |

Source: Transportation Research Board, *2010 Highway Capacity Manual* (Washington, D.C., 2010) p18-6.

## Report Organization

The remainder of this report is divided into four chapters. Chapter 2 describes existing conditions for the study intersections. Chapter 3 presents all the study intersection levels of service under future conditions. Chapter 4 updates the recommended roadway improvements. Chapter 5 describes the impact fees and the mechanics of implementation.

# 2. Existing Conditions

This chapter describes existing traffic conditions during both the AM and PM peak hours at the principal signalized intersections in Sunnyvale. The purpose of analyzing existing conditions is to identify any existing deficiencies. Intersections that operate at a substandard level under existing conditions might not qualify for funding by an impact fee in cases where the future conditions are not shown to be appreciably worse. The rationale for this is that an impact fee cannot be assessed for improvements that are needed to remedy an existing deficient condition.

## Existing Intersection Lane Configurations

The existing lane configurations at the study intersections were confirmed by observations in the field and are shown on Figure 2.

## Existing Traffic Volumes

Existing traffic volumes are based on traffic counts conducted between the years of 2014 and 2015, the 2014 CMP TRAFFIX database, as well as County records for the expressways (see Figure 3). The traffic count data are included in Appendix A.

## Existing Intersection Levels of Service

Intersection levels of service were evaluated against the Sunnyvale standards (see Table 2). The results of the analysis show that most of the study intersections currently operate at acceptable levels during both the AM and PM peak hours, with the following exceptions:

- Lawrence Expressway & Arques Avenue (#16) – PM Peak Hour (LOS F)
- Lawrence Expressway & Kifer Road (#17) – AM & PM Peak Hour (LOS F)
- Lawrence Expressway & Reed Avenue (#18) – AM & PM Peak Hour (LOS F)

The intersection levels of service calculation sheets are included in Appendix B.

The intersections on Mathilda Avenue at the SR 237 ramps are closely-spaced intersections with multiple turning movements that operate as a single coordinated signal system. These intersections experience operational issues beyond what is reflected in the typical HCM level of service calculations by TRAFFIX. Therefore, the Synchro software was used to provide a more accurate assessment of the Mathilda Avenue corridor operational issues. The Synchro analysis results for the intersections along Mathilda Avenue at the SR 237 ramps are shown on Table 2. The Synchro results match the field observations that Hexagon conducted during the AM and PM peak hours at these intersections.

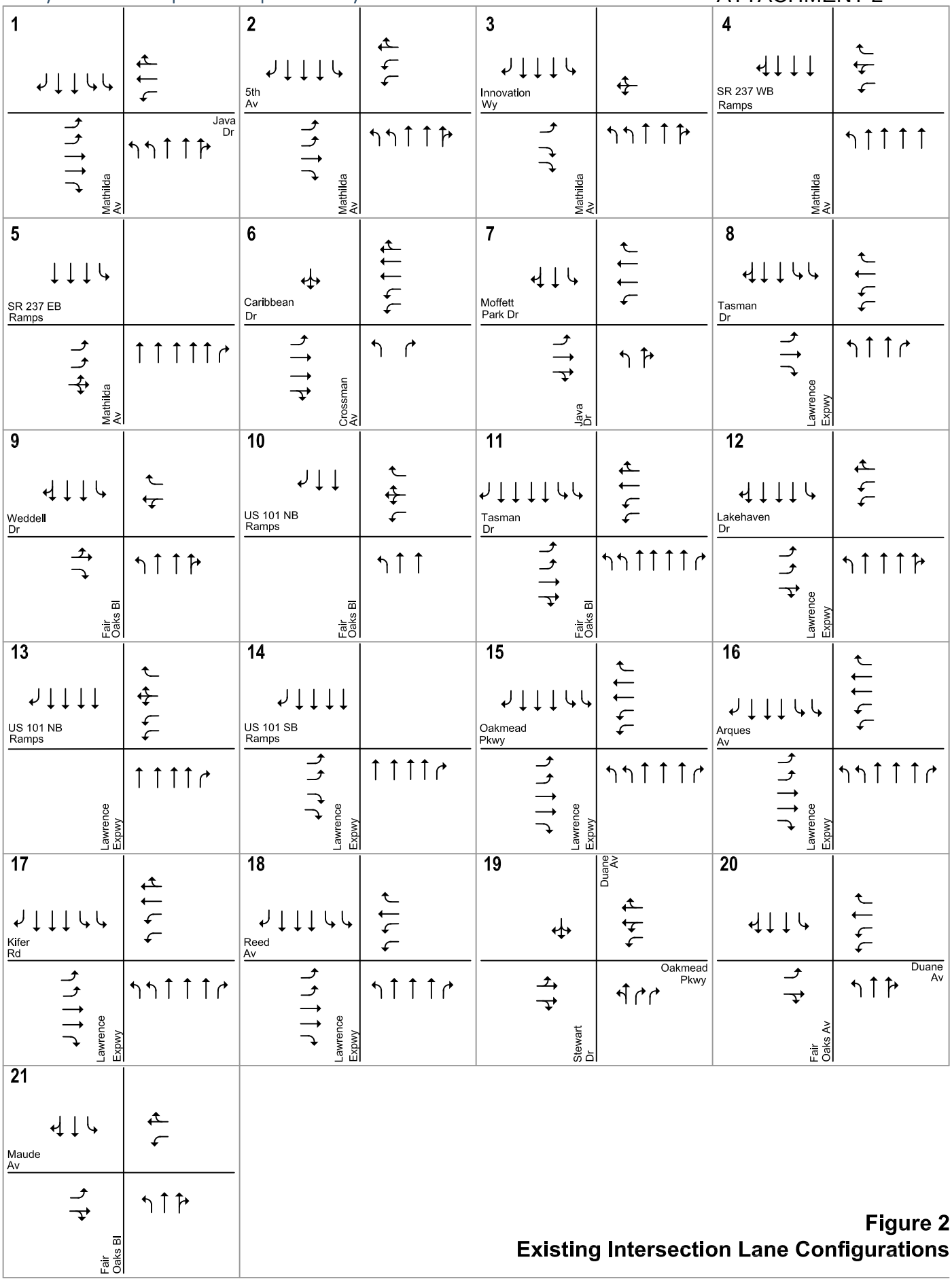



**Figure 2**
**Existing Intersection Lane Configurations**



NORTH
Not to Scale

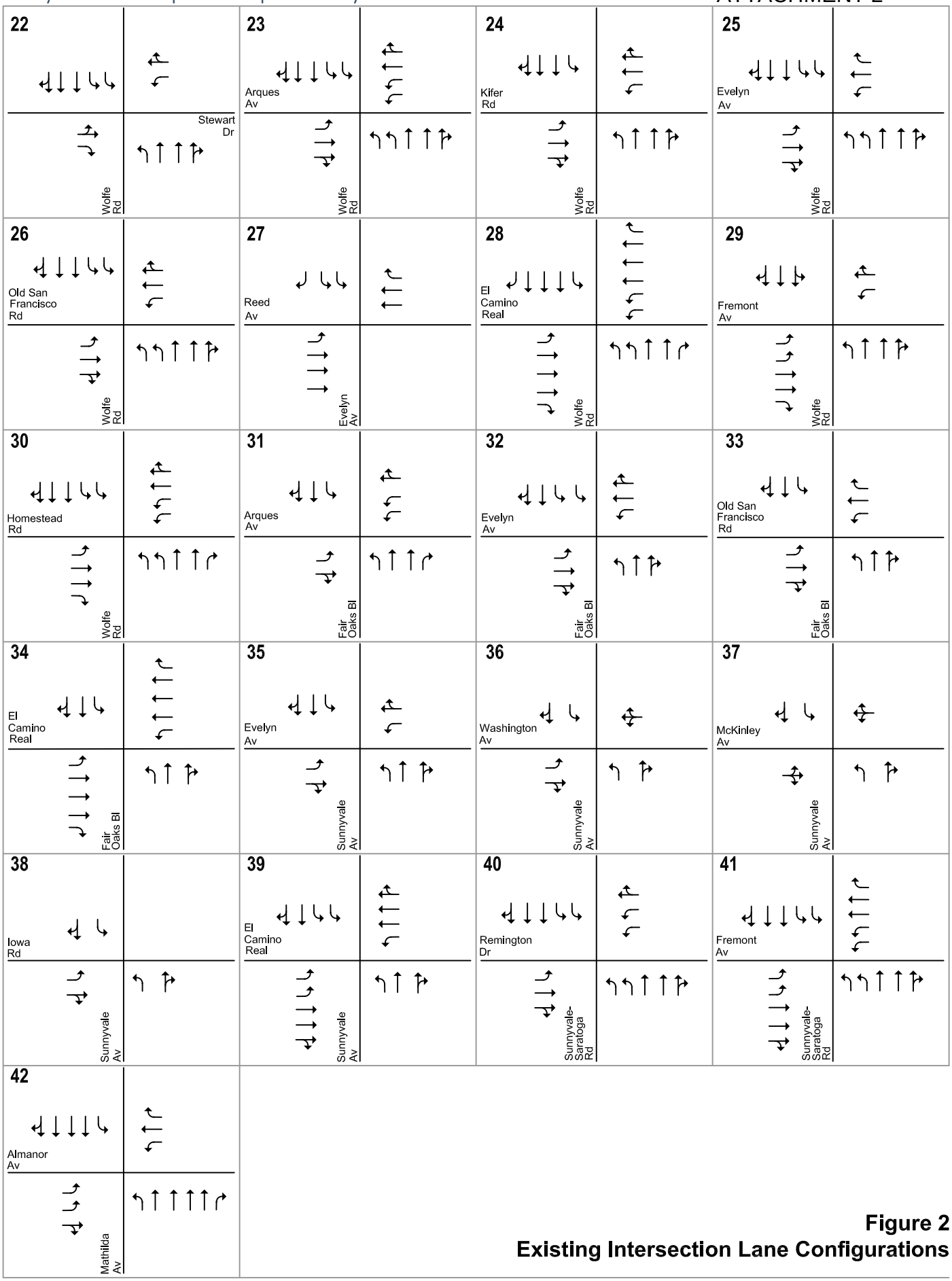



**Figure 2**
**Existing Intersection Lane Configurations**



NORTH
Not to Scale

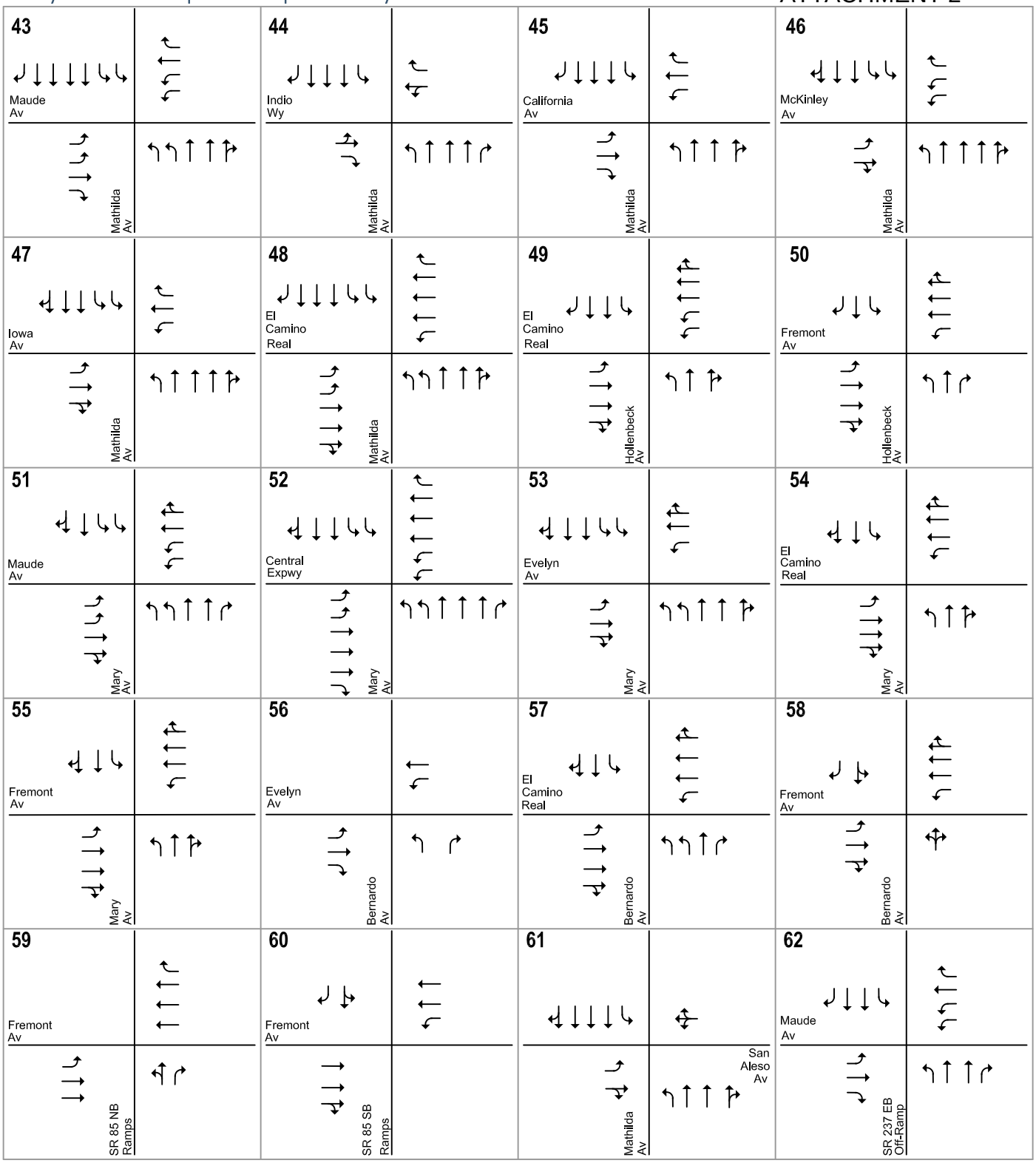



**Figure 2**
**Existing Intersection Lane Configurations**



NORTH
Not to Scale

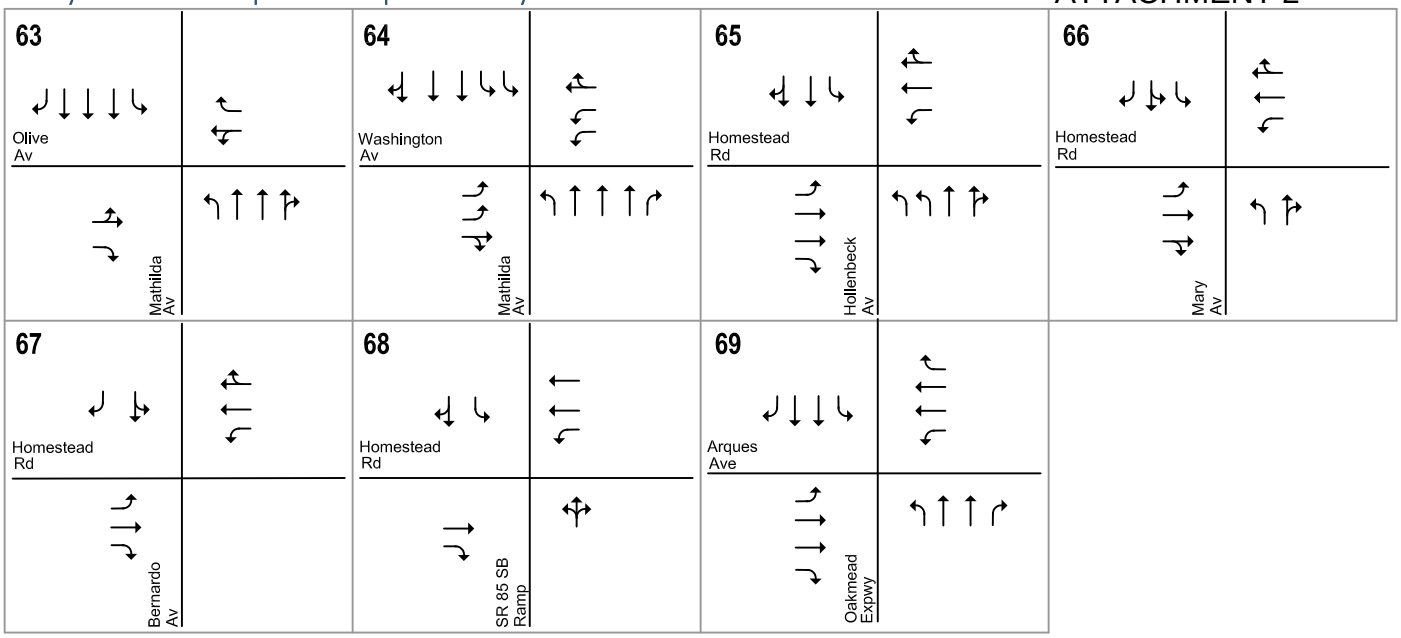



**Figure 2**
**Existing Intersection Lane Configurations**

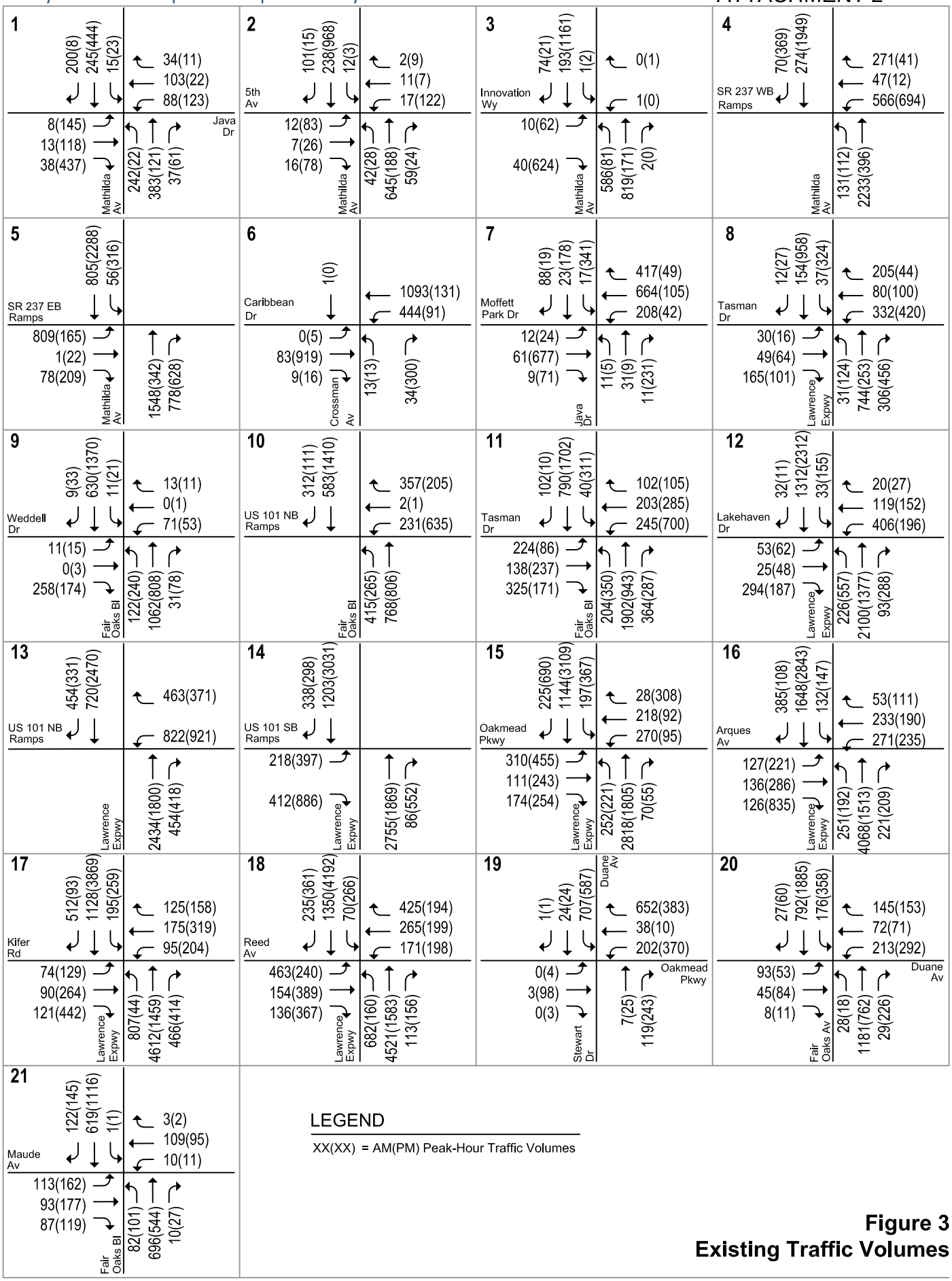
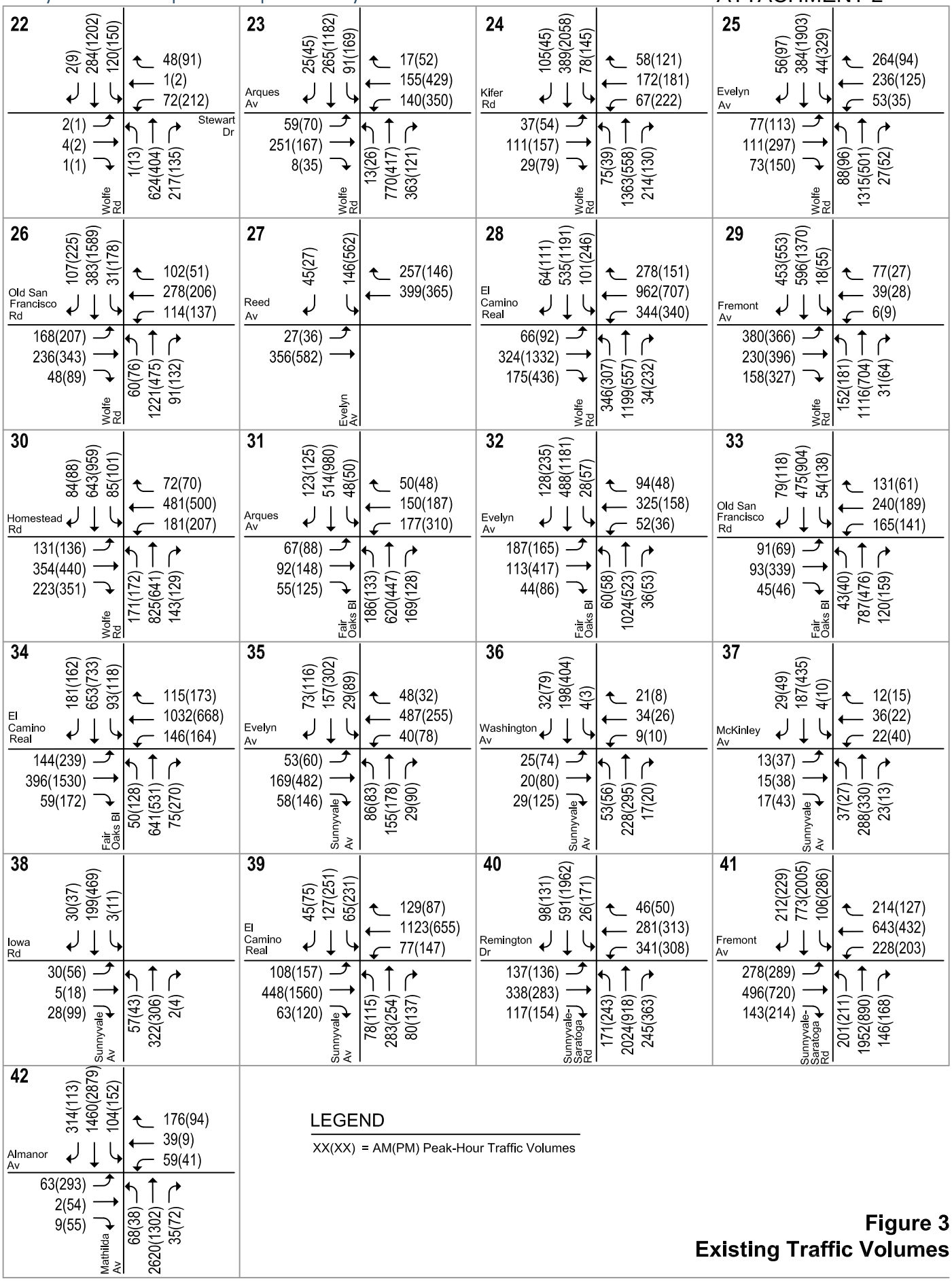



**Figure 3**
**Existing Traffic Volumes**

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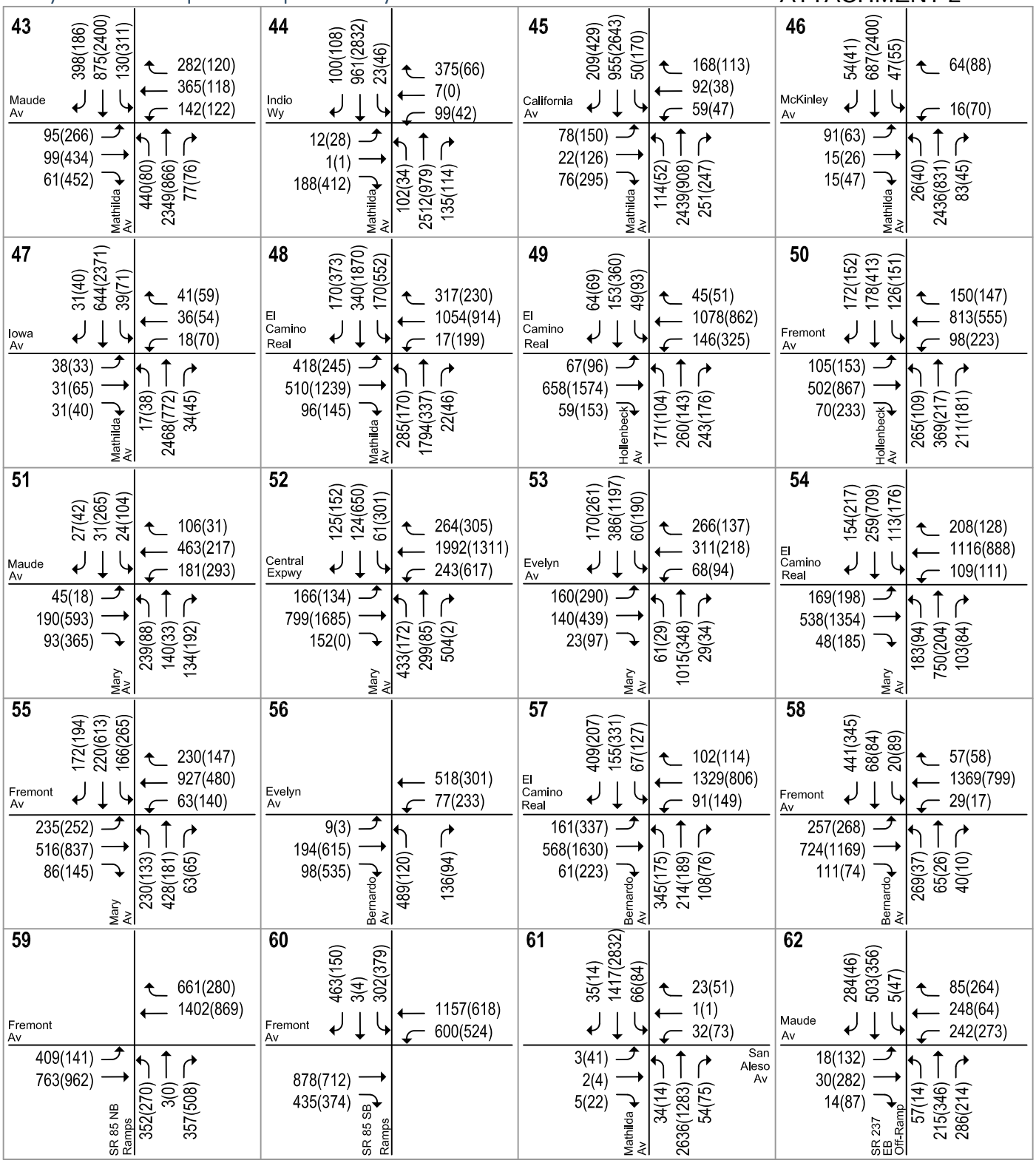


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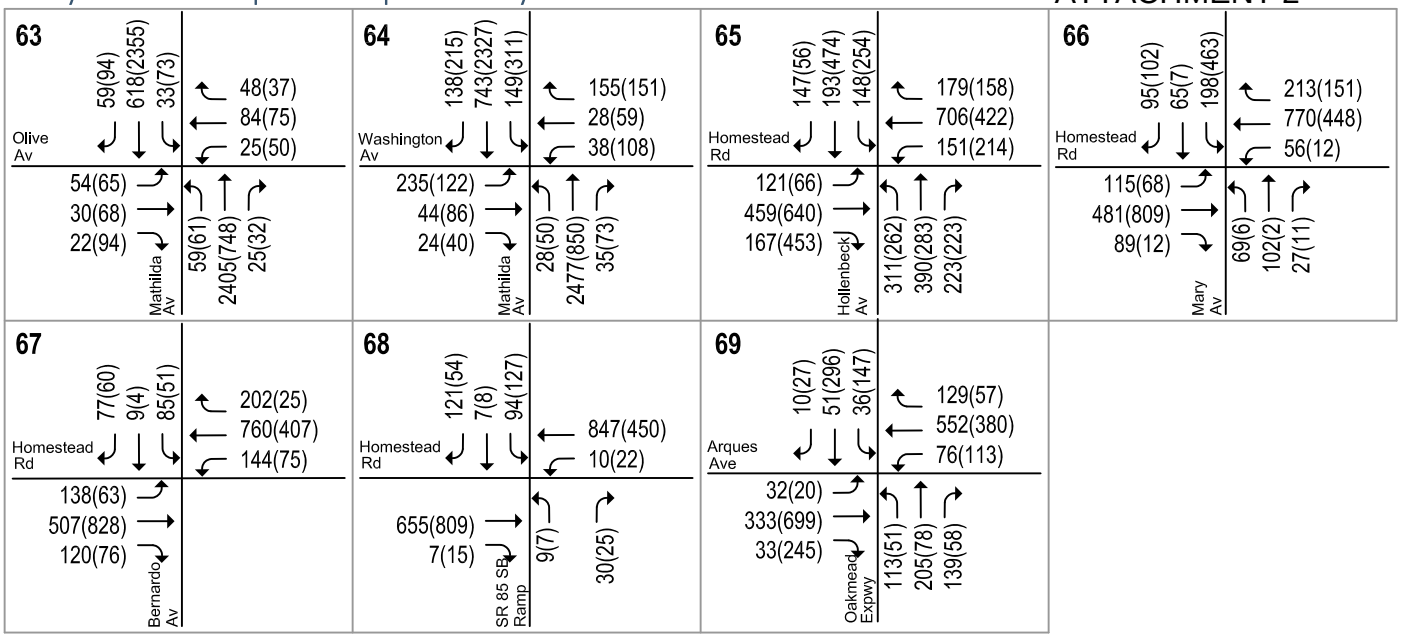
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

**Figure 3**
**Existing Traffic Volumes**




LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

**Figure 3**
**Existing Traffic Volumes**



NORTH
Not to Scale

**Table 2**
**Existing Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS |
|---|---|---|---|---|---|---|---|
| 1 | Mathilda Ave & Java Dr | * | AM | 01/00/15 | E | 26.6 | C |
| | | | PM | 10/01/14 | | 28.0 | C |
| 2 | Mathilda Ave & 5th Ave | + | AM | 06/04/15 | E | 13.5 | B |
| | | | PM | 06/04/15 | | 22.1 | C+ |
| 3 | Mathilda Ave & Innovation Way | + | AM | 06/04/15 | E | 18.5 | B- |
| | | | PM | 06/04/15 | | 19.8 | B- |
| 4 | Mathilda Ave & SR 237 WB [1] | + | AM | 06/04/15 | E | - | E |
| | | | PM | 06/04/15 | | - | E |
| 5 | Mathilda Ave & SR 237 EB [1] | + | AM | 06/04/15 | E | - | E |
| | | | PM | 06/04/15 | | - | E |
| 6 | Crossman Ave & Caribbean Dr | + | AM | 05/14/15 | E | 10.3 | B+ |
| | | | PM | 05/14/15 | | 36.0 | D+ |
| 7 | Crossman Ave & Java Dr | | AM | 11/00/14 | D | 17.0 | B |
| | | | PM | 11/00/14 | | 29.4 | C |
| 8 | Fair Oaks Ave & Tasman Dr | | AM | 06/04/15 | D | 17.1 | B |
| | | | PM | 06/04/15 | | 19.4 | B- |
| 9 | Fair Oaks Ave & Weddell Dr | | AM | 06/04/15 | D | 19.0 | B- |
| | | | PM | 06/04/15 | | 13.8 | B |
| 10 | N Fair Oaks Ave & US 101 NB | | AM | 10/00/14 | D | 16.5 | B |
| | | | PM | 10/00/14 | | 21.0 | C+ |
| 11 | Lawrence Expwy & Tasman Dr | * | AM | 05/18/15 | E | 40.2 | D |
| | | | PM | 05/18/15 | | 64.8 | E |
| 12 | Lawrence Expwy & Lakehaven Dr | + | AM | 05/18/15 | E | 59.6 | E+ |
| | | | PM | 05/18/15 | | 63.5 | E |
| 13 | Lawrence Expwy & US 101 NB | + | AM | 05/22/15 | E | 21.7 | C+ |
| | | | PM | 05/22/15 | | 24.4 | C |
| 14 | Lawrence Expwy & US 101 SB | + | AM | 05/18/15 | E | 15.1 | B |
| | | | PM | 05/18/15 | | 43.1 | D |
| 15 | Lawrence Expwy & Oakmead Pkwy | + | AM | 05/18/15 | E | 48.7 | D |
| | | | PM | 05/18/15 | | 57.5 | E+ |
| 16 | Lawrence Expwy & Arques Ave | * | AM | 05/18/15 | E | 66.6 | E |
| | | | PM | 05/18/15 | | **95.5** | **F** |
| 17 | Lawrence Expwy & Kifer Rd | + | AM | 05/18/15 | E | **168.2** | **F** |
| | | | PM | 05/18/15 | | **81.0** | **F** |
| 18 | Lawrence Expwy & Reed Ave/Monroe St | * | AM | 05/18/15 | E | **203.1** | **F** |
| | | | PM | 05/18/15 | | **86.5** | **F** |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
1. At the intersections at the Mathilda/SR 237 interchange, the calculated LOS does not reflect the unmet vehicle demand that cannot get through the intersections during the peak hours. The LOS reflect the micro-simulation analysis results using Synchro/Sim Traffic software.
**BOLD** indicates a substandard level of service

**Table 2 (Continued)**
**Existing Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS |
|---|---|---|---|---|---|---|---|
| 19 | Duane/Stewart & Duane Ave | | AM | 10/00/14 | D | 31.4 | C |
| | | | PM | 10/00/14 | | 30.6 | C |
| 20 | N Fair Oaks Ave & Duane Ave | | AM | 10/00/14 | D | 26.3 | C |
| | | | PM | 10/00/14 | | 32.1 | C- |
| 21 | Fair Oaks Ave & Maude Ave [1] | | AM | N/A | D | 28.6 | C |
| | | | PM | N/A | | 28.5 | C |
| 22 | Wolfe Rd & Stewart Dr | | AM | 10/00/14 | D | 16.1 | B |
| | | | PM | 10/00/14 | | 19.1 | B- |
| 23 | Wolfe Rd & Arques Ave | | AM | 10/00/14 | D | 24.8 | C |
| | | | PM | 10/00/14 | | 28.4 | C |
| 24 | Wolfe Rd & Kifer Rd | | AM | 05/00/14 | D | 21.1 | C+ |
| | | | PM | 05/00/14 | | 26.8 | C |
| 25 | Wolfe Rd & Evelyn Ave | | AM | 05/00/14 | D | 26.0 | C |
| | | | PM | 05/00/14 | | 24.6 | C |
| 26 | Wolfe Rd & Reed Ave | | AM | 05/00/14 | D | 28.8 | C |
| | | | PM | 05/00/14 | | 28.8 | C |
| 27 | Evelyn Ave & Reed Ave | | AM | 05/14/15 | D | 10.8 | B+ |
| | | | PM | 05/14/15 | | 18.9 | B- |
| 28 | Wolfe Rd & El Camino Real | * | AM | 05/00/14 | E | 49.8 | D |
| | | | PM | 09/19/14 | | 55.1 | E+ |
| 29 | Wolfe Rd & Fremont Ave | | AM | 05/00/14 | D | 48.9 | D |
| | | | PM | 05/00/14 | | 49.8 | D |
| 30 | Wolfe Rd & Homestead Rd | | AM | 05/00/14 | D | 30.9 | C |
| | | | PM | 05/00/14 | | 31.9 | C |
| 31 | Fair Oaks Ave & Arques Ave | | AM | 05/14/15 | D | 29.7 | C |
| | | | PM | 05/14/15 | | 34.4 | C- |
| 32 | N Fair Oaks Ave & Evelyn Ave | | AM | 05/14/15 | D | 28.1 | C |
| | | | PM | 05/14/15 | | 26.7 | C |
| 33 | N Fair Oaks Ave & Old San Francisco | | AM | 05/14/15 | D | 35.4 | D+ |
| | | | PM | 05/14/15 | | 36.7 | D+ |
| 34 | Fair Oaks Ave & El Camino Real | * | AM | 05/00/14 | E | 34.9 | C- |
| | | | PM | 10/15/14 | | 39.3 | D |
| 35 | Sunnyvale Ave & Evelyn Ave | + | AM | 05/14/15 | E | 24.6 | C |
| | | | PM | 05/14/15 | | 27.9 | C |
| 36 | Sunnyvale Ave & Washington Ave | + | AM | 05/14/15 | E | 17.7 | B |
| | | | PM | 05/14/15 | | 20.3 | C+ |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
1. Existing volumes for the Fair Oaks/Maude intersection is extrapolated based on 2013 counts.

**Table 2 (Continued)**
**Existing Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS |
|---|---|---|---|---|---|---|---|
| 37 | Sunnyvale Ave & McKinley Ave | + | AM | 05/14/15 | E | 15.3 | B |
| | | | PM | 05/14/15 | | 15.8 | B |
| 38 | Sunnyvale Ave & Iowa Ave | + | AM | 05/14/15 | E | 12.8 | B |
| | | | PM | 05/14/15 | | 16.0 | B |
| 39 | Sunnyvale Ave & El Camino Real | + | AM | 05/14/15 | E | 23.3 | C |
| | | | PM | 05/14/15 | | 30.0 | C |
| 40 | Sunnyvale-Saratoga Rd & Remington Dr | * | AM | 05/14/15 | E | 42.2 | D |
| | | | PM | 09/19/14 | | 45.8 | D |
| 41 | Sunnyvale-Saratoga Rd & Fremont Ave | * | AM | 05/00/14 | E | 34.7 | C- |
| | | | PM | 10/01/14 | | 45.7 | D |
| 42 | Mathilda Ave & Almanor Ave | + | AM | 06/04/15 | E | 17.1 | B |
| | | | PM | 06/04/15 | | 27.1 | C |
| 43 | Mathilda Ave & Maude Ave | * | AM | 06/04/15 | E | 39.0 | D+ |
| | | | PM | 09/18/14 | | 40.4 | D |
| 44 | Mathilda Ave & Indio Way | + | AM | 06/04/15 | E | 24.5 | C |
| | | | PM | 06/04/15 | | 24.9 | C |
| 45 | Mathilda Ave & California | + | AM | 06/04/15 | E | 19.9 | B- |
| | | | PM | 06/04/15 | | 25.3 | C |
| 46 | Mathilda Ave & McKinley Ave | + | AM | 06/04/15 | E | 15.1 | B |
| | | | PM | 06/04/15 | | 16.4 | B |
| 47 | Mathilda Ave & Iowa Ave | + | AM | 06/04/15 | E | 13.1 | B |
| | | | PM | 06/04/15 | | 16.7 | B |
| 48 | Mathilda Ave & El Camino Real | * | AM | 06/04/15 | E | 44.0 | D |
| | | | PM | 09/18/14 | | 48.4 | D |
| 49 | Hollenbeck Ave & El Camino Real | + | AM | 05/14/15 | E | 27.9 | C |
| | | | PM | 05/14/15 | | 28.9 | C |
| 50 | Hollenbeck Ave & Fremont Ave | | AM | 05/00/14 | D | 34.6 | C- |
| | | | PM | 05/00/14 | | 36.7 | D+ |
| 51 | Mary Ave & Maude Ave | | AM | 05/14/15 | D | 25.8 | C |
| | | | PM | 05/14/15 | | 29.1 | C |
| 52 | Mary Ave & Central Expwy | * | AM | 05/22/15 | E | 50.0 | D |
| | | | PM | 05/22/15 | | 61.6 | E |
| 53 | Mary Ave & Evelyn Ave | | AM | 05/14/15 | D | 30.0 | C |
| | | | PM | 05/14/15 | | 30.3 | C |
| 54 | Mary Ave & El Camino Real | * | AM | 05/14/15 | E | 37.3 | D+ |
| | | | PM | 09/19/14 | | 37.8 | D+ |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)

**Table 2 (Continued)**
**Existing Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS |
|---|---|---|---|---|---|---|---|
| 55 | Mary Ave & Fremont Ave | | AM | 05/00/14 | D | 41.8 | D |
| | | | PM | 05/00/14 | | 42.0 | D |
| 56 | Bernardo Ave & Evelyn Ave | | AM | 05/12/15 | D | 24.3 | C |
| | | | PM | 05/12/15 | | 19.0 | B- |
| 57 | Bernardo Ave & El Camino Real | + | AM | 05/14/15 | E | 40.1 | D |
| | | | PM | 05/14/15 | | 35.6 | D+ |
| 58 | Bernardo Ave & Fremont Ave | | AM | 05/00/14 | D | 26.6 | C |
| | | | PM | 05/00/14 | | 22.6 | C+ |
| 59 | SR 85 NB & Fremont Ave | | AM | 05/00/14 | D | 30.3 | C |
| | | | PM | 05/00/14 | | 26.6 | C |
| 60 | SR 85 SB & Fremont Ave | | AM | 05/00/14 | D | 37.5 | D+ |
| | | | PM | 05/00/14 | | 31.6 | C |
| 61 | Mathilda Ave & San Aleso Ave | + | AM | 06/04/15 | E | 12.6 | B |
| | | | PM | 06/04/15 | | 17.3 | B |
| 62 | SR 237 Service Road & Maude Ave | | AM | 09/15/15 | D | 29.2 | C |
| | | | PM | 09/15/15 | | 34.7 | C- |
| 63 | Mathilda Ave & Olive Ave | + | AM | 06/04/15 | E | 13.7 | B |
| | | | PM | 06/04/15 | | 16.9 | B |
| 64 | Mathilda Ave & Washington Avenue | + | AM | 06/04/15 | E | 32.2 | C- |
| | | | PM | 06/04/15 | | 32.0 | C- |
| 65 | Hollenbeck Avenue & Homestead Road | | AM | 09/15/15 | D | 32.7 | C- |
| | | | PM | 09/15/15 | | 35.5 | D+ |
| 66 | Mary Ave & Homestead Road | | AM | 09/15/15 | D | 25.5 | C |
| | | | PM | 09/15/15 | | 24.8 | C |
| 67 | Bernardo Avenue & Homestead Road | | AM | 09/15/15 | D | 15.5 | B |
| | | | PM | 09/15/15 | | 13.7 | B |
| 68 | SR 85 SB Ramp & Homestead Road | | AM | 09/15/15 | D | 15.4 | B |
| | | | PM | 09/15/15 | | 18.0 | B |
| 69 | Oakmead Pkwy & Arques Ave | | AM | 09/15/15 | D | 21.2 | C+ |
| | | | PM | 09/15/15 | | 23.9 | C |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)

# 3. Future Traffic Conditions

This chapter describes the future traffic conditions expected with the planned growth in the City of Sunnyvale. The land uses, roadway network, and traffic analysis results are presented below. The forecast year for this analysis is 2035.

## Traffic Volumes under Future Conditions

The 2035 forecasts of intersection turning movements were completed using the Sunnyvale Travel Demand Forecasting Model (STFM). The STFM is a mathematical representation of travel within the nine counties in the San Francisco Bay Area, and is focused to represent travel within the City of Sunnyvale. The model uses socioeconomic data, such as number of jobs and households, for different geographic areas (transportation analysis zones) to predict the travel from place to place in the future. The model is adjusted (validated) using year 2013 socioeconomic data supplied by the City of Sunnyvale and VTA to predict existing (year 2013) traffic volume. Model forecasts are compared to actual counts in order to make the adjustments. There are 172 transportation analysis zones within the model to represent the City of Sunnyvale.

The 2035 socioeconomic data are generated by the Association of Bay Area Governments and refined by VTA. The 2035 socioeconomic data within the City of Sunnyvale are based on the recently adopted 2035 Land Use and Transportation Element (LUTE) update, and were supplied by the Sunnyvale Planning Department. Table 3 shows the model inputs for the City of Sunnyvale. For the purposes of this study, the planned future land uses in Sunnyvale assume buildout of the 2035 LUTE update, which will result in a net increase of 15,100 residential units and 42,410 jobs (see Table 3).

The forecast intersection turning movement volumes were adjusted based on the 2013 model run and existing traffic counts. The difference between the 2013 model volume and count was applied to the 2035 raw model turning movements to create the adjusted forecasts (see Figure 4).

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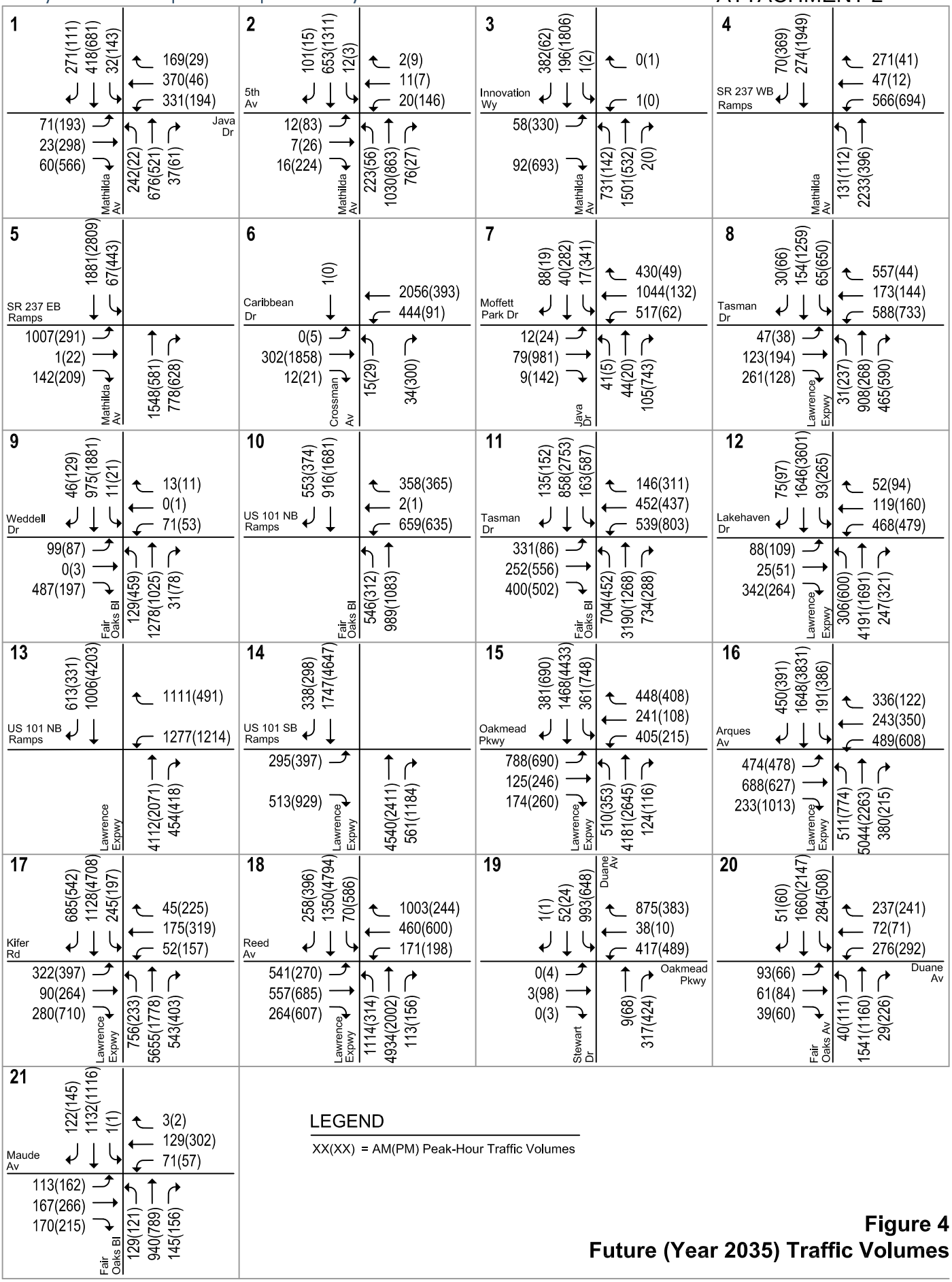



**Figure 4**
**Future (Year 2035) Traffic Volumes**

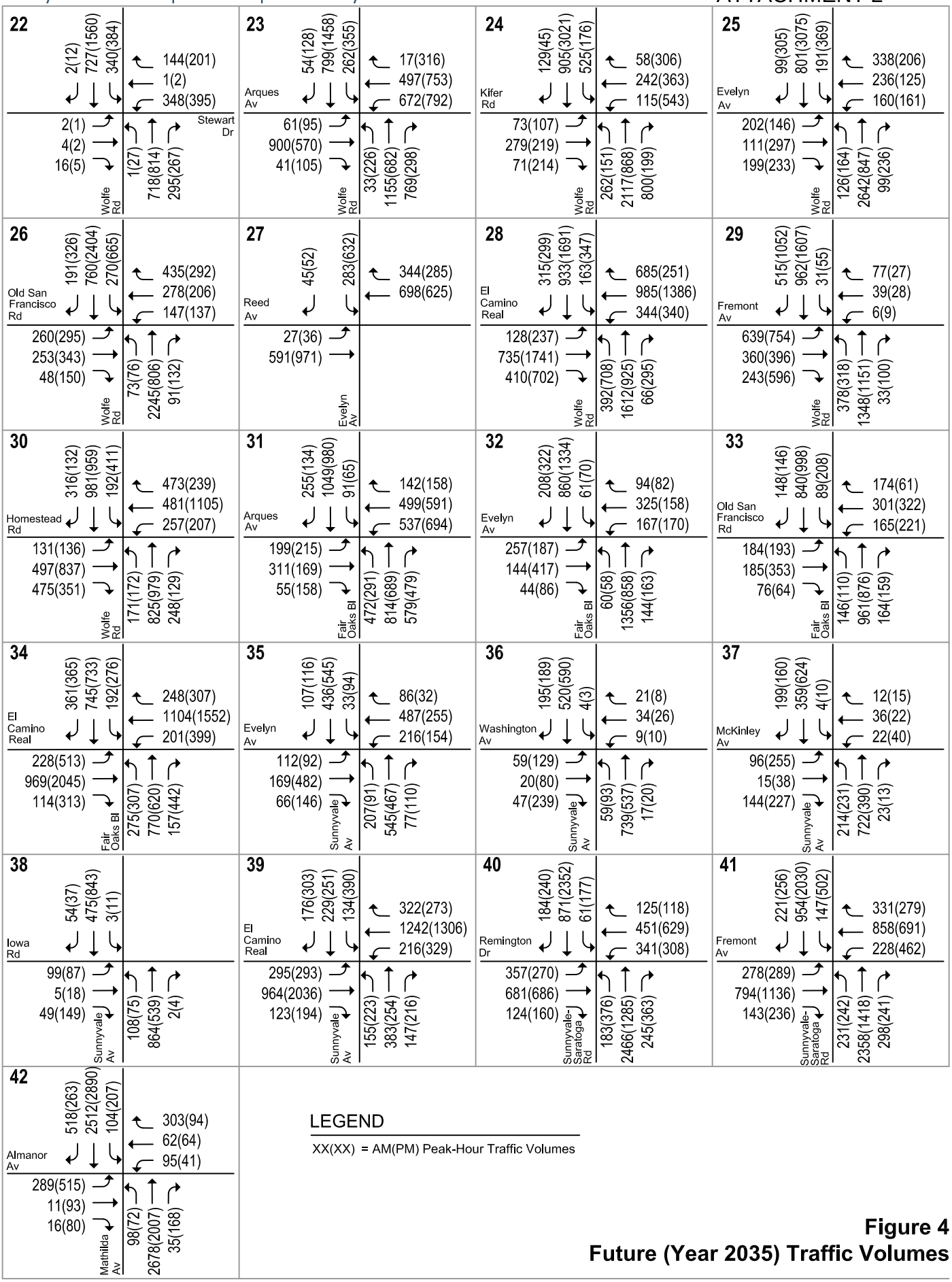
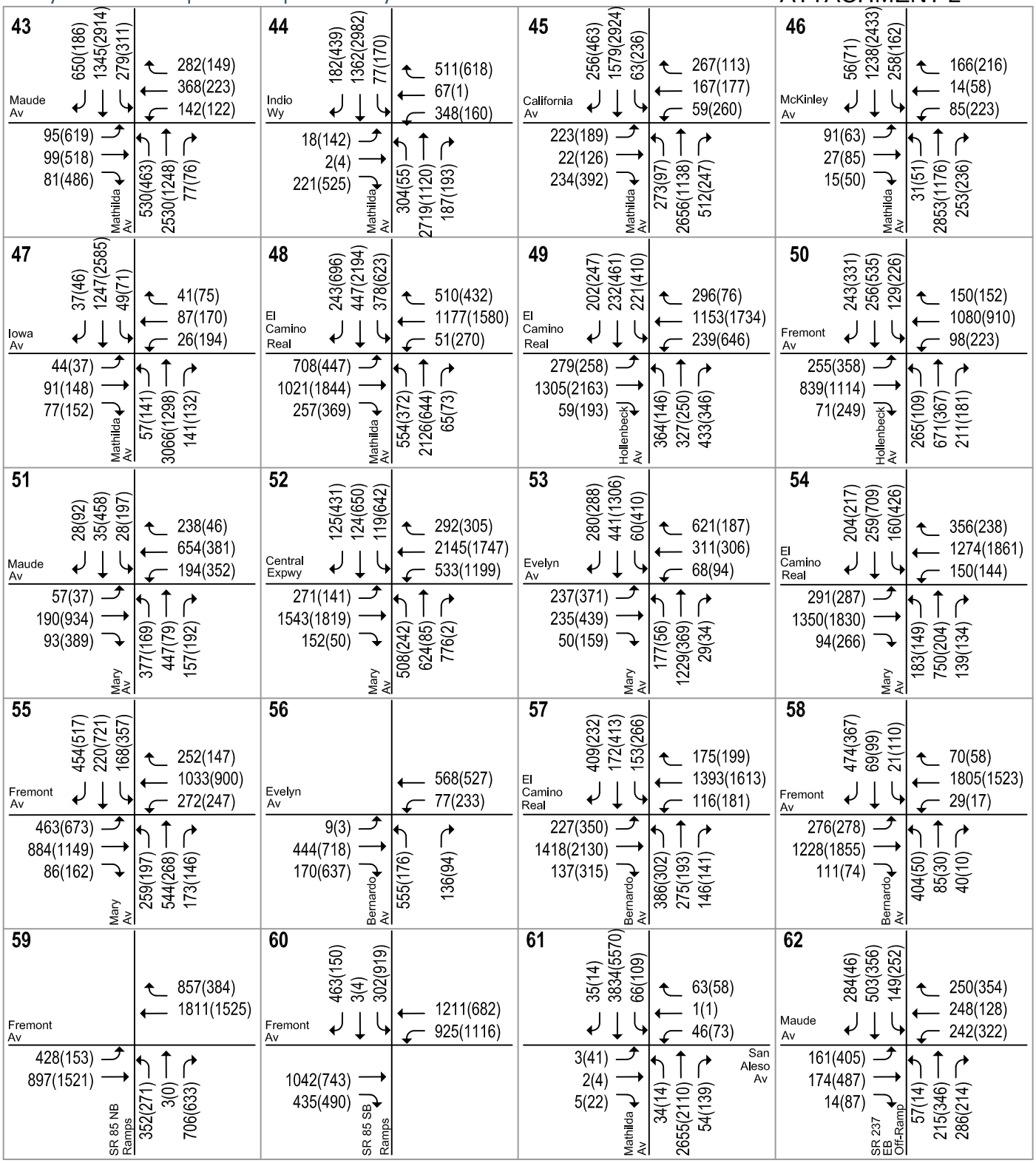


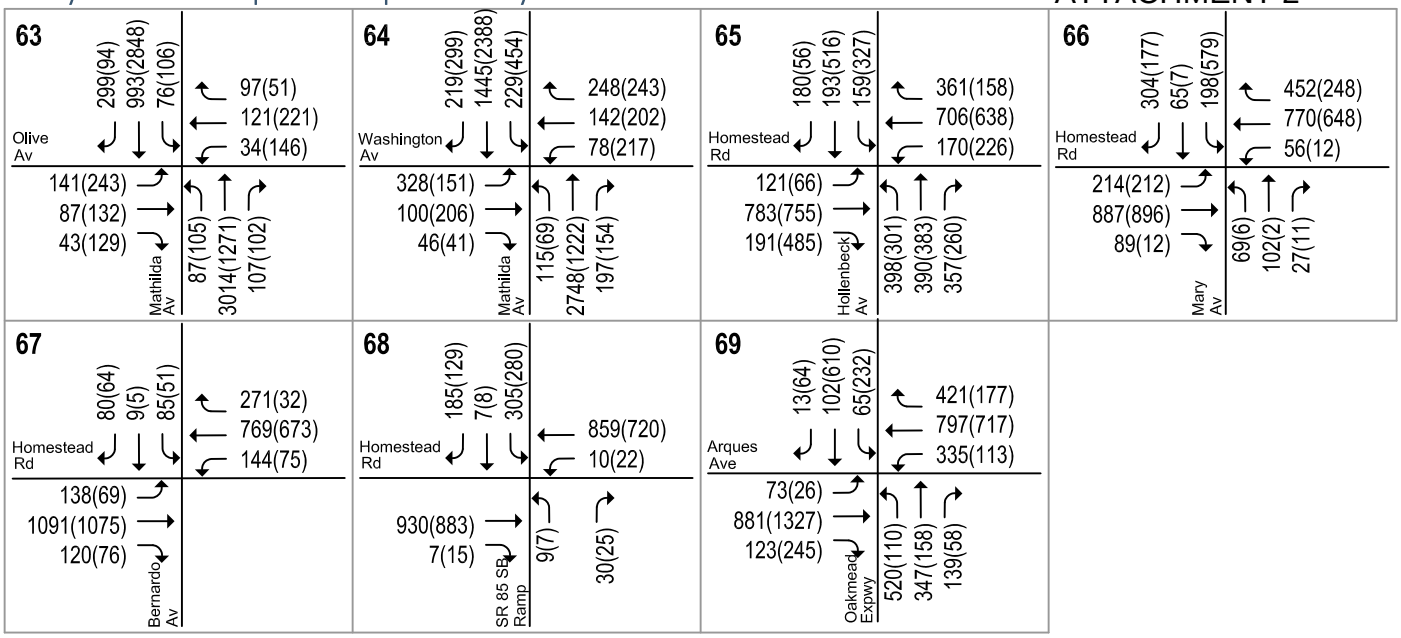

**Figure 4**
**Future (Year 2035) Traffic Volumes**




LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

**Figure 4**
**Future (Year 2035) Traffic Volumes**




LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

**Figure 4**
**Future (Year 2035) Traffic Volumes**

**Table 3**
**2035 Sunnyvale Model Inputs**

| | Sunnyvale | |
|---|---|---|
| | 2013 Existing | Year 2035 |
| Housing Units | 57,000 | 72,100 |
| Population | 147,055 | 174,500 |
| I/O/C Square Feet (million s.f.) [1] | 47.3 | 59.8 |
| Jobs | 82,000 | 124,410 |

Notes:
1. I/O/C = Industrial/Office/Commercial

## Roadway Network under Future Conditions

The STFM includes improvements to the roadway network within and outside of Sunnyvale as part of the Valley Transportation Plan (VTP). Within the City of Sunnyvale, only roadway improvements that are fully funded and will be constructed by outside agencies are included. The improvements included in the STFM are listed below:

- Construct auxiliary lanes on eastbound SR 237 between Mathilda Avenue and Fair Oaks Avenue.
- Extend express lanes on SR 237 to SR 85.
- Construct auxiliary lanes on southbound US 101 between Lawrence Expressway and Great America Parkway, and between Ellis Street and SR 237.
- Construct auxiliary lanes on southbound SR 85 between SR 237 and El Camino Real.
- Widen the ramp from northbound SR 85 to eastbound SR 237 to two lanes. Construct an auxiliary lane on eastbound SR 237 from SR 85 to Middlefield Road.
- Construct a loop on-ramp from westbound Middlefield Road to westbound SR 237. Eliminate the intersection at Middlefield Road and westbound SR 237 off-ramp, and re-align the off-ramp to the intersection on Middlefield Road at Ferguson Drive.
- Construct an auxiliary lane on southbound Lawrence Expressway between the SR 237 loop ramps.
- Construct auxiliary lanes on Central Expressway between Lawrence Expressway and Mary Avenue.
- Widen Central Expressway between Lawrence Expressway and San Tomas Expressway to six lanes.

Proposed intersection improvements in Sunnyvale that are included in the *VTP 2040* and the Santa Clara County *Expressway Plan 2040* but that are not funded are not included in the STFM. Examples of such improvements are the US 101/SR 237/Mathilda interchange reconfiguration, the grade separations along Lawrence Expressway, and the Mary Avenue extension over US 101.

The following intersection improvements that are fully funded or under construction at the time of the intersection counts were assumed under future conditions:

- At the intersection of Java Drive and Crossman Avenue, the southbound leg has been reduced from the existing two through lanes to one through lane.
- At the intersection of Lawrence Expressway and Kifer Road, Kifer Road is planned to be narrowed to one travel lane in each direction. This improvement is part of the planned Kifer road diet under the Lawrence Station Area Plan.
- At the intersection of Lawrence Expressway and Reed Avenue/Monroe Street, the westbound leg has been widened to two through lanes.
- At the intersection of Fair Oaks Avenue and Duane Avenue, the westbound leg has been restriped to include one left-turn lane, one through lane, and one right-turn lane. This improvement is part of the complete street improvement along Duane Avenue between Stewart Drive and Fair Oaks Avenue.
- At the intersection of Sunnyvale Avenue and Evelyn Avenue, the eastbound leg has been restriped to include a dedicated right-turn pocket.

Lane configurations at all other study intersections under future conditions are assumed to be the same as under existing conditions. The intersection lane configurations under future conditions are shown on Figure 5.

## Intersection Levels of Service under Future Conditions

The level of service results for the study intersections under future conditions are summarized in Table 4 and shown on Figure 6. The results show that several of the signalized intersections would operate at unacceptable levels of service under future conditions:

- Mathilda Avenue & SR 237 Westbound Ramps – AM & PM Peak Hours (LOS F)
- Mathilda Avenue & SR 237 Eastbound Ramps – AM & PM Peak Hours (LOS F)
- Crossman Avenue & Java Drive – PM Peak Hour (LOS F)
- Lawrence Expressway & Tasman Drive – AM & PM Peak Hours (LOS F)
- Lawrence Expressway & Lakehaven Drive – AM & PM Peak Hours (LOS F)
- Lawrence Expressway & Oakmead Parkway – AM & PM Peak Hours (LOS F)
- Lawrence Expressway & Arques Avenue – AM & PM Peak Hours (LOS F)
- Lawrence Expressway & Kifer Road – AM & PM Peak Hours (LOS F)
- Lawrence Expressway & Reed Avenue/Monroe Street – AM & PM Peak Hours (LOS F)
- Duane/Stewart & Duane Avenue – AM Peak Hour (LOS E)
- Wolfe Road & Arques Avenue – AM Peak Hour (LOS E)
- Wolfe Road & Kifer Road – AM & PM Peak Hours (LOS F)
- Wolfe Road & Fremont Avenue – AM & PM Peak Hours (LOS E & LOS F, respectively)
- Fair Oaks Avenue & Arques Avenue – AM & PM Peak Hours (LOS F)
- Fair Oaks Avenue & El Camino Real – PM Peak Hour (LOS F)
- Sunnyvale-Saratoga Road & Remington Drive – AM & PM Peak Hours (LOS F)
- Mathilda Avenue & El Camino Real – PM Peak Hour (LOS F)
- Hollenbeck Avenue & El Camino Real – PM Peak Hour (LOS F)
- Mary Avenue & Central Expressway – PM Peak Hour (LOS F)
- Mary Avenue & Fremont Avenue – AM & PM Peak Hours (LOS E & LOS F, respectively)
- SR 85 Northbound Ramp & Fremont Avenue – AM Peak Hour (LOS E)
- SR 85 Southbound Ramp & Fremont Avenue – AM & PM Peak Hours (LOS F)

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Of the intersections that would operate unacceptably under future conditions, the following intersections are already operating at unacceptable levels of service under existing conditions. Therefore, any improvements planned to address traffic operations at these intersections cannot be completely funded by future developments. These intersections are listed below and shown on Figure 6:

- Lawrence Expressway & Arques Avenue
- Lawrence Expressway & Kifer Road
- Lawrence Expressway & Reed Avenue/Monroe Street

The intersections of Mathilda Avenue/SR 237 westbound ramps, and Mathilda Avenue/SR 237 eastbound ramps are closely-spaced intersections with multiple turning movements that operate as a single coordinated signal system. These intersections experience operational issues beyond what is reflected in the typical HCM level of service calculations. The tight intersection spacing, high conflicting traffic volumes within the limited weave points, and lack of vehicular storage between intersections would continue to cause excessive delays and low travel speeds throughout the corridor under future conditions. Therefore, under future conditions, it is assumed that the intersections at the Mathilda/SR 237 interchange would operate at LOS F.

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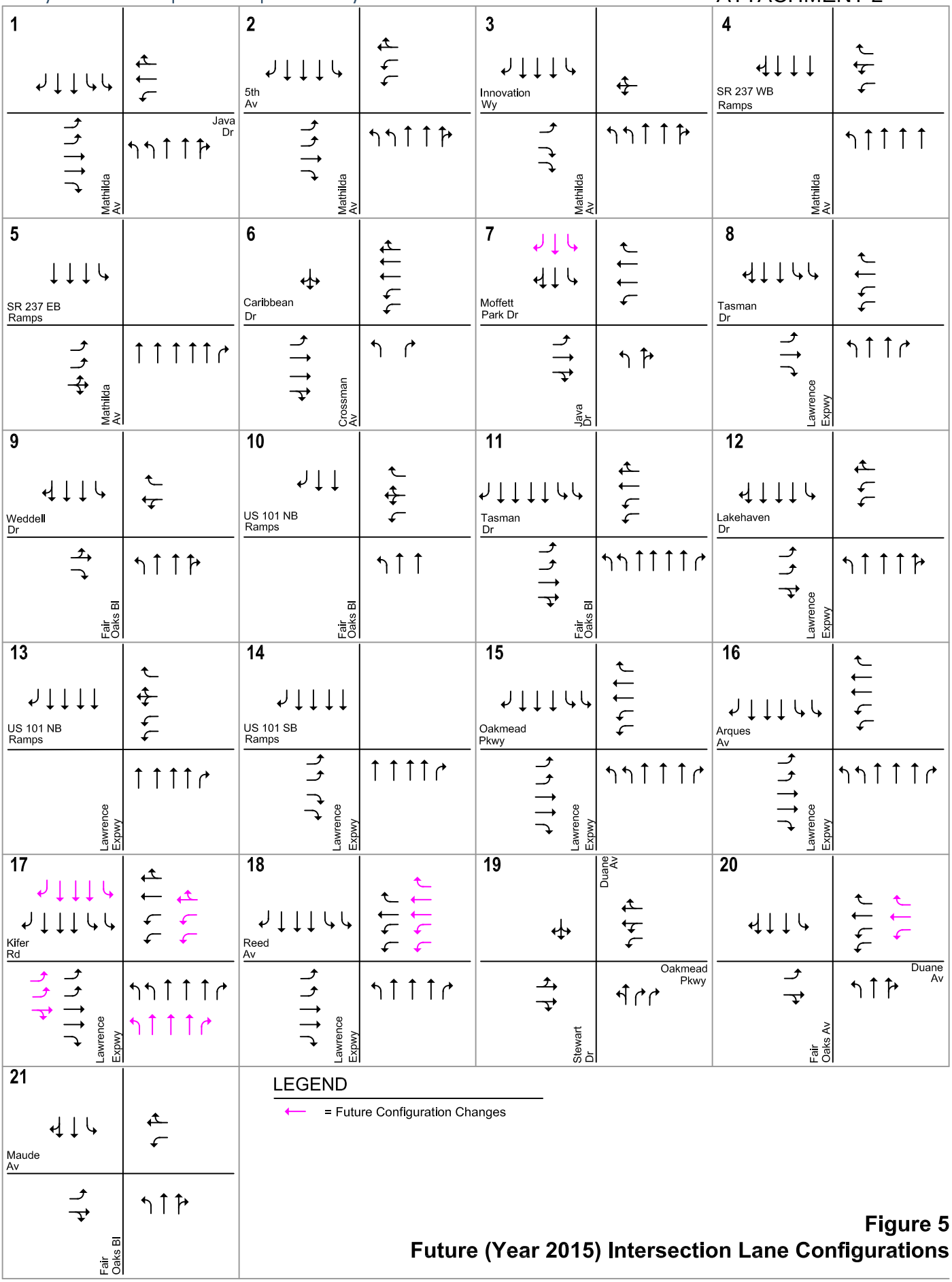



**Figure 5**
**Future (Year 2015) Intersection Lane Configurations**



NORTH
Not to Scale

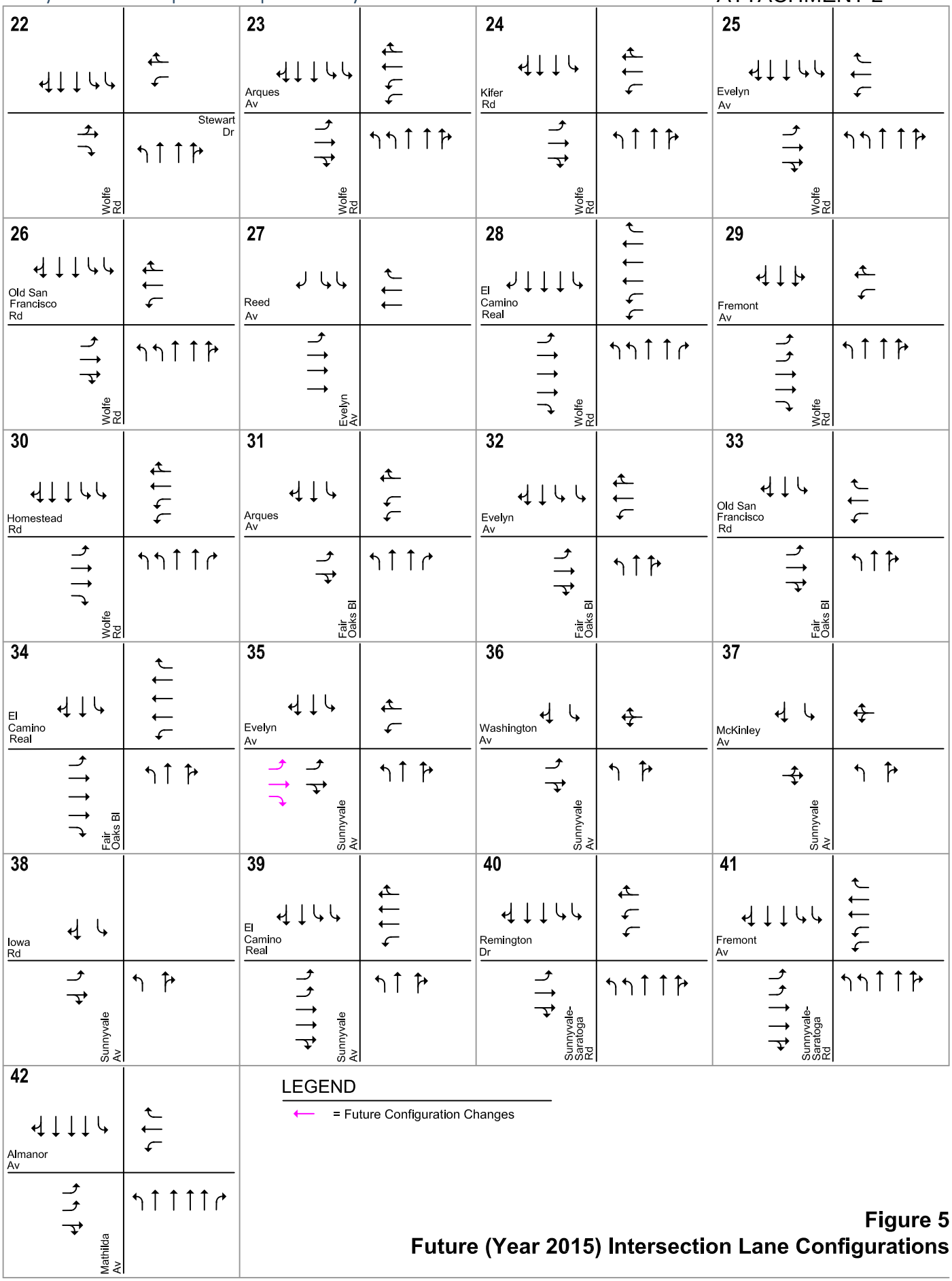
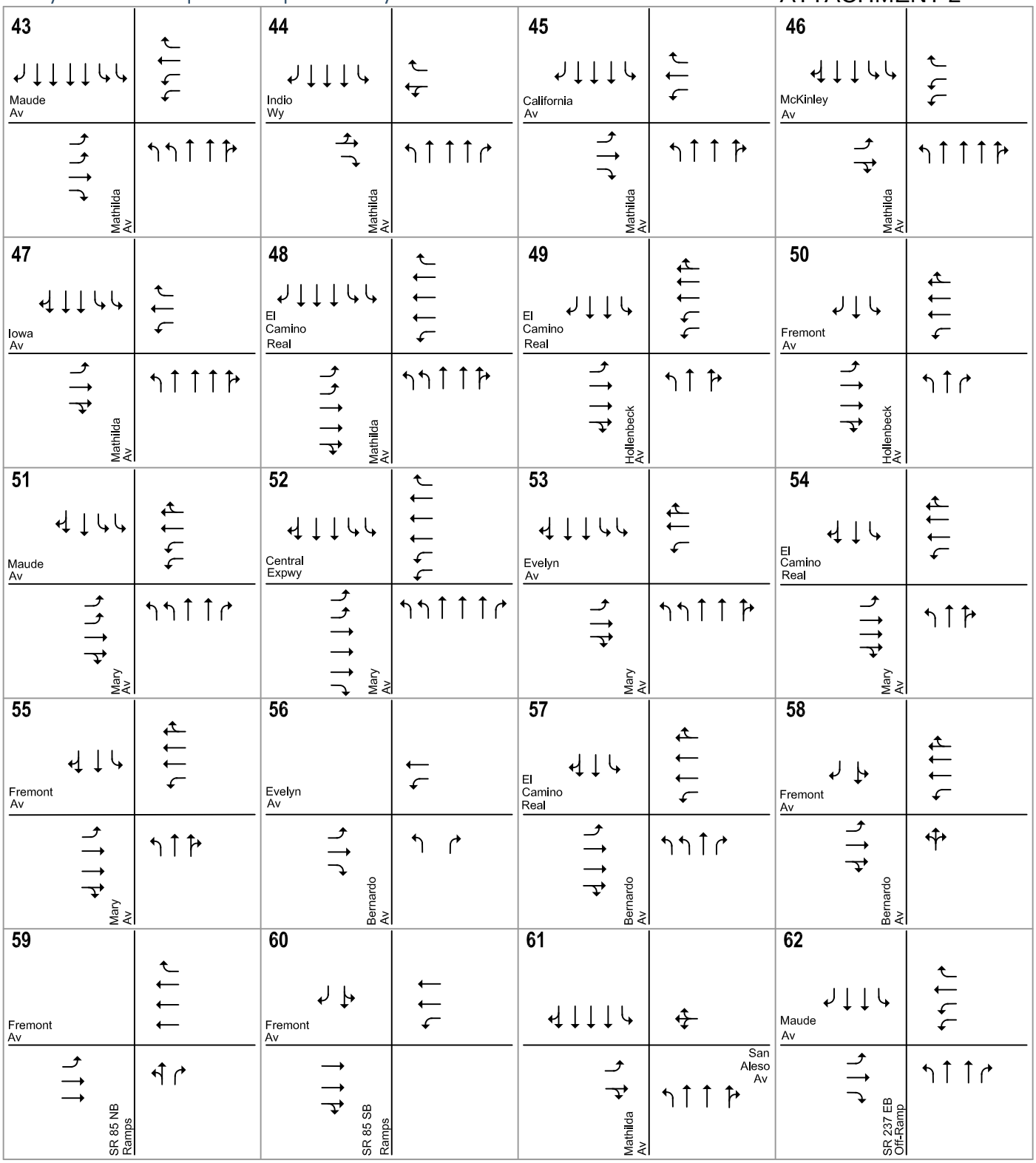


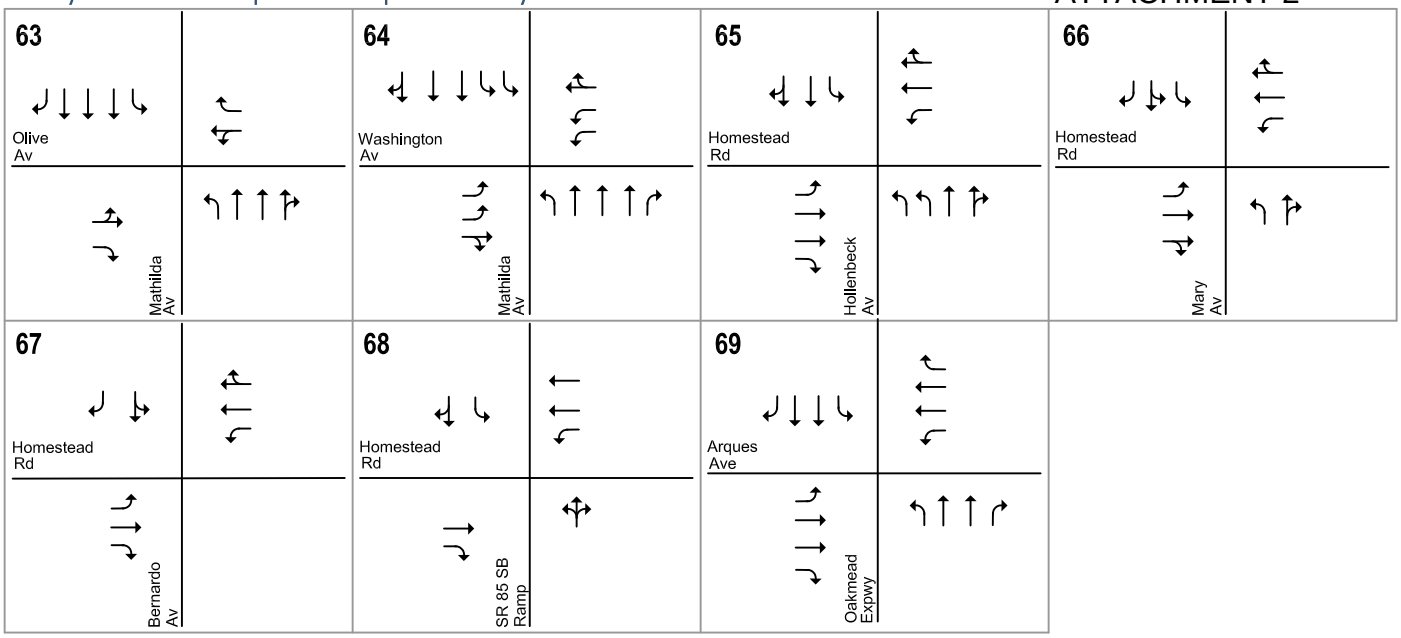

**Figure 5**
**Future (Year 2015) Intersection Lane Configurations**




LEGEND

← = Future Configuration Changes

**Figure 5**
**Future (Year 2015) Intersection Lane Configurations**



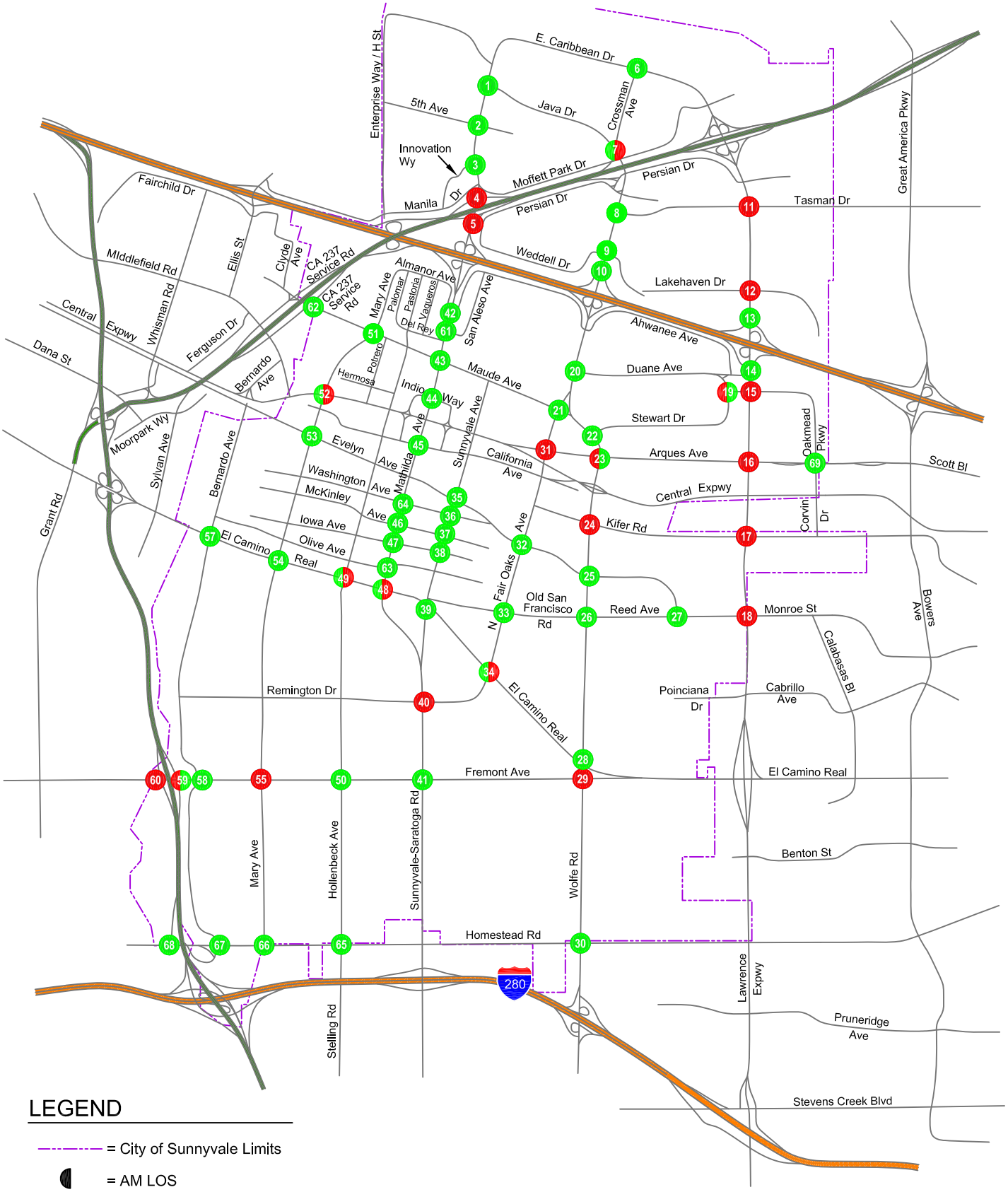

LEGEND

← = Future Configuration Changes

**Figure 5**
**Future (Year 2015) Intersection Lane Configurations**



NORTH
Not to Scale




## LEGEND

- = City of Sunnyvale Limits
- = AM LOS
- = PM LOS
- = Acceptable LOS
- = Unacceptable LOS

**Figure 6**
**Future (Year 2035) Intersection Levels of Service Summary**

NORTH
Not to Scale

**Table 4**
**Future Conditions Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS | Future Conditions Avg. Delay (sec) | Future Conditions LOS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Mathilda Ave & Java Dr | * | AM | 01/00/15 | E | 26.6 | C | 29.1 | C |
| | | | PM | 10/01/14 | | 28.0 | C | 31.5 | C |
| 2 | Mathilda Ave & 5th Ave | + | AM | 06/04/15 | E | 13.5 | B | 15.4 | B |
| | | | PM | 06/04/15 | | 22.1 | C+ | 26.1 | C |
| 3 | Mathilda Ave & Innovation Way | + | AM | 06/04/15 | E | 18.5 | B- | 18.8 | B- |
| | | | PM | 06/04/15 | | 19.8 | B- | 32.4 | C- |
| 4 | Mathilda Ave & SR 237 WB [1] | + | AM | 06/04/15 | E | - | E | - | **F** |
| | | | PM | 06/04/15 | | - | E | - | **F** |
| 5 | Mathilda Ave & SR 237 EB [1] | + | AM | 06/04/15 | E | - | E | - | **F** |
| | | | PM | 06/04/15 | | - | E | - | **F** |
| 6 | Crossman Ave & Caribbean Dr | + | AM | 05/14/15 | E | 10.3 | B+ | 12.7 | B |
| | | | PM | 05/14/15 | | 36.0 | D+ | 21.1 | C+ |
| 7 | Crossman Ave & Java Dr | | AM | 11/00/14 | D | 17.0 | B | 19.9 | B- |
| | | | PM | 11/00/14 | | 29.4 | C | **93.6** | **F** |
| 8 | Fair Oaks Ave & Tasman Dr | | AM | 06/04/15 | D | 17.1 | B | 22.0 | C+ |
| | | | PM | 06/04/15 | | 19.4 | B- | 36.6 | D+ |
| 9 | Fair Oaks Ave & Weddell Dr | | AM | 06/04/15 | D | 19.0 | B- | 25.0 | C |
| | | | PM | 06/04/15 | | 13.8 | B | 12.3 | B |
| 10 | N Fair Oaks Ave & US 101 NB | | AM | 10/00/14 | D | 16.5 | B | 36.9 | D+ |
| | | | PM | 10/00/14 | | 21.0 | C+ | 37.8 | D+ |
| 11 | Lawrence Expwy & Tasman Dr | * | AM | 05/18/15 | E | 40.2 | D | **102.3** | **F** |
| | | | PM | 05/18/15 | | 64.8 | E | **123.6** | **F** |
| 12 | Lawrence Expwy & Lakehaven Dr | + | AM | 05/18/15 | E | 59.6 | E+ | **109.9** | **F** |
| | | | PM | 05/18/15 | | 63.5 | E | **169.8** | **F** |
| 13 | Lawrence Expwy & US 101 NB | + | AM | 05/22/15 | E | 21.7 | C+ | 64.8 | E |
| | | | PM | 05/22/15 | | 24.4 | C | 27.7 | C |
| 14 | Lawrence Expwy & US 101 SB | + | AM | 05/18/15 | E | 15.1 | B | 18.8 | B- |
| | | | PM | 05/18/15 | | 43.1 | D | 36.9 | D+ |
| 15 | Lawrence Expwy & Oakmead Pkwy | + | AM | 05/18/15 | E | 48.7 | D | **163.1** | **F** |
| | | | PM | 05/18/15 | | 57.5 | E+ | **160.4** | **F** |
| 16 | Lawrence Expwy & Arques Ave | * | AM | 05/18/15 | E | 66.6 | E | **158.9** | **F** |
| | | | PM | 05/18/15 | | **95.5** | **F** | **181.9** | **F** |
| 17 | Lawrence Expwy & Kifer Rd | + | AM | 05/18/15 | E | **168.2** | **F** | **295.1** | **F** |
| | | | PM | 05/18/15 | | **81.0** | **F** | **257.7** | **F** |
| 18 | Lawrence Expwy & Reed Ave/Monroe St | * | AM | 05/18/15 | E | **203.1** | **F** | **304.0** | **F** |
| | | | PM | 05/18/15 | | **86.5** | **F** | **149.7** | **F** |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
calculations. The tight intersection spacing, high conflicting traffic volumes within the limited weave points, and lack of vehicular storage between intersections would continue to cause excessive delays and low travel speeds throughout the corridor under future conditions. Therefore, under future conditions, it is assumed that the intersections at the Mathilda/SR 237 interchange would operate at LOS F.
**BOLD** indicates a substandard level of service

**Table 4 (Continued)**
**Future Conditions Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS | Future Conditions Avg. Delay (sec) | Future Conditions LOS |
|---|---|---|---|---|---|---|---|---|---|
| 19 | Duane/Stewart & Duane Ave | | AM | 10/00/14 | D | 31.4 | C | **63.7** | **E** |
| | | | PM | 10/00/14 | | 30.6 | C | 32.6 | C- |
| 20 | N Fair Oaks Ave & Duane Ave | | AM | 10/00/14 | D | 26.3 | C | 37.4 | D+ |
| | | | PM | 10/00/14 | | 32.1 | C- | 52.3 | D- |
| 21 | Fair Oaks Ave & Maude Ave [1] | | AM | N/A | D | 28.6 | C | 33.3 | C- |
| | | | PM | N/A | | 28.5 | C | 36.1 | D+ |
| 22 | Wolfe Rd & Stewart Dr | | AM | 10/00/14 | D | 16.1 | B | 27.0 | C |
| | | | PM | 10/00/14 | | 19.1 | B- | 25.4 | C |
| 23 | Wolfe Rd & Arques Ave | | AM | 10/00/14 | D | 24.8 | C | **70.6** | **E** |
| | | | PM | 10/00/14 | | 28.4 | C | 43.1 | D |
| 24 | Wolfe Rd & Kifer Rd | | AM | 05/00/14 | D | 21.1 | C+ | **83.2** | **F** |
| | | | PM | 05/00/14 | | 26.8 | C | **101.5** | **F** |
| 25 | Wolfe Rd & Evelyn Ave | | AM | 05/00/14 | D | 26.0 | C | 42.8 | D |
| | | | PM | 05/00/14 | | 24.6 | C | 49.6 | D |
| 26 | Wolfe Rd & Reed Ave | | AM | 05/00/14 | D | 28.8 | C | 53.9 | D- |
| | | | PM | 05/00/14 | | 28.8 | C | 48.4 | D |
| 27 | Evelyn Ave & Reed Ave | | AM | 05/14/15 | D | 10.8 | B+ | 11.9 | B+ |
| | | | PM | 05/14/15 | | 18.9 | B- | 18.0 | B |
| 28 | Wolfe Rd & El Camino Real | * | AM | 05/00/14 | E | 49.8 | D | 61.2 | E |
| | | | PM | 09/19/14 | | 55.1 | E+ | 77.0 | E- |
| 29 | Wolfe Rd & Fremont Ave | | AM | 05/00/14 | D | 48.9 | D | **61.9** | **E** |
| | | | PM | 05/00/14 | | 49.8 | D | **91.7** | **F** |
| 30 | Wolfe Rd & Homestead Rd | | AM | 05/00/14 | D | 30.9 | C | 34.0 | C- |
| | | | PM | 05/00/14 | | 31.9 | C | 42.9 | D |
| 31 | Fair Oaks Ave & Arques Ave | | AM | 05/14/15 | D | 29.7 | C | **105.4** | **F** |
| | | | PM | 05/14/15 | | 34.4 | C- | **80.3** | **F** |
| 32 | N Fair Oaks Ave & Evelyn Ave | | AM | 05/14/15 | D | 28.1 | C | 31.2 | C |
| | | | PM | 05/14/15 | | 26.7 | C | 30.8 | C |
| 33 | N Fair Oaks Ave & Old San Francisco | | AM | 05/14/15 | D | 35.4 | D+ | 43.2 | D |
| | | | PM | 05/14/15 | | 36.7 | D+ | 47.3 | D |
| 34 | Fair Oaks Ave & El Camino Real | * | AM | 05/00/14 | E | 34.9 | C- | 46.4 | D |
| | | | PM | 10/15/14 | | 39.3 | D | **118.9** | **F** |
| 35 | Sunnyvale Ave & Evelyn Ave | + | AM | 05/14/15 | E | 24.6 | C | 34.0 | C- |
| | | | PM | 05/14/15 | | 27.9 | C | 30.7 | C |
| 36 | Sunnyvale Ave & Washington Ave | + | AM | 05/14/15 | E | 17.7 | B | 12.7 | B |
| | | | PM | 05/14/15 | | 20.3 | C+ | 24.3 | C |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
1. Existing volumes for the Fair Oaks/Maude intersection is extrapolated based on 2013 counts.
**BOLD** indicates a substandard level of service

**Table 4 (Continued)**
**Future Conditions Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS | Future Conditions Avg. Delay (sec) | Future Conditions LOS |
|---|---|---|---|---|---|---|---|---|---|
| 37 | Sunnyvale Ave & McKinley Ave | + | AM | 05/14/15 | E | 15.3 | B | 23.1 | C |
| | | | PM | 05/14/15 | | 15.8 | B | 48.2 | D |
| 38 | Sunnyvale Ave & Iowa Ave | + | AM | 05/14/15 | E | 12.8 | B | 13.6 | B |
| | | | PM | 05/14/15 | | 16.0 | B | 17.4 | B |
| 39 | Sunnyvale Ave & El Camino Real | + | AM | 05/14/15 | E | 23.3 | C | 30.2 | C |
| | | | PM | 05/14/15 | | 30.0 | C | 50.2 | D |
| 40 | Sunnyvale-Saratoga Rd & Remington Dr | * | AM | 05/14/15 | E | 42.2 | D | **95.6** | **F** |
| | | | PM | 09/19/14 | | 45.8 | D | **121.4** | **F** |
| 41 | Sunnyvale-Saratoga Rd & Fremont Ave | * | AM | 05/00/14 | E | 34.7 | C- | 42.4 | D |
| | | | PM | 10/01/14 | | 45.7 | D | 62.9 | E |
| 42 | Mathilda Ave & Almanor Ave | + | AM | 06/04/15 | E | 17.1 | B | 32.3 | C- |
| | | | PM | 06/04/15 | | 27.1 | C | 34.8 | C- |
| 43 | Mathilda Ave & Maude Ave | * | AM | 06/04/15 | E | 39.0 | D+ | 42.8 | D |
| | | | PM | 09/18/14 | | 40.4 | D | 54.3 | D- |
| 44 | Mathilda Ave & Indio Way | + | AM | 06/04/15 | E | 24.5 | C | 37.4 | D+ |
| | | | PM | 06/04/15 | | 24.9 | C | 33.9 | C- |
| 45 | Mathilda Ave & California | + | AM | 06/04/15 | E | 19.9 | B- | 37.8 | D+ |
| | | | PM | 06/04/15 | | 25.3 | C | 46.8 | D |
| 46 | Mathilda Ave & McKinley Ave | + | AM | 06/04/15 | E | 15.1 | B | 20.2 | C+ |
| | | | PM | 06/04/15 | | 16.4 | B | 22.5 | C+ |
| 47 | Mathilda Ave & Iowa Ave | + | AM | 06/04/15 | E | 13.1 | B | 14.6 | B |
| | | | PM | 06/04/15 | | 16.7 | B | 28.9 | C |
| 48 | Mathilda Ave & El Camino Real | * | AM | 06/04/15 | E | 44.0 | D | 68.7 | E |
| | | | PM | 09/18/14 | | 48.4 | D | **92.6** | **F** |
| 49 | Hollenbeck Ave & El Camino Real | + | AM | 05/14/15 | E | 27.9 | C | 42.3 | D |
| | | | PM | 05/14/15 | | 28.9 | C | **93.2** | **F** |
| 50 | Hollenbeck Ave & Fremont Ave | | AM | 05/00/14 | D | 34.6 | C- | 43.8 | D |
| | | | PM | 05/00/14 | | 36.7 | D+ | 42.9 | D |
| 51 | Mary Ave & Maude Ave | | AM | 05/14/15 | D | 25.8 | C | 28.3 | C |
| | | | PM | 05/14/15 | | 29.1 | C | 35.2 | D+ |
| 52 | Mary Ave & Central Expwy | * | AM | 05/22/15 | E | 50.0 | D | 76.3 | E- |
| | | | PM | 05/22/15 | | 61.6 | E | **155.6** | **F** |
| 53 | Mary Ave & Evelyn Ave | | AM | 05/14/15 | D | 30.0 | C | 38.8 | D+ |
| | | | PM | 05/14/15 | | 30.3 | C | 34.2 | C- |
| 54 | Mary Ave & El Camino Real | * | AM | 05/14/15 | E | 37.3 | D+ | 43.2 | D |
| | | | PM | 09/19/14 | | 37.8 | D+ | 54.4 | D- |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
**BOLD** indicates a substandard level of service

**Table 4 (Continued)**
**Future Conditions Intersection Levels of Service**

| # | Intersection | CMP | Peak Hour | Count Date | LOS Std. | Existing Avg. Delay (sec) | Existing LOS | Future Conditions Avg. Delay (sec) | Future Conditions LOS |
|---|---|---|---|---|---|---|---|---|---|
| 55 | Mary Ave & Fremont Ave | | AM | 05/00/14 | D | 41.8 | D | **62.8** | **E** |
| | | | PM | 05/00/14 | | 42.0 | D | **90.0** | **F** |
| 56 | Bernardo Ave & Evelyn Ave | | AM | 05/12/15 | D | 24.3 | C | 25.7 | C |
| | | | PM | 05/12/15 | | 19.0 | B- | 18.5 | B- |
| 57 | Bernardo Ave & El Camino Real | + | AM | 05/14/15 | E | 40.1 | D | 42.6 | D |
| | | | PM | 05/14/15 | | 35.6 | D+ | 46.0 | D |
| 58 | Bernardo Ave & Fremont Ave | | AM | 05/00/14 | D | 26.6 | C | 31.9 | C |
| | | | PM | 05/00/14 | | 22.6 | C+ | 25.4 | C |
| 59 | SR 85 NB & Fremont Ave | | AM | 05/00/14 | D | 30.3 | C | **62.2** | **E** |
| | | | PM | 05/00/14 | | 26.6 | C | 30.8 | C |
| 60 | SR 85 SB & Fremont Ave | | AM | 05/00/14 | D | 37.5 | D+ | **84.4** | **F** |
| | | | PM | 05/00/14 | | 31.6 | C | **204.2** | **F** |
| 61 | Mathilda Ave & San Aleso Ave | + | AM | 06/04/15 | E | 12.6 | B | 15.2 | B |
| | | | PM | 06/04/15 | | 17.3 | B | 30.2 | C |
| 62 | SR 237 Service Road & Maude Ave | | AM | 09/15/15 | D | 29.2 | C | 33.2 | C- |
| | | | PM | 09/15/15 | | 34.7 | C- | 41.0 | D |
| 63 | Mathilda Ave & Olive Ave | + | AM | 06/04/15 | E | 13.7 | B | 21.3 | C+ |
| | | | PM | 06/04/15 | | 16.9 | B | 31.1 | C |
| 64 | Mathilda Ave & Washington Avenue | + | AM | 06/04/15 | E | 32.2 | C- | 52.4 | D- |
| | | | PM | 06/04/15 | | 32.0 | C- | 49.4 | D |
| 65 | Hollenbeck Avenue & Homestead Road | | AM | 09/15/15 | D | 32.7 | C- | 34.3 | C- |
| | | | PM | 09/15/15 | | 35.5 | D+ | 40.2 | D |
| 66 | Mary Ave & Homestead Road | | AM | 09/15/15 | D | 25.5 | C | 26.1 | C |
| | | | PM | 09/15/15 | | 24.8 | C | 29.2 | C |
| 67 | Bernardo Avenue & Homestead Road | | AM | 09/15/15 | D | 15.5 | B | 17.6 | B |
| | | | PM | 09/15/15 | | 13.7 | B | 14.5 | B |
| 68 | SR 85 SB Ramp & Homestead Road | | AM | 09/15/15 | D | 15.4 | B | 32.6 | C- |
| | | | PM | 09/15/15 | | 18.0 | B | 28.2 | C |
| 69 | Oakmead Pkwy & Arques Ave | | AM | 09/15/15 | D | 21.2 | C+ | 39.4 | D |
| | | | PM | 09/15/15 | | 23.9 | C | 26.2 | C |

Notes:
* Denotes CMP intersection (LOS E threshold)
+ Denotes an intersection on a CMP roadway (LOS E threshold)
**BOLD** indicates a substandard level of service

# 4. Recommended Roadway Improvements

This chapter identifies the roadway and intersection improvements that would be necessary to maintain acceptable transportation conditions, as defined by current level of service policy, with buildout of the planned future land uses. The improvements to be funded by the Traffic Impact Fee is shown on Tables 5 and 6, and discussed in detail below. Improvement project costs are taken from the Santa Clara County Expressway Plan, Valley Transportation Plan 2040, as available. Improvement project costs for the remaining projects were provided by City staff or estimated by Hexagon.

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## Table 5
## Recommended Roadway Improvements

| Improvement | Total Cost | Funding Sources | | | Sunnyvale Funding Attributable to Future Growth | | |
|---|---|---|---|---|---|---|---|
| | | % External Funding | External Contribution | City Contribution | % Responsibility | Note | Traffic Impact Fee |
| ***Expressway Improvements*** | | | | | | | |
| Mary/Central Intersection add 3rd westbound left-turn lane [1] | $ 1,500,000 | 80% | $ 1,200,000 | $ 300,000 | 100% | | $ 300,000 |
| Lawrence Grade Separations at Reed/Monroe, Kifer, and Arques [2] | $ 440,000,000 | 90% | $ 396,000,000 | $ 44,000,000 | 30% | [6] | $ 13,200,000 |
| Lawrence/Oakmead Grade Separation [1] | $ 60,000,000 | 80% | $ 48,000,000 | $ 12,000,000 | 100% | | $ 12,000,000 |
| Lawrence/Lakewood Intersection Signalization [4] | $ 5,800,000 | 50% | $ 2,900,000 | $ 2,900,000 | 100% | | $ 2,900,000 |
| Lawrence/Tasman Depress LRT under intersection [1] | $ 23,600,000 | 80% | $ 18,880,000 | $ 4,720,000 | 100% | | $ 4,720,000 |
| ***Mathilda Corridor Improvements*** | | | | | | | |
| Mathilda/SR237, Mathilda/US 101 Interchange Reconfiguration [1] | $ 40,000,000 | 80% | $ 32,000,000 | $ 8,000,000 | 100% | | $ 8,000,000 |
| Mary Avenue Extension [3] | $ 78,000,000 | 70% | $ 54,600,000 | $ 23,400,000 | 100% | | $ 23,400,000 |
| ***Citywide Intersection Improvements*** | | | | | | | |
| Caltrain Grade Separation at Mary Avenue and at Sunnyvale Avenue [1] | $ 180,000,000 | 80% | $ 144,000,000 | $ 36,000,000 | 40% | [7] | $ 14,400,000 |
| ITS projects (including Mathilda Avenue) [4] | $ 20,000,000 | 50% | $ 10,000,000 | $ 10,000,000 | 100% | | $ 10,000,000 |
| Future Traffic Signal Construction [5] | $ 10,000,000 | 20% | $ 2,000,000 | $ 8,000,000 | 100% | | $ 8,000,000 |
| Intersection Improvements [5] | $ 13,000,000 | 20% | $ 2,600,000 | $ 10,400,000 | 100% | | $ 10,400,000 |
| ***Bicycle and Pedestrian Facilities*** | | | | | | | |
| Complete Bike Network [4] | $ 10,000,000 | 50% | $ 5,000,000 | $ 5,000,000 | 100% | | $ 5,000,000 |
| Bernardo.Caltrain Bike-Ped Undercrossing [1] | $ 9,400,000 | 80% | $ 7,520,000 | $ 1,880,000 | 100% | | $ 1,880,000 |
| Complete Sidewalks | $ 9,800,000 | 0% | $ - | $ 9,800,000 | 100% | | $ 9,800,000 |
| Pedestrian Facility Improvements [4] | $ 5,000,000 | 50% | $ 2,500,000 | $ 2,500,000 | 100% | | $ 2,500,000 |
| | | | | **Total Cost** | | | **$ 126,500,000** |

Notes:

1. The City of Sunnyvale will contribue 20% towards the identified regional projects.
2. The City of Sunnyvale will contribute 10% towards the identified Lawrence Expressway grade separation projects.
3. The City of Sunnyvale will contribute 30% towards the cost for the Mary Avenue extension project.
4. The City of Sunnyvale will contribute 50% towards the cost for the the Lawrence/Lakewood intersection signalization, City-wide ITS projects and City-wide pedestrian and bicycle improvements.
5. The City of Sunnyvale will contribute 80% towards the cost for the City-wide intersection improvements.
6. These three intersections are operating at an unacceptable LOS F under existing conditions. Therefore, new development fair share equals traffic added by new developments. Based on the Sunnyvale Travel Demand Forecast Model, new development added traffic would be approximatley 32% of future traffic volume at these three intersections.
7. The Caltrain Grade Separation projects are designed to address existing issues. Therefore, new development fair share equals traffic added by new developments on the north legs of the two intersections (the leg affected by Caltrain). Based on the Sunnyvale Travel Demand Forecast Model, new developments added traffic at the north legs of the two intersections would be approximately 40% of future traffic volume at the north legs.

**Table 6**
**Recommended Intersection Improvement Cost Breakdown**

| Intersection | Improvement | Estimated Cost [1] |
|---|---|---|
| Duane/Stewar & Duane Ave | Widen westbound to include two right-turn lanes, one shared through-left lane and one left-turn lane | $ 700,000 |
| Wolfe Rd & Arques Ave | Restripe northbound to include one left-turn lane, two through lanes, and two right-turn lanes | $ 100,000 |
| Wolfe Rd & Kifer Rd | Widen intersection to accommodate two left-turn lanes on all approaches | $ 2,800,000 |
| Wolfe Rd & Fremont Ave | Mitigation measure from Wolfe Road traffic study | $ 5,500,000 |
| Fair Oaks Ave & Arques Ave | Widen eastbound to include a dedicated right-turn lane | $ 300,000 |
| Fair Oaks Ave & El Camino Real | Widen eastbound and westbound to include a second left-turn lane | $ 2,100,000 |
| Sunnyvale-Saratoga Rd & Remington Dr | Widen northbound and westbound to include a dedicated right-turn lane | $ 600,000 |
| Hollenbeck Ave & El Camino Real | Restripe southbound to include two left-turn, one through, and one shared through-right lane | $ 100,000 |
| SR 85 Northbound Ramps & Fremont Ave | Modify the SR 85 northbound off-ramp | $ 200,000 |
| SR 85 Southbound Ramps & Fremont Ave | Modify the SR 85 southbound off-ramp | $ 200,000 |
| | **Total Cost (rounded to the nearest million)** | **$ 13,000,000** |

Notes:
1. Cost estimates were based on Year 2015 economic conditions with a 40% contingency included.

## Expressway Improvements

As shown in Table 4 above in Chapter 3, seven expressway intersections are forecast to operate at unacceptable levels of service by City standards under future conditions. The discussion below identifies the needed improvements at these intersections.

### Lawrence Expressway & Tasman Drive (#11)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 3 project to depress the light rail tracks under the intersection. At the time of this report, there are no finalized plans for this improvement. It is assumed that the finalized reconfiguration plan would restore intersection operations to an acceptable level of service.

**Responsibility:** It is assumed that 80% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the improvement funding. Since this intersection is operating at acceptable levels of service under existing conditions, future developments within Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

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### Lawrence Expressway & Lakehaven Drive (#12)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** To restore intersection levels of service to acceptable levels, the required at-grade improvement would displace homes and businesses. The County of Santa Clara, which has jurisdiction over the intersection, currently has no plans to grade-separate this intersection. This intersection currently experiences long queues in the northbound left turn lane, which is partially caused by vehicles entering Lawrence Expressway from Bridgewood Way. The traffic consists of local residents and visitors from the Mercado Shopping Center on Wildwood Avenue. Since these vehicles cannot make a left turn directly onto Lawrence Expressway from Bridgewood Way, vehicles wishing to proceed southbound on Lawrence Expressway must turn right and make a U-turn at the intersection of Lawrence Expressway and Lakehaven Drive/Sandia Avenue, contributing to the long queues in the left turn lane. While currently manageable, the queue is expected to grow to unacceptable levels in the future due to expected growth in the area. Therefore, Sunnyvale plans to convert the Lawrence Expressway/Bridgewood Way intersection into a signalized four-way intersection. This will make it possible to make a left turn directly from Bridgewood Way onto Lawrence Expressway. It is expected that the signal at Bridgewood Way would partially improve the intersection operations at the Lakehaven Drive intersection.

**Responsibility:** It is assumed that 50% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 50% towards the improvement funding. Since this intersection is operating at acceptable levels of service under existing conditions, future developments within Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

### Lawrence Expressway & Oakmead Parkway (#15)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 3 project to grade separate this intersection. At the time of this report, there are no finalized plans for this improvement. It is assumed that the finalized reconfiguration plan would restore intersection operations to an acceptable level of service.

**Responsibility:** It is assumed that 80% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the improvement funding. Since this intersection is operating at acceptable levels of service under existing conditions, future developments within Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

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### Lawrence Expressway & Arques Avenue (#16)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 1 project to grade separate this intersection. At the time of this report, there are no finalized plans for this improvement. It is assumed that the finalized reconfiguration plan would restore intersection operations to an acceptable level of service.

**Responsibility:** It is assumed that 90% of the funding for this improvement would come from external sources such as federal/state grants. It is expected that the City of Sunnyvale would contribute 10% towards the improvement funding. Since this intersection is operating at unacceptable levels of service under existing conditions, the identified improvement cannot be fully funded by future developments. A select link analysis in the STFM determined that 32% of the total traffic at this intersection is generated by future developments within the City of Sunnyvale. Therefore, future developments would be responsible for 32% of Sunnyvale's share.

### Lawrence Expressway & Kifer Road (#17)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 1 project to grade separate this intersection. At the time of this report, there are no finalized plans for this improvement. It is assumed that the finalized reconfiguration plan would restore intersection operations to an acceptable level of service.

**Responsibility:** It is assumed that 90% of the funding for this improvement would come from external sources such as federal/state grants. It is expected that the City of Sunnyvale would contribute 10% towards the improvement funding. Since this intersection is operating at unacceptable levels of service under existing conditions, the identified improvement cannot be fully funded by future developments. A select link analysis in the STFM determined that 32% of the total traffic at this intersection is generated by future developments within the City of Sunnyvale. Therefore, future developments would be responsible for 32% of Sunnyvale's share.

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### Lawrence Expressway & Reed Avenue/Monroe Street (#18)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 1 project to grade separate this intersection. At the time of this report, there are no finalized plans for this improvement. It is assumed that the finalized reconfiguration plan would restore intersection operations to an acceptable level of service.

**Responsibility:** It is assumed that 90% of the funding for this improvement would come from external sources such as federal/state grants. It is expected that the City of Sunnyvale would contribute 10% towards the improvement funding. Since this intersection is operating at unacceptable levels of service under existing conditions, the identified improvement cannot be fully funded by future developments. A select link analysis in the STFM determined that 32% of the total traffic at this intersection is generated by future developments within the City of Sunnyvale. Therefore, future developments would be responsible for 32% of Sunnyvale's share.

### Mary Avenue & Central Expressway (#52)

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during the PM peak hour. The needed improvement is discussed below:

**Improvement:** The August 2015 update of the *County of Santa Clara Expressway Plan 2040* identified a Tier 3 project to install a third westbound left-turn lane on Central Expressway. This improvement would partially improve the intersection operations under future conditions.

**Responsibility:** It is assumed that 80% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the improvement funding. Since this intersection is operating at acceptable levels of service under existing conditions, future developments within Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

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# Intersection Improvements

## Improvements at Intersections with Unacceptable LOS

As shown in Table 4 above in Chapter 3, 15 intersections are forecast to operate at unacceptable levels of service by City standards under future conditions. No feasible improvements are identified for the following two intersections:

- Mathilda Avenue & El Camino Real (#48)
- Mary Avenue & Fremont Avenue (#55)

The discussion below identifies the needed improvements at the remaining 13 intersections. The City of Sunnyvale routinely gets grants to improve intersection operations. It is assumed that, in general, the City of Sunnyvale would be able to receive grants to cover 20% of the cost of the intersection improvements listed below. The City of Sunnyvale expects to contribute 80% towards the improvement funding. All the intersections needing improvements below are operating at acceptable levels of service under existing conditions (see Table 2). Therefore, future developments within the City of Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share. The improvement funding contributions for the Mathilda Avenue and SR 237 ramps are different and are described in detail below.

**Mathilda Avenue & SR 237 Ramps**

Under future conditions, the intersections at the Mathilda Avenue and SR 237 ramps are forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The Valley Transportation Plan 2040 identifies a project to reconstruct the Mathilda/US 101 and Mathilda/SR 237 interchange area (VTP ID: H33). The identified project is expected to help alleviate traffic congestion along Mathilda Avenue at the SR 237 interchanges.

The recently adopted 2035 Land Use and Transportation Element (LUTE) includes extending Mary Avenue from its current terminus at Almanor Avenue over the SR 237/US 101 interchange to connect with Enterprise Way in the Moffett Park business area. It is anticipated that the Mary Avenue extension would divert a portion of the Moffett Park traffic from Mathilda Avenue to Mary Avenue, thus helping alleviate the traffic congestion along Mathilda Avenue at the US 101 and SR 237 interchanges.

**Responsibility:** It is assumed that 80% of the funding for the Mathilda interchange reconfiguration project and 70% of the funding for the Mary Avenue extension project would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the Mathilda interchange reconfiguration improvement funding and 30% towards the Mary Avenue extension improvement funding. Since the intersections are operating at acceptable levels of service under existing conditions, future developments within Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

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**Crossman Avenue & Java Drive (#7)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during the PM peak hour. The unacceptable LOS F is mainly due to traffic avoiding using Mathilda Avenue to exit the Moffett Park area. It is expected that the above mentioned Mathilda Avenue/US 101/SR 237 interchange reconfiguration project, as well as the Mary Avenue extension project, would improve vehicle circulation along Mathilda Avenue and keep the diverted traffic on Mathilda Avenue. As a result, it is expected that the Mathilda interchange reconfiguration project and the Mary Avenue extension project would restore intersection operations at Crossman Avenue and Java Drive to acceptable conditions. Intersection improvements are thus not needed at the intersection of Crossman Avenue and Java Drive.

**Duane Avenue/Stewart Drive & Duane Avenue (#19)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS E during the AM peak hour. The needed improvement is discussed below:

**Improvement:** The westbound leg would require restriping to include one left-turn lane, one shared through-right lane, and two right-turn lanes. Right-of-way acquisition would be required. This improvement would restore intersection operations to acceptable levels of service under future conditions.

**Wolfe Road & Arques Avenue (#23)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS E during the AM peak hour. The needed improvement is discussed below:

**Improvement:** The westbound leg would require restriping to include one left-turn lane, one shared through-right lane, and one right-turn lane. Alternatively, the intersection could be converted to a two-lane roundabout. Right-of-way acquisition would be required with either improvement option. This improvement would restore intersection operations to acceptable levels of service under future conditions.

**Wolfe Road & Kifer Road (#24)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** This intersection would require widening on all approaches to accommodate two left-turn lanes. Right-of-way acquisition would be required. This improvement would restore intersection operations to acceptable levels of service under future conditions.

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**Wolfe Road & Fremont Avenue (#29)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS E during the AM peak hour and at an unacceptable LOS F during the PM peak hour. The needed improvement is discussed below:

**Improvement:** According to the *Wolfe Road Corridor Traffic Improvement Study*, prepared by Kimley Horn, dated February 2016, Wolfe Road between Homestead Road and El Camino Real is recommended for multimodal improvements to improve vehicle operations as well as bicycle and pedestrian facilities. At the time of this report, the multimodal improvements have not been finalized. Potential improvement alternatives include removal of on-street parking along Wolfe Road to improve bicycle facilities, narrowing Wolfe Road to two lanes in each direction, modifying and coordinating the signals on Wolfe Road at the El Camino Real intersection and Fremont intersection, and constructing a new signalized intersection at Fremont Avenue and El Camino Real. It is assumed that the implementation of the Wolfe corridor multimodal improvements would restore intersection operations at Wolfe Road and Fremont Avenue to acceptable levels of service. The cost estimate for the Wolfe Road and Fremont Avenue improvement assumes the highest cost alternative identified in the traffic improvement study.

**Fair Oaks Avenue & Arques Avenue (#31)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The eastbound leg would require widening to include one left-turn lane, one through lane, and one dedicated right-turn lane. This improvement would not require additional right-of-way acquisition. This improvement would partially improve the intersection operations under future conditions.

**Fair Oaks Avenue & El Camino Real (#34)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during the PM peak hour. The needed improvement is discussed below:

**Improvement:** The eastbound and westbound legs would require widening to include two left-turn lanes. Right-of-way acquisition would be required for this improvement. This improvement would restore intersection operations to acceptable levels of service under future conditions.

**Sunnyvale-Saratoga Road & Remington Drive (#40)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The northbound and westbound legs would require widening to include two left-turn lanes. Right-of-way acquisition would be required for this improvement. This improvement would restore intersection operations to acceptable levels of service under future conditions during only the AM peak hour. During the PM peak hour under future conditions, this improvement would partially improve the intersection operations.

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**Hollenbeck Avenue & El Camino Real (#49)**

Under future conditions, this intersection is forecast to operate at an unacceptable LOS F during the PM peak hour. The needed improvement is discussed below:

**Improvement:** The southbound leg would require restriping to include two left-turn lanes, one through lane, and one shared through-right lane. No right-of-way acquisition would be required. This improvement would restore intersection operations to acceptable levels of service under future conditions.

**SR 85 & Fremont Avenue (#59, 60)**

Under future conditions, the intersection at SR 85 northbound ramps and Fremont Avenue is forecast to operate at an unacceptable LOS E during the AM peak hour. The intersection at SR 85 southbound ramps and Fremont Avenue is forecast to operate at an unacceptable LOS F during both the AM and PM peak hours. The needed improvement is discussed below:

**Improvement:** The SR 85 northbound off-ramp would require widening to restore intersection operations to acceptable levels of service. No right-of-way acquisition would be required. The SR 85 southbound off-ramp would require restriping to partially restore intersection operations to acceptable levels of service.

## Caltrain Grade Separations

The City of Sunnyvale currently has two at-grade crossings with the Caltrain railroad: at Mary Avenue and at Sunnyvale Avenue. During the AM and PM peak hours, there are frequent train services requiring frequent interruptions to vehicular circulation. Future developments would generate more traffic on both Mary Avenue and Sunnyvale Avenue that would result in longer delays during train crossings. To prevent potential capacity issues on both roadways, both roadways would need to be grade separated from the Caltrain railroad.

**Responsibility:** It is assumed that 80% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the improvement funding. Since the Caltrain grade separations are designed to address existing issues, the identified improvements cannot be fully funded by future developments. A select link analysis in the STFM determined that 40% of the total traffic on the north legs (affected legs) of both roadways is generated by future developments within the City of Sunnyvale. Therefore, future developments would be responsible for 40% of Sunnyvale's funding share.

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## Intelligent Transportation System (ITS) Projects

Intelligent Transportation Systems (ITS) are advanced technological applications aimed at better serving all modes of transportation. Examples of ITS projects include bicycle detection at signals, pedestrian detection at crosswalks, and corridor signal coordination. These improvements can smooth traffic flow and reduce delays. It is anticipated that future developments would generate increased traffic volumes along major roadway corridors (i.e. Mathilda Avenue, El Camino Real), and would generate increased pedestrian and bicycle activities at intersections. Not all of the intersections that would be made deficient by future development can be improved through widening. ITS projects would be needed to ensure adequate vehicular circulation and ensure pedestrian and bicycle safety while crossing roadways.

**Responsibility:** It is assumed that 20% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 80% towards the improvement funding. Because this improvement is needed as a result of increased traffic, pedestrian and bicycle volumes from future developments, future developments within the City of Sunnyvale would be required to contribute 100% towards the City of Sunnyvale's funding share.

## New Signals and Signal Upgrades

The City currently has 128 signalized intersections. It is anticipated that additional intersections will be signalized through the term of this update. Additional traffic signals will be needed because of increases in traffic due to new or intensified development. It is not advisable to identify the precise locations warranting signalization in the future based on traffic forecasts derived from the model since the locations and intensity of development may vary from that assumed in the travel demand model. It is therefore recommended that the traffic fee reflect historical trends without specifying the exact intersections to be included in the fee program. In addition to the funding of new signals with the mitigation fee, development projects also may be required to install signals at locations where traffic signal warrants are met as a result of project generated traffic. It is also anticipated that traffic signal and signal system improvements will be required as traffic increases and the existing system ages.

**Responsibility:** It is assumed that 20% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 80% towards the improvement funding. Future developments within the City of Sunnyvale would be responsible for 100% of the cost of installing signals at locations that do not warrant signals today but would warrant signals, or modifications to existing signals, in the future. The cost estimate for constructing new signals and signal upgrades is based on the assumption that each new signalized intersection/signal upgrades would cost approximately $500,000 and that one new signal/upgrade would be implemented annually until year 2035.

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## Bicycle and Pedestrian Facilities

The recently adopted Land Use and Transportation Element (LUTE) establishes various policies to develop a transportation network that supports all modes of transportation. The LUTE uses transportation demand management (TDM) as a tool to reduce automobile trips and encourage alternative modes of transportation. The City has recently adopted TDM Program guidelines requiring development projects to implement TDM measures to achieve project-specific trip reductions. To effectively promote alternative modes of transportation, and help ensure that the development-specific TDM programs are effective, a safe and continuous bicycle and pedestrian network needs to be established.

Physical improvements are not possible at all intersections that would be made deficient by new development. To partially offset these deficiencies, which are caused by new development, Sunnyvale will invest in bicycle and sidewalk improvements. Future developments within the City of Sunnyvale will be responsible for 100% of the City's funding share for the improvements discussed below.

### Complete Bicycle Network and Pedestrian Facilities

The City of Sunnyvale *Bicycle Master Plan* identifies a list of bicycle improvements throughout the City of Sunnyvale. City's Public Works Department has also identified numerous locations where pedestrian sidewalks are discontinuous. To promote walking for short trips, existing pedestrian facilities would also require improvements to ensure pedestrians feel safe while walking. These improvements could include crosswalks, detached sidewalks, etc. The Traffic Impact Fee will be used for funding completion of the City's bicycle network, providing continuous pedestrian sidewalks, and improving existing pedestrian facilities. These improvements would be needed to create and maintain a safe and logical bikeways system and walkable community, which would help ensure the effectiveness of development-specific TDM programs.

**Responsibility:** It is assumed that 50% of the funding for completing the City's bicycle network and improving the City's existing pedestrian facilities would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 50% towards the improvement funding for these two projects. The City of Sunnyvale expects to contribute 100% towards the cost of completing the City's sidewalk network.

**Caltrain Bike/Ped Undercrossing at Bernardo Avenue**

One of the major bicycle facility improvements identified in the Bicycle Master Plan is a pedestrian/bicycle undercrossing beneath the Caltrain tracks at Bernardo Avenue. According to the Bicycle Master Plan, an undercrossing at this location would provide an opportunity to shorten the bicycle commute distance and times for Sunnyvale residents working in nearby Mountain View workplaces. The undercrossing would encourage alternative modes of transportation and would help ensure the effectiveness of development-specific TDM programs.

**Responsibility:** It is assumed that 80% of the funding for this improvement would come from external sources such as federal/state grants. The City of Sunnyvale expects to contribute 20% towards the improvement funding.

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# 5. Derivation of Traffic Impact Fee

To develop a traffic impact fee, it is necessary to first find the estimated cost of improvements per additional peak hour trip generated. The expected PM peak-hour trip growth to year 2035 was obtained from the Sunnyvale travel demand forecasting model (see Table 7). Following past planning practice in Sunnyvale, the growth in trips generated within the Moffett Park area was calculated separately from growth in trips in the remainder of the city.

**Table 7**
**Peak-Hour Trip Growth**

| | Growth in Peak-Hour Trips | |
|---|---|---|
| | Growth (trips) | % of Sunnyvale Growth |
| Moffett Park | 4,134 | 11% |
| Remainder of Sunnyvale | 32,713 | 89% |
| Total | 36,847 | 100% |

The model also allowed the determination of whether the need for transportation improvements is triggered by trip growth in the Moffett Park area or by trip growth in other parts of the city (see Table 8). The reason for separating out the Moffett Park growth is that because of the limited number of roads that serve the area, Moffett Park growth places a proportionately larger burden on the City's transportation system. The cost allocation percentages shown in Table 8 are based on the following:

- *Citywide Intersection Improvements and Bicycle/Pedestrian Facilities*: For these projects, the allocation used was based on the percentage share of peak-hour trip growth, as shown in Table 7.
- *Mathilda/US 101/SR 237 Complex and Mary Avenue extension*: The Sunnyvale travel demand forecasting model determined that 39% of the Sunnyvale trips that would use the improvements to the Mathilda/US 101/SR 237 complex, as well as the Mary Avenue extension, would be generated by growth in the Moffett Park area, so costs of those improvements were allocated accordingly.

- *Mary Avenue and Central Expressway Improvements*: The Sunnyvale travel demand forecasting model determined that 2% of the Sunnyvale trips at the intersection of Mary Avenue and Central Expressway would come from Moffett Park growth, so costs of those improvements were allocated accordingly.
- *Lawrence Expressway Improvements South of US 101*: The Sunnyvale travel demand forecasting model determined that 13% of the Sunnyvale trips along Lawrence Expressway south of US 101 would come from Moffett Park growth, so costs of those improvements were allocated accordingly.
- *Lawrence Expressway Improvements North of US 101*: The Sunnyvale travel demand forecasting model determined that 30% of the Sunnyvale trips along Lawrence Expressway north of US 101 would come from Moffett Park growth, so costs of those improvements were allocated accordingly.

The results of the cost allocation calculations show that growth in Moffett Park will necessitate about $24.6 million in improvement costs, and growth in the remainder of the city will necessitate about $101.9 million in improvement costs, as shown in Table 8.

**Table 8**
**Cost Breakdown**

| Improvement | Total Improvement Cost | Sunnyvale Traffic Impact Fee Contribution | Moffett Park | | Remainder of Sunnyvale | |
|---|---|---|---|---|---|---|
| | | | % Traffic | Cost | % Traffic | Cost |
| ***Expressway Improvements*** | | | | | | |
| Mary/Central Intersection add 3rd westbound left-turn lane | $ 1,500,000 | $ 300,000 | 2% | $ 6,000 | 98% | $ 294,000 |
| Lawrence Grade Separations at Reed/Monroe, Kifer, and Arques | $ 440,000,000 | $ 13,200,000 | 13% | $ 1,716,000 | 87% | $ 11,484,000 |
| Lawrence/Oakmead Grade Separation | $ 60,000,000 | $ 12,000,000 | 13% | $ 1,560,000 | 87% | $ 10,440,000 |
| Lawrence/Lakewood Intersection Signalization | $ 5,800,000 | $ 2,900,000 | 30% | $ 870,000 | 70% | $ 2,030,000 |
| Lawrence/Tasman Depress LRT under intersection | $ 23,600,000 | $ 4,720,000 | 30% | $ 1,416,000 | 70% | $ 3,304,000 |
| ***Mathilda Corridor Improvements*** | | | | | | |
| Mathilda/SR237, Mathilda/US 101 Interchange Reconfiguration | $ 40,000,000 | $ 8,000,000 | 39% | $ 3,120,000 | 61% | $ 4,880,000 |
| Mary Avenue Extension | $ 78,000,000 | $ 23,400,000 | 39% | $ 9,126,000 | 61% | $ 14,274,000 |
| ***Citywide Intersection Improvements*** | | | | | | |
| Caltrain Grade Separation at Mary Avenue and at Sunnyvale Avenue | $ 180,000,000 | $ 14,400,000 | 11% | $ 1,584,000 | 89% | $ 12,816,000 |
| ITS projects (including Mathilda Avenue) | $ 20,000,000 | $ 10,000,000 | 11% | $ 1,100,000 | 89% | $ 8,900,000 |
| Future Traffic Signal Construction | $ 10,000,000 | $ 8,000,000 | 11% | $ 880,000 | 89% | $ 7,120,000 |
| Intersection Improvements (including Wolfe and El Camino Real) | $ 13,000,000 | $ 10,400,000 | 11% | $ 1,144,000 | 89% | $ 9,256,000 |
| ***Bicycle and Pedestrian Facilities*** | | | | | | |
| Complete Bike Network | $ 10,000,000 | $ 5,000,000 | 11% | $ 550,000 | 89% | $ 4,450,000 |
| Bernardo.Caltrain Bike-Ped Undercrossing | $ 9,400,000 | $ 1,880,000 | 11% | $ 207,000 | 89% | $ 1,673,000 |
| Complete Sidewalks | $ 9,800,000 | $ 9,800,000 | 11% | $ 1,078,000 | 89% | $ 8,722,000 |
| Pedestrian Facility Improvements | $ 5,000,000 | $ 2,500,000 | 11% | $ 275,000 | 89% | $ 2,225,000 |
| | | **$ 126,500,000** | | **$ 24,632,000** | | **$ 101,868,000** |

The cost per new trip can be calculated by dividing the improvement cost per area by the number of expected new trips per area (see Table 9).

**Table 9**
**Cost per Trip**

| | | Moffett Park | | Remainder of Sunnyvale |
|---|---|---|---|---|
| Cost | $ | 24,632,000 | $ | 101,868,000 |
| Growth (trips) | | 4,134 | | 32,713 |
| **Cost/Trip** | **$** | **5,958** | **$** | **3,114** |

Table 10 shows the final calculated traffic impact fees. The impact fees were derived by multiplying the cost per trip by the typical PM peak-hour trip generation rate for each land use, using rates from the Institute of Traffic Engineers' *Trip Generation, 9th Edition*. For example, the trip generation rate for single family detached housing is one peak-hour trip per unit, so the fee per dwelling unit is equal to the cost per trip. It should be noted that a 50% pass-by trip reduction is assumed for retail land use. Also, it should be noted that no residential or office development is planned in the Moffett Park area.

**Table 10**
**Impact Fee per Land Use Type**

| Land Use | ITE Code | PM Peak Hour | Unit of Measure | Proposed Impact Fee | |
|---|---|---|---|---|---|
| | | | | Moffett Park Area | Remainder of Sunnyvale |
| | | | **Per Trip Cost** | **$ 5,958** | **$ 3,114** |
| Single-Family Detached Housing | 210 | 1 | per dwelling unit | $ - | $ 3,114 |
| Multi-Family Attached Housing | 220 | 0.62 | per dwelling unit | $ - | $ 1,931 |
| General Office | 710 | 1.49 | per 1,000 sq. ft. | $ - | $ 4,640 |
| Research & Development | 760 | 1.07 | per 1,000 sq. ft. | $ 6,375 | $ 3,332 |
| Industrial | 110 | 0.97 | per 1,000 sq. ft. | $ 5,779 | $ 3,021 |
| Retail [1] | 820 | 1.855 | per 1,000 sq. ft. | $ 11,052 | $ 5,776 |
| Hotel | 310 | 0.6 | per room | $ 3,575 | $ 1,868 |

Notes:
All rates are from: Institute of Transportation Engineers, *Trip Generation, 9th Edition.*
1. Retail rate is reduced by 50 percent to account for pass-by trips.

## Implementation of the Traffic Impact Fee Program

It is recommended that the fee be applied to the following:

1. New residential, commercial, industrial, or other non-residential development projects.
2. Additions or alterations to existing residential development that create one or more additional dwelling units.
3. Additions or alterations to existing non-residential development that increase the gross square footage of the development.

It is recommended that the fee be paid in full to the City before the first building permit is issued. If no building permit is required, the fee shall be paid before a conversion of use may take place. It is recommended that the sums derived from the collection of the traffic impact fees be used for the projects identified in the Traffic Mitigation program. In no case shall any of the moneys be used for regular street maintenance.

It is recommended that the Traffic Mitigation Program be implemented in five or ten-year phases for the purpose of ensuring that the accumulated fees are sufficient in amount to fund the planned improvements and are actually expended on the improvements within the given time frame.

## Periodic Adjustments to the Fee

It is recommended that the traffic impact fees be adjusted periodically to reflect the current status of traffic impact requirements, projected development square footage, construction and land costs, and other factors. The Director of Public Works shall make an annual review, or more frequent review if deemed necessary, of the Traffic Mitigation Program and make recommendations for amendment, if any. The review will be submitted with recommendations to the City Council.

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# City of Sunnyvale
# Traffic Impact Fee Update
# Technical Appendices

# Appendix A
## Traffic Counts

# Appendix B
## Intersection Level of Service Calculation Sheets

# Appendix C
## Sunnyvale Travel Demand Forecast Model Validation Memorandum