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## CHAPTER 1 INTRODUCTION

This report documents the traffic impact analysis of the potential traffic-related impacts of widening two arterial crossings of the California Aqueduct in the City of Hesperia: Main Street and Rancho Road. This report has been prepared in accordance with the City of Hesperia traffic impact study requirements, and in support of the environmental documentation required under the California Environmental Quality Act (CEQA).

### 1.1 Project Description

The City of Hesperia General Plan Circulation Element identifies the Main Street Corridor, extending from I-15 to I Avenue as a Major Arterial and a Special Street. In addition to three travel lanes in each direction in the vicinity of the aqueduct crossing, Main Street will include a landscaped median to enhance the aesthetics of Main Street as well as a widened pathway to encourage non-motorized transportation (walking, biking, etc.) within 120 feet of right-of-way. The existing Main Street bridge over the California Aqueduct is approximately 60 feet wide and inadequate to accommodate the ultimate planned configuration of the roadway.

Rancho Road is also classified as a Special Street. As planned, it will provide three travel lanes in each direction, a landscaped median and parkways, and 16-foot wide pathways along each side within 140 feet of right-of-way. Department of Water Resources completed a seismic retrofit of the Rancho Road aqueduct crossing in February 2015. These interim improvements did not significantly alter the configuration of the roadway or enhance roadway capacity and, as such, are inadequate to accommodate the long term vision for the Rancho Road corridor.

The City's objective is to enhance service to its residents and businesses by accommodating existing and future east/west vehicular, pedestrian and bicycle traffic capacity on these two major arterial roadways in the City. Expanding capacity requires additional lanes of travel at the aqueduct crossings on Rancho Road and Main Street. Both structures will be designed to the ultimate roadway width inclusive of three lanes of travel in each direction, as well as safe passage for pedestrians and bicyclists. Although there is no funding source established for construction of these projects at this time, the City intends on having shelf ready projects in the event funding becomes available.

### 1.2 Project Study Area

The traffic impact analysis evaluates potential impacts along Main Street between Key Point Avenue (west of I-15) and Maple Avenue (east of the California Aqueduct); and along Rancho Road from Escondido Avenue to Danbury Avenue. Figure 1 shows the location of the Projects in a regional context. Figure 2 shows the study area.

Figure 1: Vicinity Map

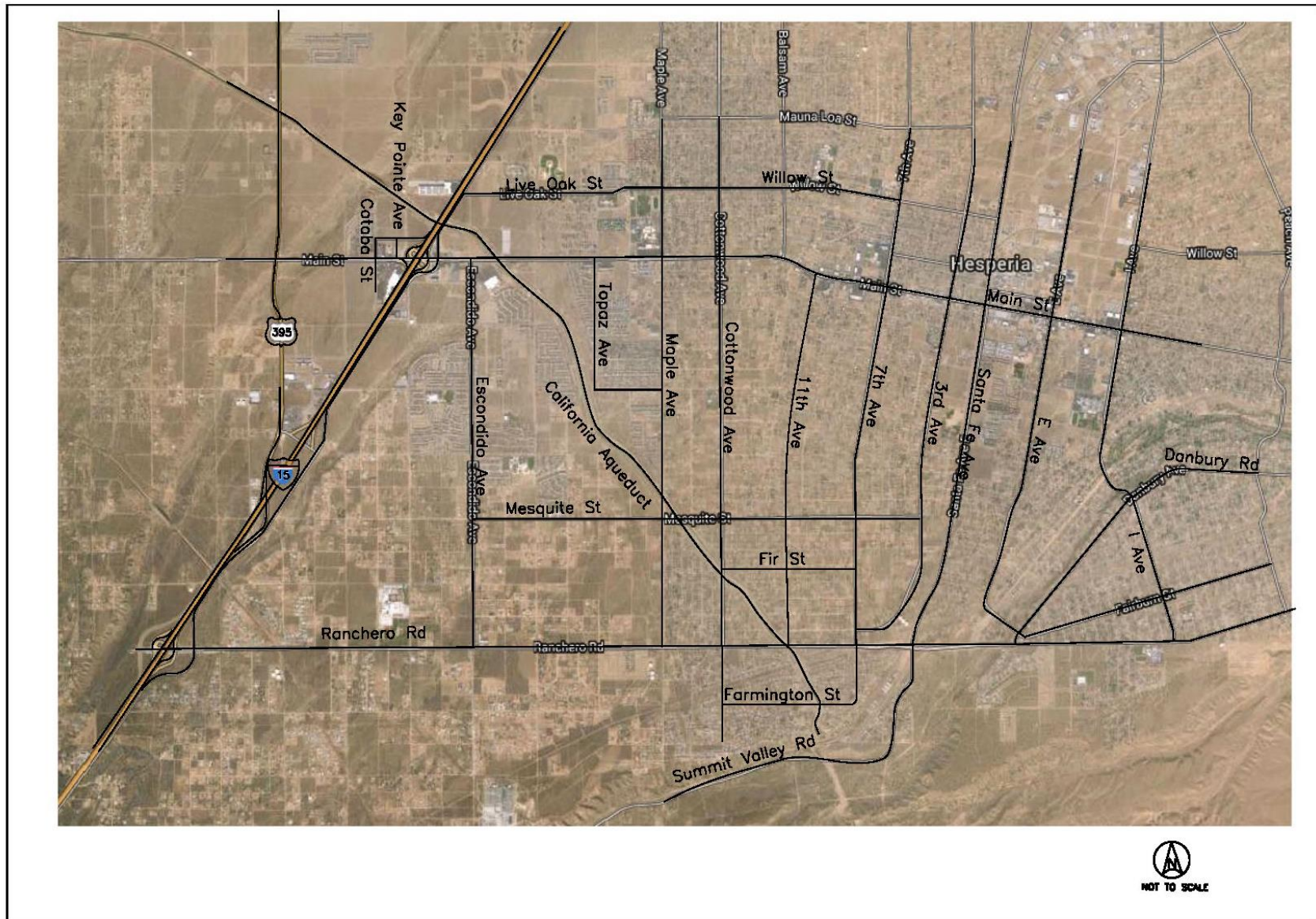
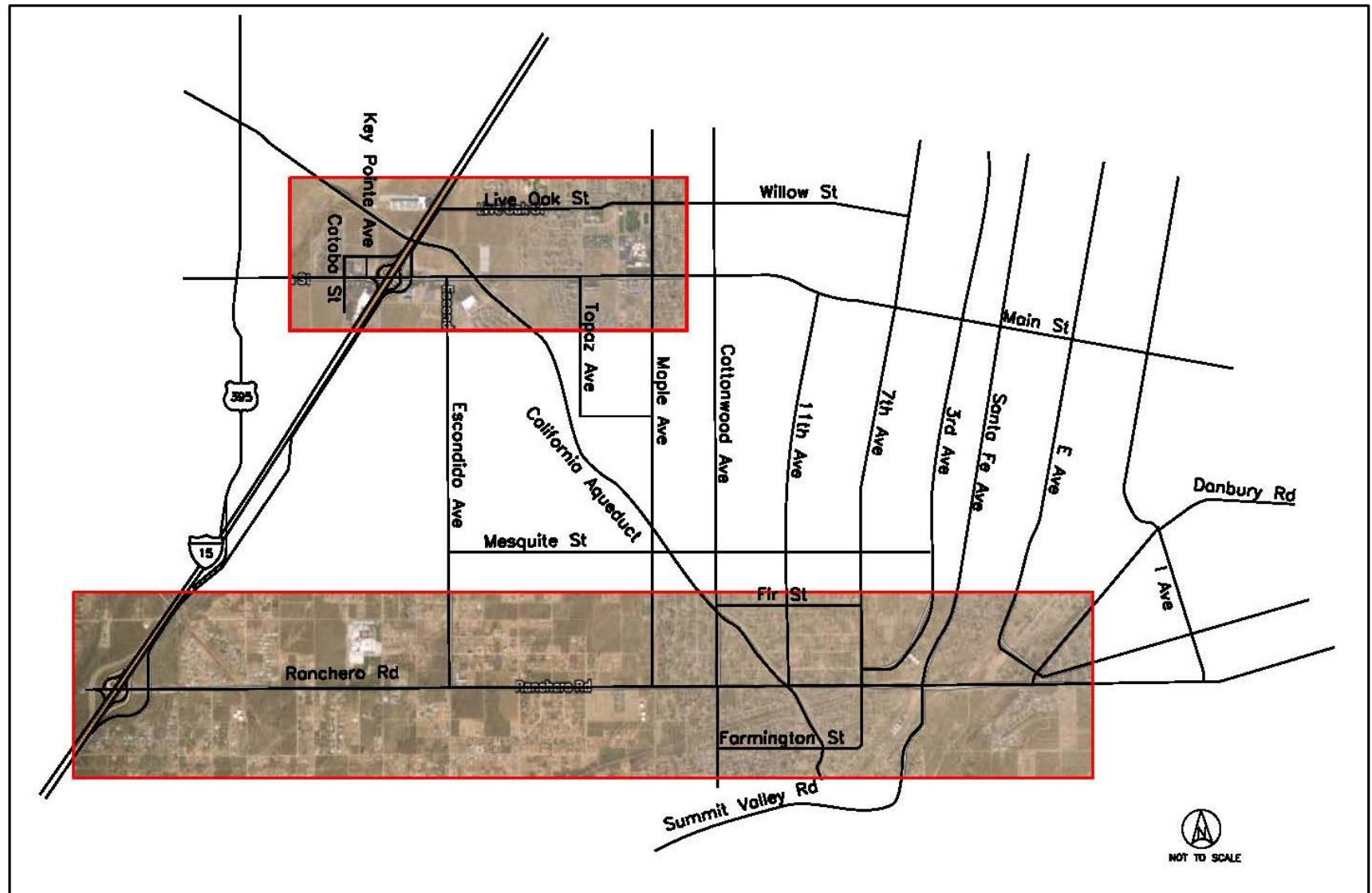






Figure 2: Study Area Map



### 1.3 Report Organization

This report documents the assumptions, methodologies, analyses and results used to evaluate the potential traffic-related impacts of the circulation system modifications proposed as part of the Groundwater and Liquefaction Mitigation Master Plan.

- Chapter 1 Introduction - describes the purpose of the current study and describes the projects to be evaluated;
- Chapter 2 Analysis Methodologies - describes the methodologies, analysis procedures, and standards utilized to evaluate roadway and intersection traffic conditions;
- Chapter 3 Existing Conditions – describes the existing transportation network within the study area of the proposed Projects, and provides analysis results for existing traffic conditions.
- Chapter 4 Future Conditions – describes the transportation network and traffic conditions within the study area for two future scenarios: Near-Term Future (2017) and Horizon Year (2040).
- Chapter 5 Impact Assessment – describes traffic operational impacts of each Project during construction, assuming that the Projects are constructed sequentially, or simultaneously in the Near-Term (2017).
- Chapter 6 Findings and Conclusions – describes the results of the analysis and identifies any required mitigation.



## CHAPTER 2 ANALYSIS METHODOLOGIES

The traffic analyses prepared for this study were performed in accordance with City of Hesperia requirements and the San Bernardino County Congestion Management Program (CMP) requirements. Detailed information on roadway segment and intersection analysis methodologies, standards, and thresholds are discussed in the following sections.

### 2.1 Analysis Framework

Traffic conditions have been evaluated for three analysis timeframes:

- Existing Conditions (2015);
- Near-Term Future Conditions (2017, the likely year of project construction); and
- Horizon Year Conditions (2040)

### 2.2 Intersection Level of Service Analysis and Criteria

In compliance with the requirements of the City of Hesperia and the County of San Bernardino, the analysis methods provided in the Highway Capacity Manual (HCM) have been used for intersection Level of Service (LOS) analysis. The Highway Capacity Manual (HCM) 2000 operations method for signalized intersections was used to evaluate currently signalized intersections. The HCM methods for evaluating unsignalized intersections were used to evaluate stop-controlled intersections.

#### 2.2.1 Signalized Intersection Analysis Method

The Highway Capacity Manual 2010 Intersection Delay Method was used to evaluate the level of service of signalized intersections within the study area. Specific input parameters, consistent with the San Bernardino CMP have been used for the peak hour analysis.

In the Delay Method, level of service (LOS) is evaluated on the basis of control delay per vehicle (in seconds per vehicle). The average control delay per vehicle is estimated and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value as shown in Table 1.

**Table 1: LOS Criteria for Signalized Intersections**

LOS	CONTROL DELAY PER VEHICLE (Sec/Veh)	LOS DESCRIPTION
A	≤ 10	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	>10 - 20	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.

**Table 1 - continued**

<b>LOS</b>	<b>CONTROL DELAY PER VEHICLE (Sec/Veh)</b>	<b>LOS DESCRIPTION</b>
C	>20 - 35	Good operation. Occasionally drivers may have to wait more than 60 seconds, and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.
D	>35 - 55	Fair operation. Cars are sometimes required to wait more than 60 seconds during short peaks. There are no long-standing traffic queues. This level is typically associated with design practice for peak periods.
E	>55 - 80	Poor operation. Some long-standing vehicular queues develop on critical approaches to intersections. Delays may be up to several minutes.
F	>80	Failure. Represents jammed conditions. Backups form locations downstream or on the cross street may restrict or prevent movement of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop and go type traffic flow.

### 2.2.2 Stop-Controlled Intersection Analysis Method

The Highway Capacity Manual (HCM) analysis method for evaluating minor street stop intersections is based on the average total delay for each impeded movement. For all-way stop controlled intersections, it is based on the average delay for the entire intersection. Total delay is defined as the total elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. Table 2 presents LOS criteria used for analysis of the non-signalized intersections.

**Table 2: LOS Criteria for Stop-Controlled Intersections**

<b>LOS</b>	<b>AVERAGE DELAY (Sec/Veh)</b>	<b>TOTAL LOS DESCRIPTION</b>
A	0 - 10	Excellent. Vehicles proceed immediately upon complete stop.
B	>10 - 15	Very Good. Most vehicles are able to proceed through the intersection immediately upon complete stop.
C	>15 - 25	Good. Minor delay before proceeding through the stop-controlled intersection.
D	>25 - 35	Fair. Steady queue of vehicles moving through the intersection; some wait is required for adequate gap to move from minor street.
E	>35 - 50	Poor. Queues are longer and delay somewhat greater at all-way stops. Gaps less frequent resulting in greater delay for minor street stops.
F	>50	Failure. Long vehicle queues resulting in considerable delay to clear the intersection.

Source: Highway Capacity Manual 2000

## 2.3 Daily Roadway Analysis

Daily roadway analysis is based on comparison of average daily traffic (ADT) volume to the Level of Service D capacity of the roadway segment. Roadway level of segment service standards are presented in Table 3.

**Table 3: Roadway Segment LOS Standard**

NUMBER MID-BLOCK LANES	OF	LOS (veh/day)	D	CAPACITY
		UNDIVIDED		DIVIDED
2		14,500		17,400
4		24,480		30,600
6		36,880		46,100
8		N/A		60,100

Source: City of Hesperia General Plan Update Transportation Technical Report, 2009

## 2.4 Performance Criteria and Thresholds of Significance

In accordance with the City of Hesperia Circulation Element, the target LOS for peak hour operations of intersections is LOS D or better for the majority of intersections in the City, with a target of LOS E acceptable through freeway interchanges and along major corridors, such as Main Street/Phelan Road.

The City of Hesperia and the San Bernardino County CMP do not specify criteria for identification of significant traffic impacts beyond stating that the LOS standard needs to be maintained. For purposes of this analysis, the projects are considered to cause a significant impact if project-related traffic causes the LOS at a study intersection to deteriorate from an acceptable LOS to a deficient LOS (LOS E or F depending on the location).

The LOS and V/C ratios above are based on the delay methodology outlines in the Highway Capacity Manual.

## 2.4 Travel Forecasting

### 2.4.1 Near-Term Future Traffic Volume Forecasts

Near-Term Future traffic volumes were developed by applying an annual growth factor to existing traffic volume turning movements to estimate growth to 2017. A growth factor of 2 percent per year was used on Main Street and 4 percent per year on Ranchero Road. The growth factors were developed based on historic traffic volume trends on both of these roads. Turning movements were “smoothed” by comparing the arrival and departure volumes between adjacent intersections.

### 2.4.2 2040 Traffic Volume Forecasts

2040 traffic volume forecasts were developed by applying a 2 percent per year growth factor to 2035 link volume forecasts from the San Bernardino Transportation Analysis Model (SBTAM) developed and maintained by the San Bernardino Associated Governments (SANBAG). 2040 AM and PM peak hour turning movements were developed based on the National Cooperative

Highway Research Program (NCHRP) Report 225 methodology. The 2035 directional link volumes for AM and PM peak hours were factored to reflect growth between 2035 and 2040. The resulting 2040 directional link volumes were used as arrival and departure volumes for study intersections and in combination with existing traffic volume turning movements, AM and PM peak hour turning movements were estimated.

## CHAPTER 3 EXISTING CONDITIONS

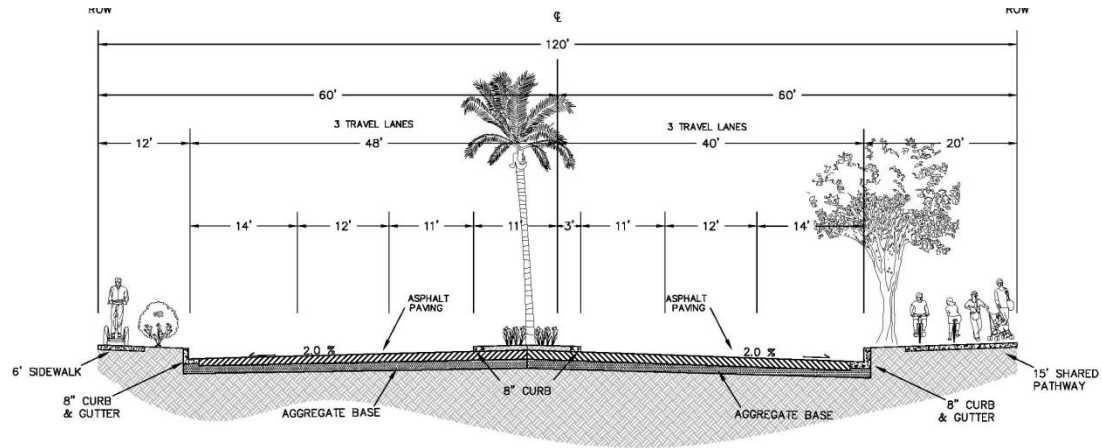
This section describes key study area roadway segments and intersections, existing average daily traffic volumes and peak hour intersection traffic volume information, and level of service (LOS) analysis results for Existing Conditions. Existing Conditions reflect physical and operational characteristics of the study area transportation system in 2015.

### 3.1 Existing Roadway Characteristics

In the study area, **Interstate 15** (I-15) is a north-south freeway with three general purpose lanes in each direction. There are currently no high occupancy vehicle (HOV) lanes along I-15 through the study area. There is a full-diamond interchange on I-15 at Oak Hill Road, a half diamond interchange at Joshua Street (southbound off-ramp and northbound on-ramp) and a full diamond interchange with northbound and southbound loop on-ramps at Main Street. A full diamond interchange with a southbound loop ramp was recently constructed at Ranchero Road (completed in February 2015). There is a system interchange between I-15 and US Highway 395. I-15 currently carries 124,000 to 129,000 vehicles per day south of Highway 395, and 101,000 to 105,000 vehicles per day north of the Highway 395 junction. Based on *Annual Average Daily Truck Traffic on California Highways*, provided by Caltrans, trucks represent approximately 13.5 percent of the daily vehicle mix on I-15 south of Highway 395, and approximately 15.6 percent of the daily mix north of Highway 395.

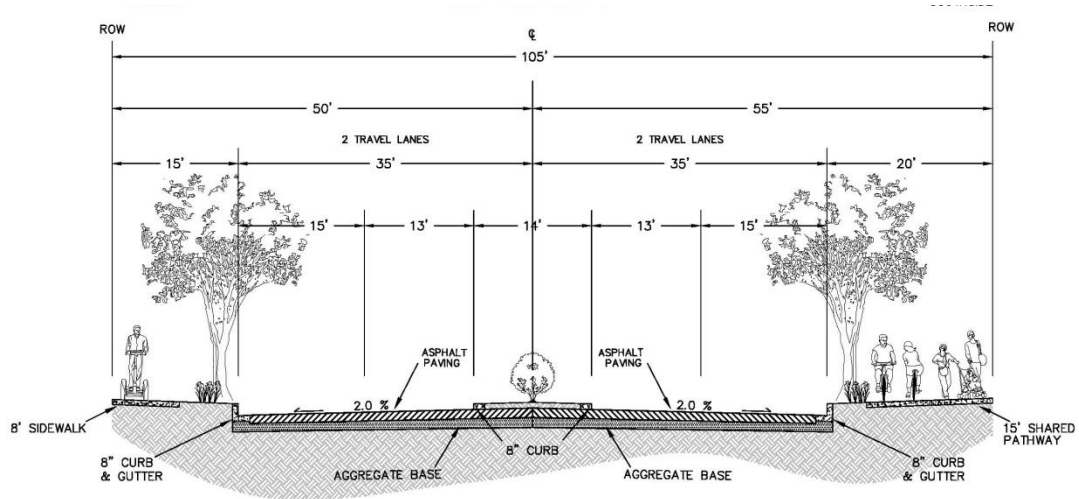
**US Highway 395** is a four-lane traditional highway from the I-15 connectors to north of Joshua Street, where it transitions to a two-lane highway. Highway 395 currently carries approximately 23,000 to 26,000 vehicles per day in the study area. The *Annual Average Daily Truck Traffic on California Highways* shows that trucks comprise approximately 22 percent of the daily vehicle mix on Highway 395 north of I-15.

**Main Street** is an east-west roadway that extends from the western city limit (Main Street Phelan Road) to nearly the eastern city limits. Within the study area, from Key Point Avenue through the I-15 interchange area, Main Street consists of three to four lanes in each direction with turn lanes at intersections. West of Mariposa and the Walmart Center entrance, Main Street narrows to two lanes in each direction with a two-way left turn lane. The City's Circulation Element defines the Main Street Corridor as a Special Street. Main Street Corridor "A" extends from I-15 to 9<sup>th</sup> Street and is planned to include three lanes in each direction, a raised landscaped median and a 15-foot shared pathway along the south side for non-motorized transportation. Main Street Corridor "B" extends from 9<sup>th</sup> Street to I Avenue. This segment is planned to include two lanes in each direction with a raised landscaped median and a 15-foot shared pathway along the south side. Currently, Main Street carries approximately 27,000 to 35,000 vehicles per day in the study area.



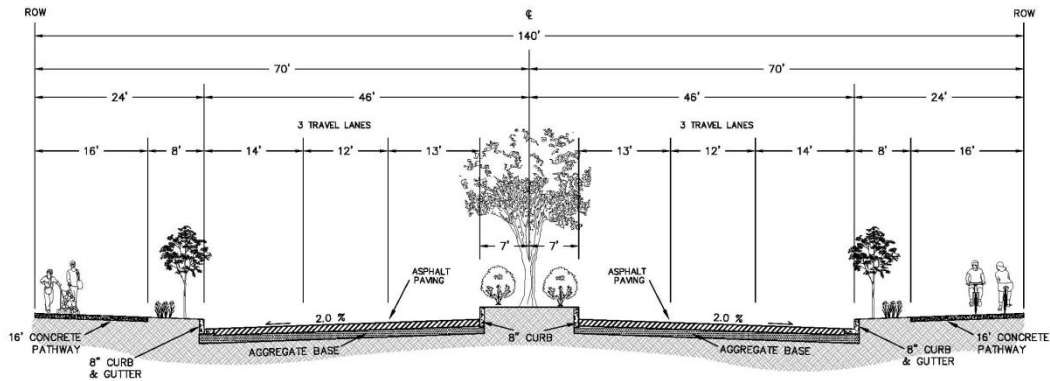
### Main Street Corridor A

Source: Traffic Circulation Plan, Hesperia General Plan 2010



### Main Street Corridor B

Source: Traffic Circulation Plan, Hesperia General Plan 2010



Ranchero Road Build-Out Conditions

Source: *Traffic Circulation Plan, Hesperia General Plan 2010*

**Ranchero Road** is an east-west roadway that extends between Mariposa Road, just east of the I-15 Freeway on the west and Arrowhead Lake Road on the east. Within the study area, Ranchero Road consists of one lane in each direction from Escondido Avenue to west of 7<sup>th</sup> Avenue. From west of 7<sup>th</sup> Avenue to Danbury Avenue, Ranchero Road has two lanes in each direction, and then one lane in each direction east of Danbury Road. The posted speed limit along Ranchero Road varies between 45 and 50 miles per hour (mph). On the City's Circulation Element, Ranchero Road is classified as a six-lane Major Arterial "Special Street" with 140 feet of right-of-way from Escondido Avenue to Danbury Avenue; a four-lane divided Arterial between Danbury Avenue and I Avenue; and a two-lane divided Secondary Arterial east of I Avenue.

Ranchero Road current carries approximately 5,500 vehicles per day at its eastern end and approximately 12,000 vehicles per day in vicinity of I-15.

Two phases of the three-phased Ranchero Road Corridor Project have been completed with the opening of the I-15/Ranchero Road interchange in February 2015. The third phase is the widening of Ranchero Road to four lanes between I-15 and Santa Fe Avenue, including the bridge over the California Aqueduct. With the completion of the third phase, the Corridor Project is anticipated to improve motorist safety and safety response times for emergency vehicles as well as improving mobility and efficiency of moving commodities by relieving congestion and improving overall regional air quality.

**Mariposa Road** is a north-south two-lane undivided roadway that runs parallel to and immediately east of I-15. It is classified in the City's Circulation Element as a Secondary Arterial (84-feet of right-of-way) between Oak Hill and Ranchero Road, and between Joshua Street and Main Street. Between Ranchero Road and Joshua Street, Mariposa Road is classified as an Arterial (100-feet of right-of-way).

**Escondido Avenue** is a north-south roadway that extends from Main Street to approximately 1.4 miles south of Ranchero Road. Between Main Street and Cedar Street, Escondido Avenue is a four-lane roadway. From south of Main Street (and south of the Walmart Center) to Hollister Avenue, Escondido Avenue has two lanes in each direction with a two-way left turn lane. South of Hollister Street to Cedar Street, Escondido has two lanes in each direction with a median.



South of Cedar Street, Escondido Avenue is a two-lane roadway. The City's Circulation Element identifies Escondido Avenue as an Arterial.

**Topaz Avenue** is a north-south roadway located mid-way between Escondido Avenue and Cottonwood Avenue. It extends from north of Live Oak Lane on the north to Muscatel Street on the south. It is a local roadway but has a signalized intersection with Main Street.

**Maple Avenue** is a north-south two-lane roadway. Maple Avenue extends from Mariposa Avenue at the northern City limits just south of the Bear Valley Road/I-15 interchange on the north, to just south of Ranchero Road (approximately 0.75 mile) where it terminates in a residential tract. On the City's Circulation Element Maple Avenue is classified as a four-lane divided Arterial with a center turn lane north of Ranchero Road, and a six-lane divided Major Arterial south of Ranchero Road. It is shown on the Circulation Element to be extended southerly from its current terminus through unincorporated County land, to connect with Rancho Las Flores Parkway, a future planned roadway.

**Cottonwood Avenue** is a north-south roadway that extends from Mariposa Road north of Bear Valley Road on the north to south of Ranchero Road on the south. Between Main Street and Bear Valley Road, Cottonwood Avenue is a two-lane roadway with a two-way left turn lane. North of Bear Valley Road and south of Main Street, Cottonwood Avenue is a two-lane roadway. Between Main Street and Bear Valley Road, Cottonwood Avenue is classified as an Arterial; between Ranchero Road and Main Street, Cottonwood Avenue is classified as a Rural Collector.

**11<sup>th</sup> Avenue** is a two-lane, north-south roadway that extends the length of the City of Hesperia. 11<sup>th</sup> Avenue terminates in an unsignalized "T" intersection with Ranchero Road, immediately east of the California Aqueduct. South of Ranchero Road, a segment of 11<sup>th</sup> Avenue serves residences between Cromdale Street and Halinor Street. The proximity of 11<sup>th</sup> Avenue to the California Aqueduct poses a challenge to the widening of Ranchero Street over the Aqueduct. 11<sup>th</sup> Avenue is classified in the City's General Plan Circulation Element as an Arterial between Bear Valley Road and Main Street, and as a Rural Collector between Main Street and Ranchero Road.

**7<sup>th</sup> Avenue** is a north-south roadway. Between Walnut Street, south of Main Street and Willow Street, 7<sup>th</sup> Avenue consists of two lanes in each direction with turn lanes at intersections. South of Walnut Street to Halinor Street and north of Willow Street to Bear Valley Road, 7<sup>th</sup> Avenue is a two-lane roadway. The City's Circulation Element classifies 7<sup>th</sup> Avenue as an Arterial from Ranchero Road to Bear Valley Road.

**Santa Fe Avenue** is a north-south roadway that extends from south of Ranchero Road to just north of Main Street parallel to and east of the Burlington Northern Santa Fe Railway tracks. It is a two-lane roadway and is classified as a future Arterial on the City's Circulation Element.

### 3.2 Study Intersections

The following intersections were identified in coordination with the City and the Project Development Team for analysis in this study:

1. Main Street at Key Point Avenue (signalized)
2. Main Street at I-15 Southbound Ramps (signalized)
3. Main Street at I-15 Northbound Ramps (signalized)
4. Main Street at Mariposa Road (signalized)
5. Main Street at Escondido Avenue (signalized)
6. Main Street at Topaz Avenue (signalized)
7. Main Street at Maple Avenue (signalized)
8. Rancho Road at Escondido Avenue (signalized)
9. Rancho Road at Maple Avenue (stop-controlled)
10. Rancho Road at Cottonwood Avenue (stop-controlled)
11. Rancho Road at 11<sup>th</sup> Avenue (stop-controlled)
12. Rancho Road at 7<sup>th</sup> Avenue (stop-controlled)
13. Rancho Road at Santa Fe Avenue (signalized)
14. Rancho Road at Danbury Avenue (stop-controlled)

Figure 3 shows the locations of the study intersections. Figure 4 shows the existing traffic control lane configurations at each of the study intersections

### 3.3 Public Transportation Service

The Victor Valley Transit Authority (VVTA) provides bus service within the study area. While routes 15, 42, 44, 45, 46 and 48 all provide fixed route transit service within Hesperia, only Route 48 operates along key study roadways (Main Street or Rancho Road.) Route 48, operates along Main Street between Cataba Road and G Avenue and servicing the Walmart Center, providing hourly service seven days a week.

### 3.4 Existing Traffic Volumes

Recent traffic volume data was compiled from existing sources and augmented, where necessary with new data collection. The City of Hesperia provided average daily traffic volume count data, collected in October 2014 for study area roadway segments. Peak hour traffic volume turning movements for study intersections were obtained from the *Traffic Impact Analysis for the Tapestry Specific Plan*, December 2014. The data included in this study was collected in late 2014. New peak hour traffic volume turning movement counts were conducted at the following locations:

- Main Street at Key Point Avenue
- Main Street at Escondido Avenue
- Main Street at Topaz Avenue
- Rancho Road at Cottonwood Avenue
- Rancho Road at 11<sup>th</sup> Avenue
- Rancho Road at 7<sup>th</sup> Avenue.

Figure 3: Locations of Study Intersections

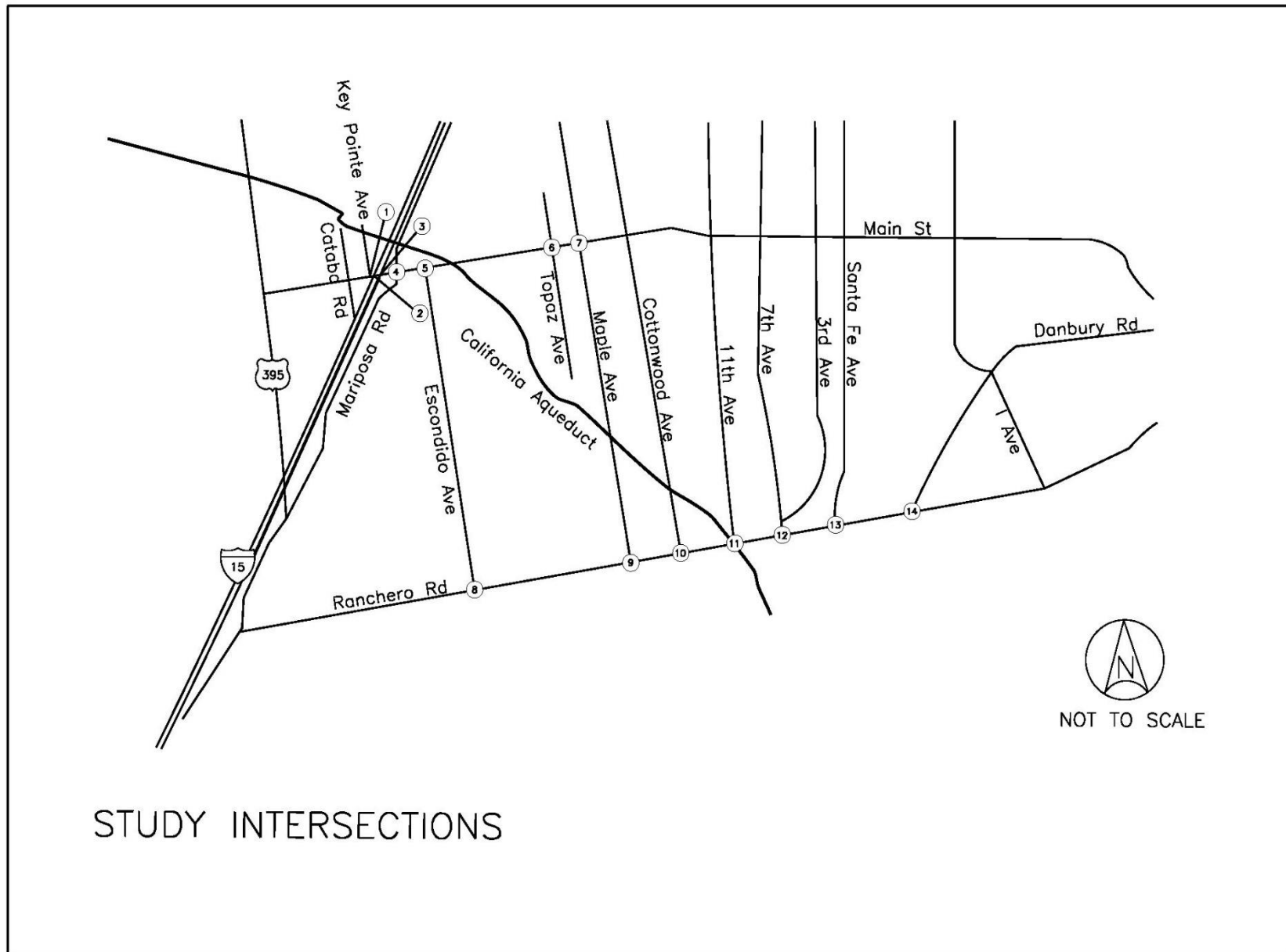
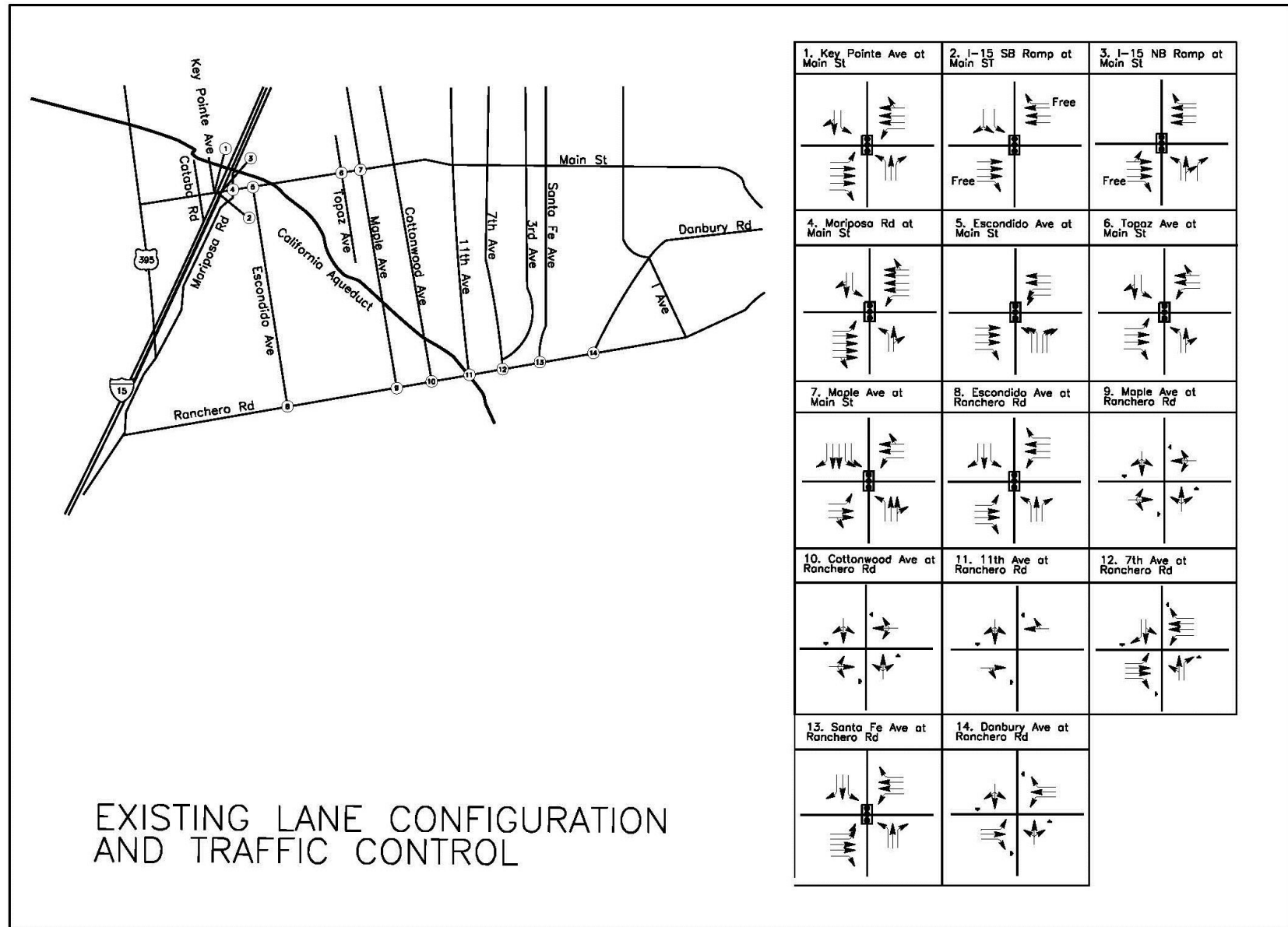


Figure 4: Existing Lane Configurations and Traffic Control at Study Intersections



Although peak hour traffic volume turning movement counts were available from the Tapestry Specific Plan Traffic Analysis, new counts were collected at these locations to evaluate changes in traffic volume at these locations between the time the original counts were collected in late 2014 and the current counts. The other four intersections where new counts were conducted had not been included in the Tapestry Specific Plan Traffic Analysis.

The new AM and PM peak period traffic volume turning movement counts were collected from 6:00 to 9:00 a.m. and from 4:00 to 6:00 p.m. on Tuesday, May 12, 2015.

Figure 5 shows AM and PM peak hour traffic volumes at study area intersections.

#### **3.4.1 Existing Levels of Service at Study Intersections**

Operating levels of service at study area intersections were evaluated using the Highway Capacity Manual methodologies for signalized and non-signalized intersections, as appropriate. The HCM analysis was performed using the Traffix 8.0 software. Table 4 shows the results of the analyses. Review of Table 4 shows that all study area intersections currently operate at an acceptable level of service d or better with the exception of the unsignalized intersection of Ranchero Road at Maple Avenue during the evening peak hour; it is estimated to operate at LOS E due to excessive delay on the eastbound approach.

#### **3.4.2 Existing Roadway Segment Capacity Analysis**

Existing daily roadway volumes are presented in Figure 6. Table 5 compares existing average daily traffic volumes on key roadway segments to Level of Service D daily traffic-carrying capacity. Review of this table indicates that all study roadway segments are currently operating at LOS D or better.

Figure 5: Existing AM and PM Peak Hour Traffic Volumes

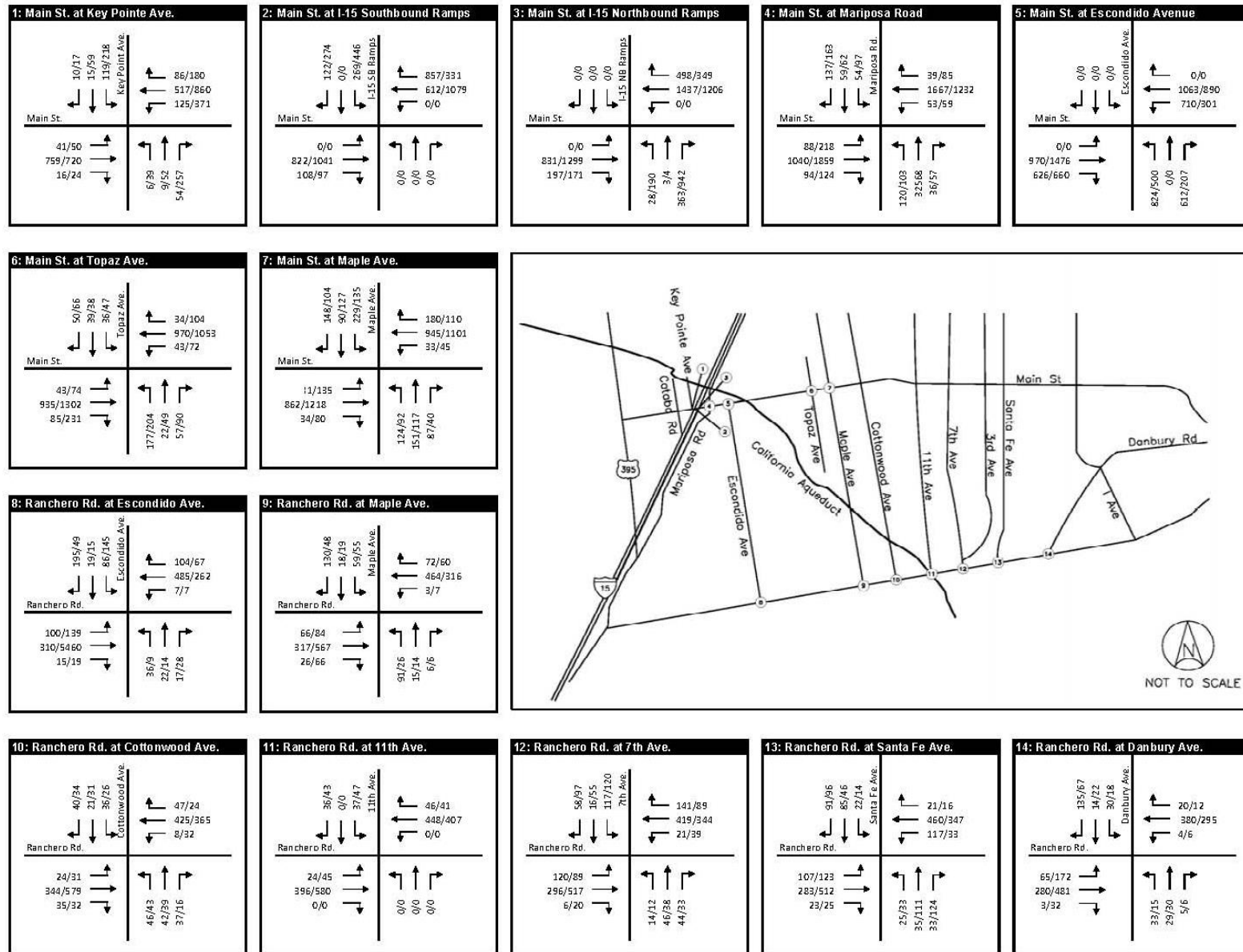
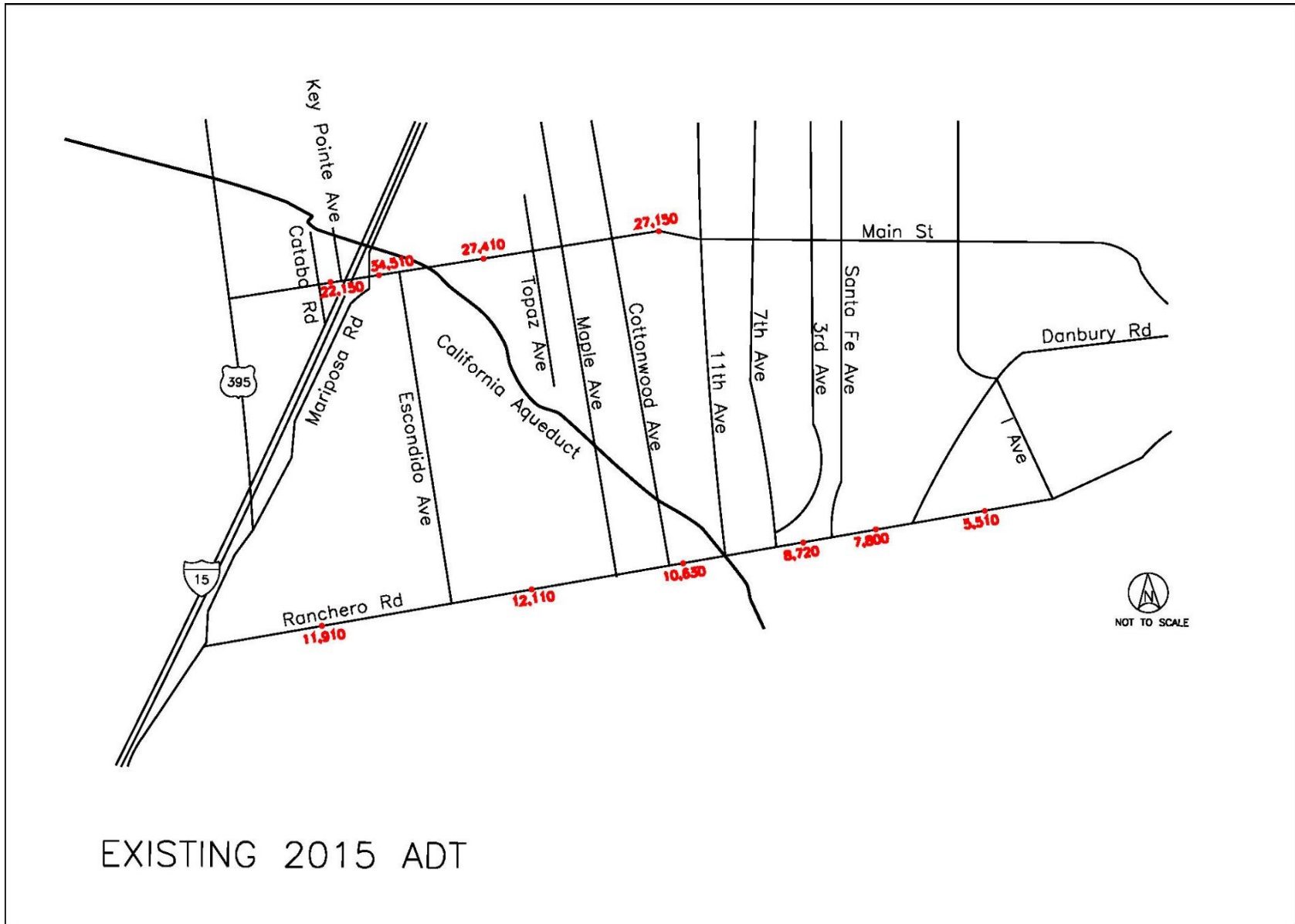






Figure 6: Existing Average Daily Traffic on Study Roadway Segments



**Table 4: Intersection Levels of Service - Existing Conditions**

INTERSECTION	S/U	AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	B	11.4	B	16.2
Main Street at I-15 Southbound Ramps	S	B	12.9	C	23.4
Main Street at I-15 Northbound Ramps	S	B	10.9	C	31.8
Main Street at Mariposa Road	S	C	23.1	C	24.9
Main Street at Escondido Avenue	S	B	19.3	C	20.9
Main Street at Topaz Avenue	S	B	11.6	B	12.1
Main Street at Maple Avenue	S	B	17.7	B	15.1
Ranchero Road at Escondido Avenue	S	B	17.0	B	13.8
Ranchero Road at Maple Avenue	U	D	26.8	E	44.4
Ranchero Road at Cottonwood Avenue	U	C	17.0	D	33.3
Ranchero Road at 11th Avenue	U	C	17.0	C	21.7
Ranchero Road at 7th Avenue	U	B	12.8	B	15.0
Ranchero Road at Santa Fe Avenue	S	B	12.6	B	15.1
Ranchero Road at Danbury Avenue	U	B	14.0	C	16.3

**Table 5: Roadway Segment Capacity Analysis - Existing Conditions**

ROADWAY SEGMENT			NUMBER OF LANES	LOS D CAPACITY	EXISTING (2015) DAILY TRAFFIC VOLUME	LOS D OR BETTER
ROADWAY	FROM	TO				
Main Street	Cataba Road	I-15	6D	46,100	22,150	YES
	I-15	Escondido Avenue	6D	46,100	34,510	YES
	Escondido Avenue	Maple Avenue	4D-P	30,600	27,410	YES
	Maple Avenue	3rd Avenue	4D-P	30,600	27,150	YES
Ranchero Road	Mariposa Road	Escondido Ave.	2U	14,500	11,910	YES
	Escondido Avenue	Maple Ave	2U	14,500	12,110	YES
	Maple Avenue	7th Ave	2U	14,500	10,630	YES
	7th Avenue	Santa Fe Ave	4D	30,600	8,720	YES
	Santa Fe Avenue	Danbury Ave	4D	30,600	7,800	YES
	Danbury Avenue	I Ave	2U	14,500	5,510	YES

## CHAPTER 4 FUTURE CONDITIONS

This section presents forecast future traffic volumes for two analysis timeframes: Near-Term (2017) and Horizon Year (2040), and the LOS analysis results for each of these. For each scenario, planned and committed transportation improvements that will be in place by the analysis year were assumed.

### 4.1 Opening Year (2017) Near-Term Future Conditions

Phase II of the Ranchero Corridor Project (the interchange with I-15) was completed and opened to traffic in February 2015 and has been assumed as part of the Existing Conditions analysis. No additional roadway improvements have been assumed to be completed between 2015 and 2017.

#### 4.1.1 Near-Term Traffic Volumes

Near-Term forecasts were developed by applying a 2 percent growth factor to existing traffic volumes along Main Street and a 4 percent per year growth factor to traffic volumes along Ranchero Road. The growth factors were developed based on historical traffic data and trend. The higher growth factor for Ranchero Road reflects the completion of the Ranchero Road interchange with I-15 which provides greater access to/from Ranchero Road and will likely result in increased traffic volumes on Ranchero Road, particularly as Main Street becomes more congested in the vicinity of I-15 in the future. Figure 7 shows the Near-Term Future AM and PM peak hour turning movement volumes at study intersections. Figure 8 shows the average daily traffic on study roadway segments for Near-Term Conditions.

#### 4.1.2 Near-Term Intersection Levels of Service

Table 6 shows the results of the levels of service analysis for Near-Term Future Conditions. All of the study area intersections are forecast to operate at an acceptable level of service D or better with two exceptions. The unsignalized intersections of Ranchero Road at Maple Avenue is forecast to operate at LOS E during the evening peak hour and the unsignalized intersection of Ranchero Road at Cottonwood Avenue is forecast to operate at LOS E during the evening peak hour.

#### 4.1.3 Near-Term Roadway Segment Capacity Analysis

Average daily traffic volumes forecast along study area roadway segments in 2017 are all well within the LOS D carrying capacity of the roadways. Table 7 summarizes the results of the analysis. Review of Table 7 shows that all roadway segments are estimated to carry traffic within their LOS D capacity.

**Table 6: Intersection Levels of Service – Near-Term (2017) Conditions**

INTERSECTION	S/U	AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	B	11.4	B	16.0
Main Street at I-15 Southbound Ramps	S	B	12.9	C	23.4
Main Street at I-15 Northbound Ramps	S	B	10.8	C	31.6
Main Street at Mariposa Road	S	C	23.1	C	24.8
Main Street at Escondido Avenue	S	B	19.1	C	20.8
Main Street at Topaz Avenue	S	B	11.5	B	12.0
Main Street at Maple Avenue	S	B	17.6	B	14.9
Ranchero Road at Escondido Avenue	S	B	17.1	B	13.9
Ranchero Road at Maple Avenue	U	D	30.5	F	51.2
Ranchero Road at Cottonwood Avenue	U	C	18.3	E	38.2
Ranchero Road at 11th Avenue	U	C	17.6	C	23.0
Ranchero Road at 7th Avenue	U	B	13.1	C	15.5
Ranchero Road at Santa Fe Avenue	S	B	12.7	B	15.0
Ranchero Road at Danbury Avenue	U	B	14.5	C	17.3

**Table 7: Roadway Segment Capacity Analysis – Near-Term (2017) Conditions**

ROADWAY SEGMENT			NUMBER OF LANES	LOS D CAPACITY	2017 DAILY TRAFFIC VOLUME	LOS D OR BETTER
ROADWAY	FROM	TO				
Main Street	Cataba Road	I-15	6D	46,100	23,510	YES
	I-15	Escondido Avenue	6D	46,100	36,620	YES
	Escondido Avenue	Maple Avenue	4D-P	30,600	29,090	YES
	Maple Avenue	3rd Avenue	4D-P	30,600	28,810	YES
Ranchero Road	Mariposa Road	Escondido Ave.	2U	14,500	13,400	YES
	Escondido Avenue	Maple Ave	2U	14,500	13,620	YES
	Maple Avenue	7th Ave	2U	14,500	11,960	YES
	7th Avenue	Santa Fe Ave	4D	30,600	9,810	YES
	Santa Fe Avenue	Danbury Ave	4D	30,600	8,770	YES
	Danbury Avenue	I Ave	2U	14,500	6,200	YES

Figure 7: Near-Term (2017) AM and PM Peak Hour Traffic Volumes

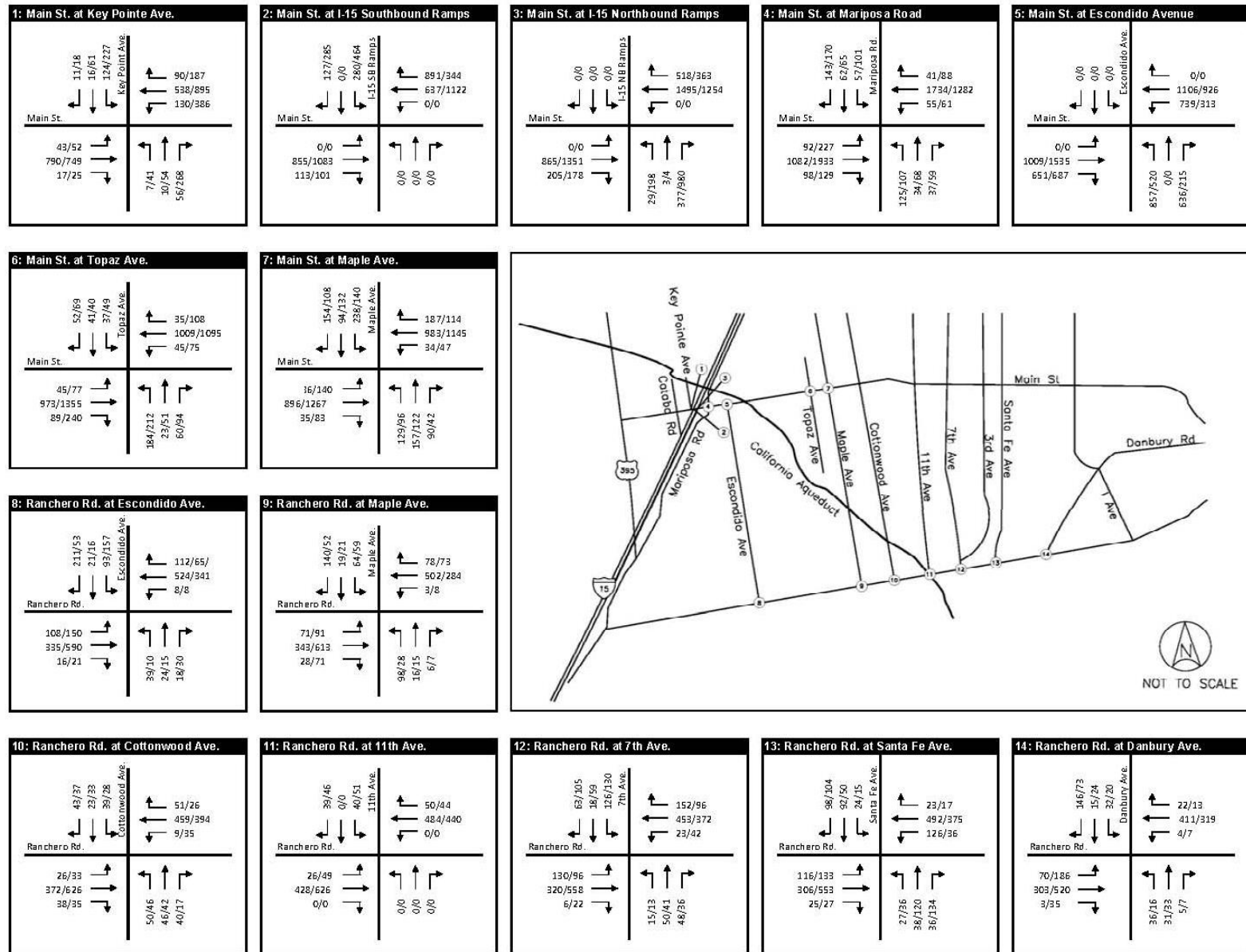
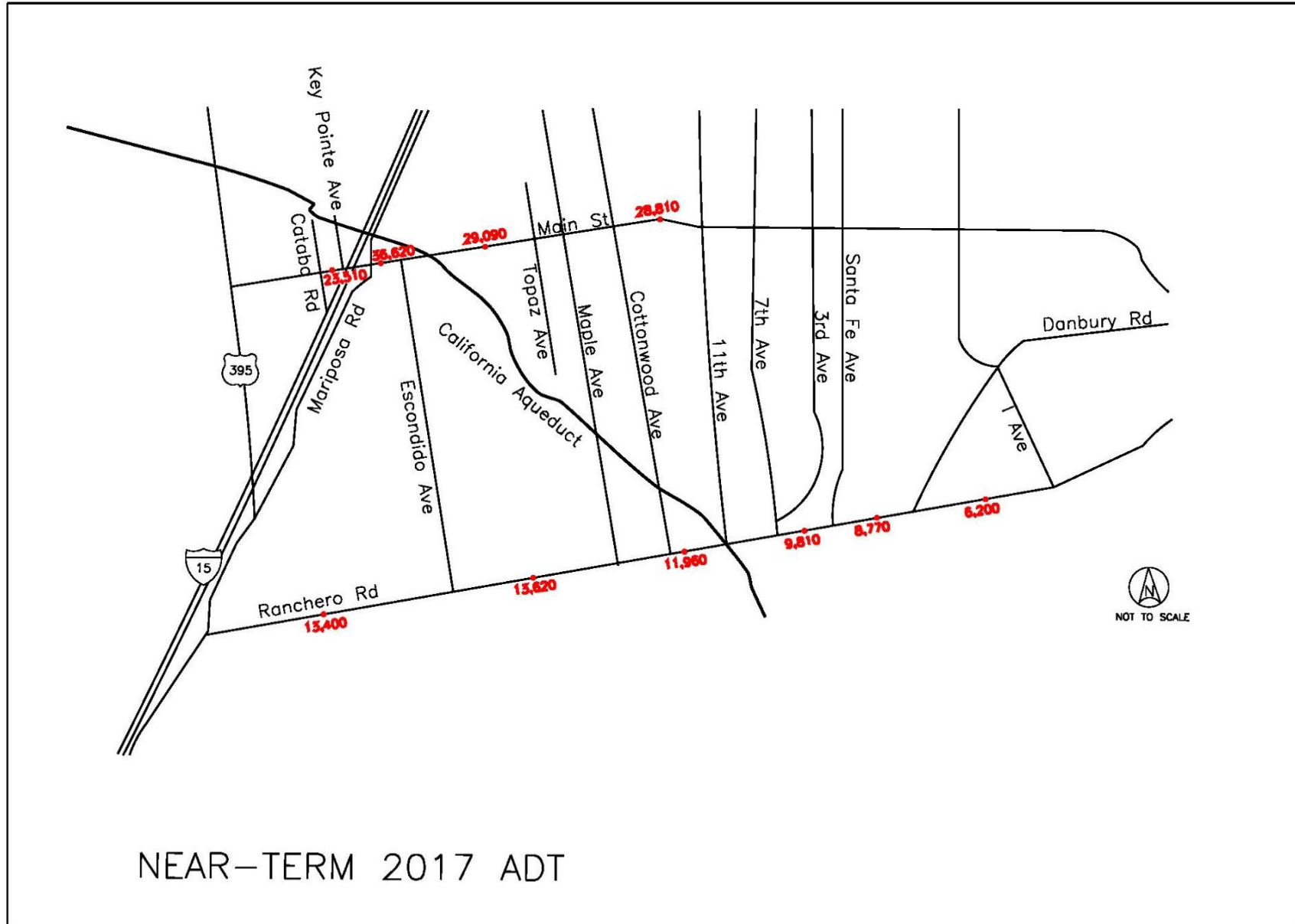




Figure 8: Near-Term (2017) Average Daily Traffic on Study Roadway Segments



## 4.2 Horizon Year (2040) Conditions

The Horizon Year analysis assumed build-out of all local and regional arterials in accordance with the City of Hesperia's Traffic Circulation Plan. Figure 9 shows the City's adopted Traffic Circulation Plan. The recommended traffic control and lane configurations of study area intersections based on the adopted Traffic Circulation Plan are presented in Figure 10. Of the 12 study area intersections, all are expected to be controlled by traffic signals by 2040 with the exception of Ranchero Road at 11<sup>th</sup> Avenue.

### 4.2.1 Horizon Year Traffic Volume

As described previously in Section 2.4, 2040 traffic volume forecasts were prepared based on the San Bernardino Transportation Analysis Model (SBTAM) developed and maintained by the SANBAG. The model generates 2035 traffic volume forecasts based on input from local jurisdictions in San Bernardino County on the land use and transportation network assumptions to be included within each jurisdiction for the planning horizon year of the model. Generally, these assumptions are consistent with the General Plans for the jurisdictions.

2035 AM peak period, PM peak period and average daily forecasts were requested from SANBAG. The traffic volumes from the model were factored to reflect levels of growth likely to occur between 2035 and 2040. A growth factor of 2 percent per year was applied.

As described previously, peak hour traffic volume turning movements were developed by converting the peak period traffic link volumes from the model to peak hour, using factors provided by SANBAG. Turning movements were estimated based on existing traffic volume turning movements, existing link volumes from the SBTAM model and the 2040 link volumes. The estimated turning movements were 'smoothed' to more accurately reflect conservation of flow and balance between intersections. Figure 11 shows the estimated 2040 AM and PM peak hour traffic volume turning movements at study area intersections. Figure 12 shows average daily traffic volumes on study roadway segments for 2040 conditions.

### 4.2.2 Horizon Year Intersection Level of Service Analysis

By the Horizon Year, all study area intersections are assumed to be controlled by traffic signals with the exception of the intersection of Ranchero Road and 11<sup>th</sup> Avenue, which will continue to be controlled by stop signs on 11<sup>th</sup> Avenue. Table 8 shows the results of the intersection levels of service for the Horizon Year Conditions. All of the study area intersections are estimated to operate at an acceptable LOS C or better except for Main Street at Key Pointe Avenue which is estimated to operate at an acceptable LOS D during the evening peak hour in 2040.

### 4.2.3 Horizon Year Roadway Segment Capacity Analysis

Table 8 shows the results of the roadway segment capacity analysis for Horizon Year Conditions. All roadway segments are forecast to carry traffic volumes well within the LOS D capacity of their General Plan classification.

Figure 9: City of Hesperia Traffic Circulation Plan

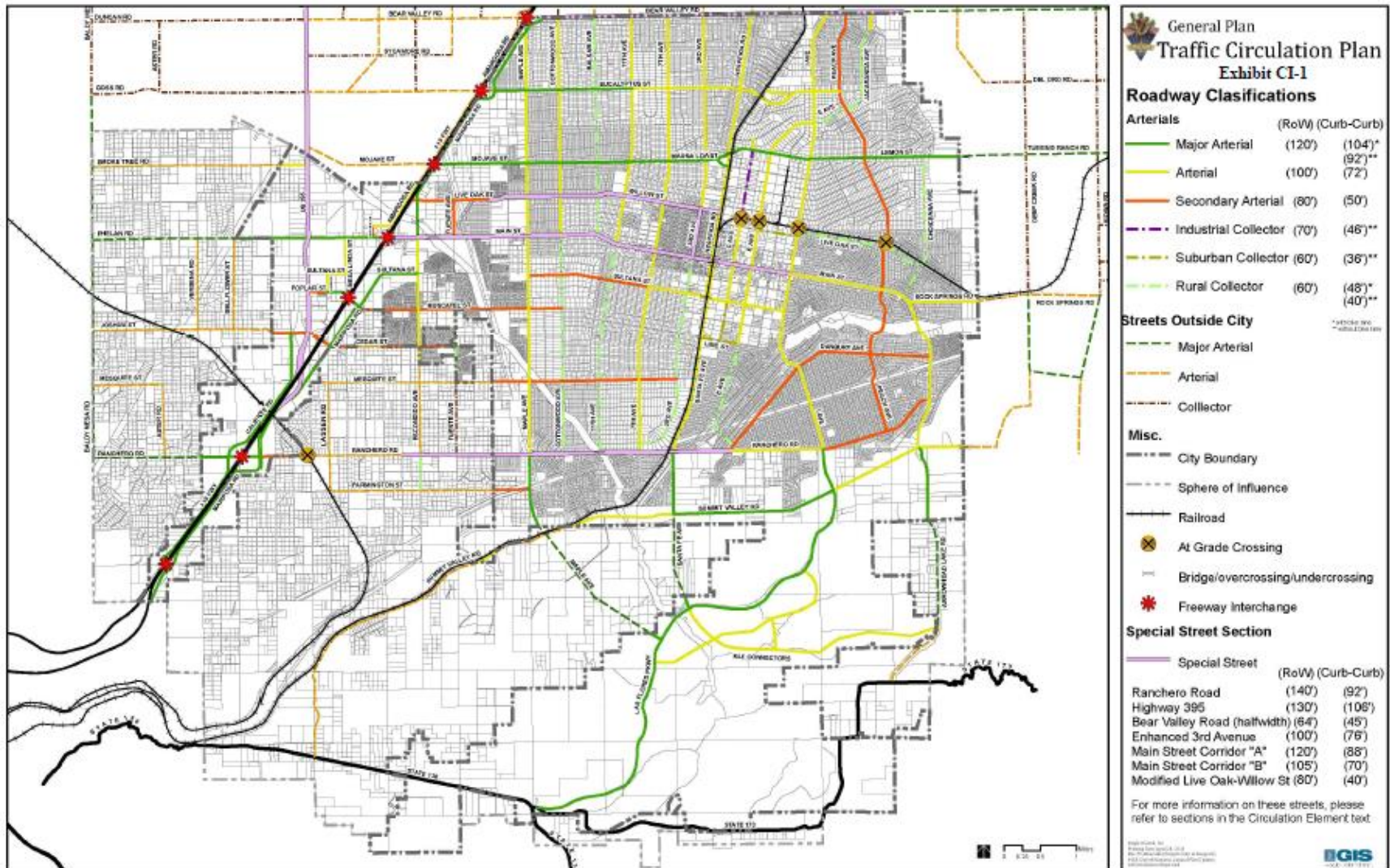
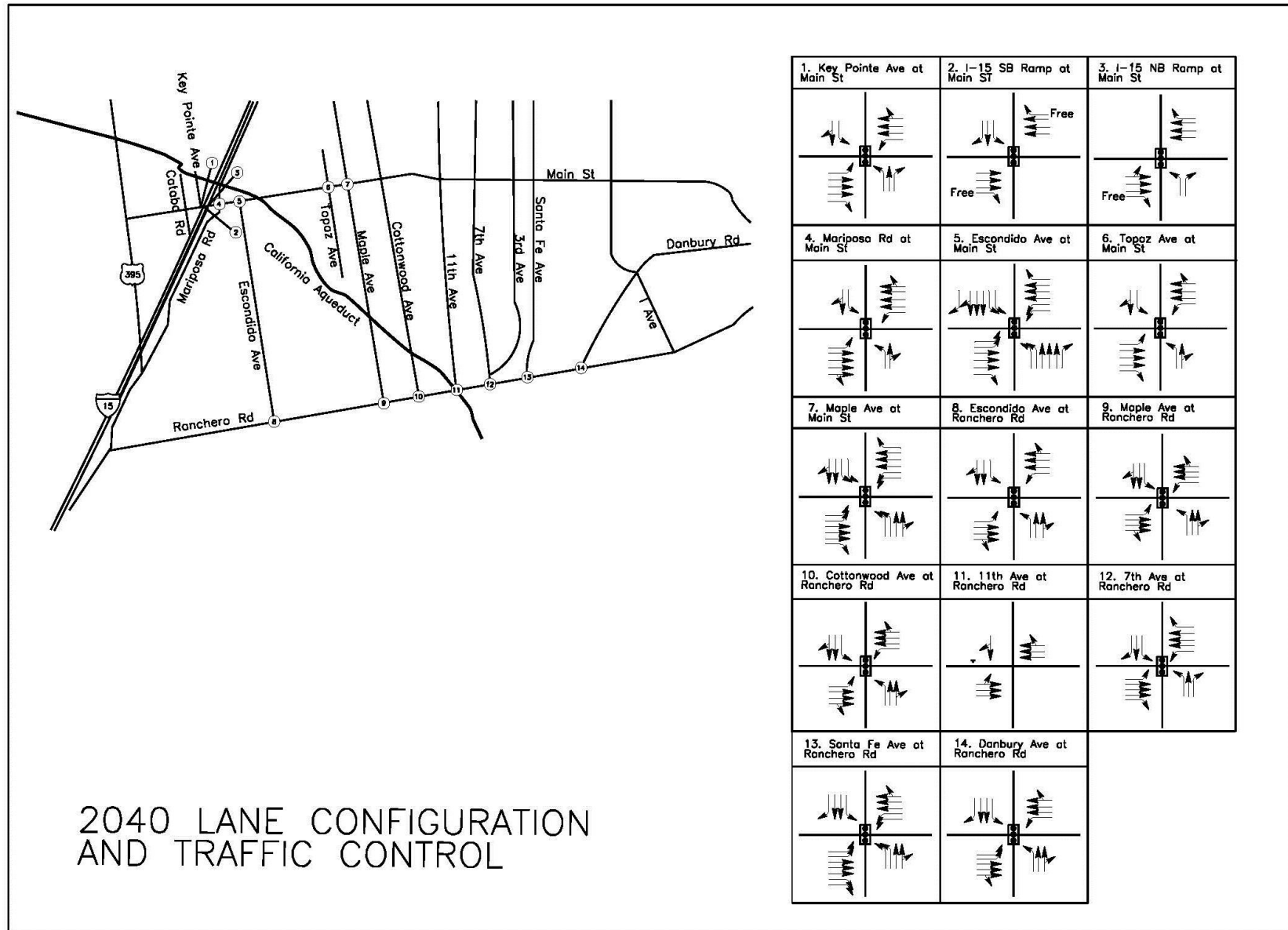


Figure 10: Study Intersection Lane Configurations and Traffic Control - Horizon Year (2040)



**Figure 11: Horizon Year (2040) AM and PM Peak Hour Traffic Volumes**



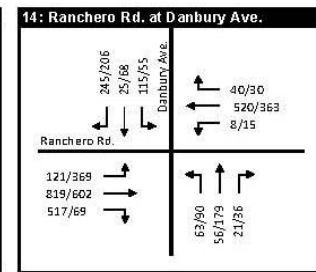
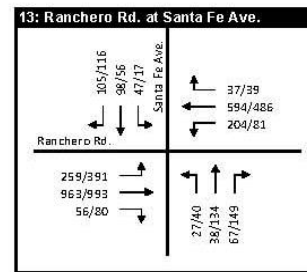
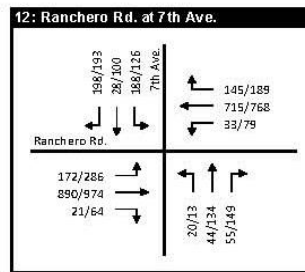
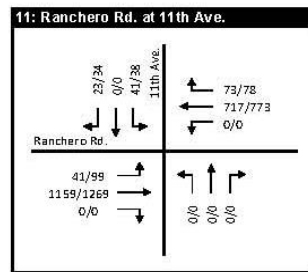
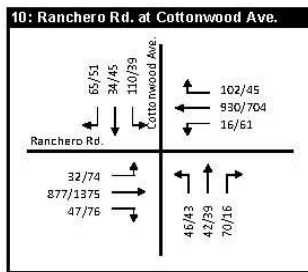
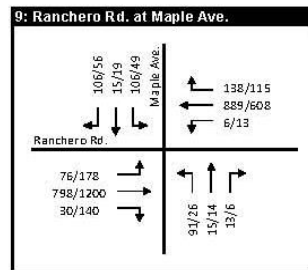
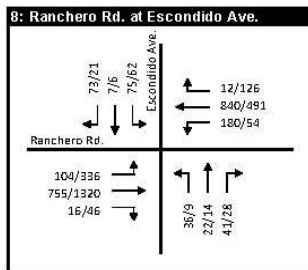
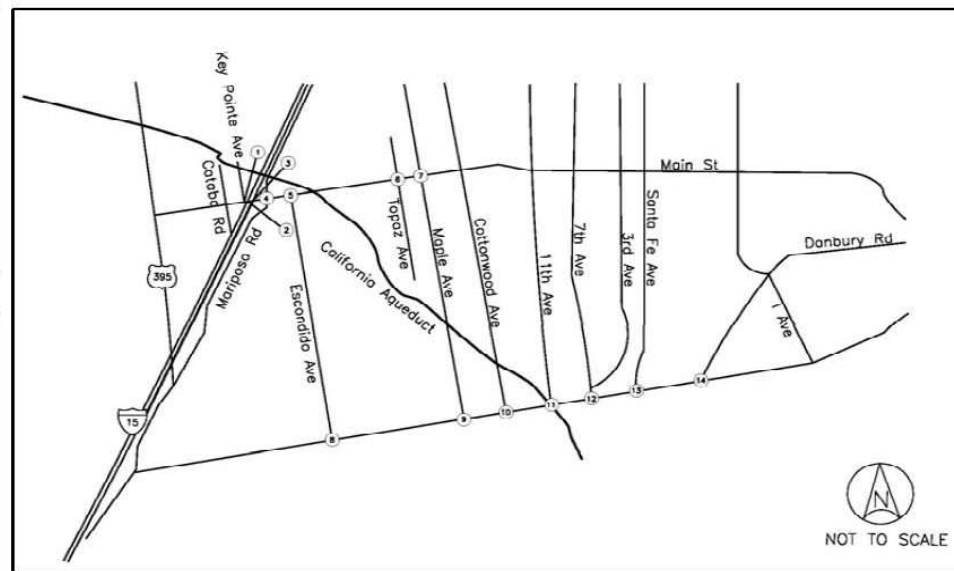
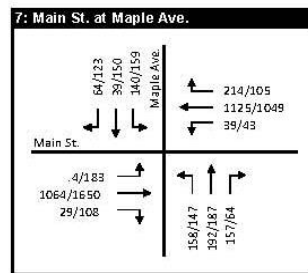
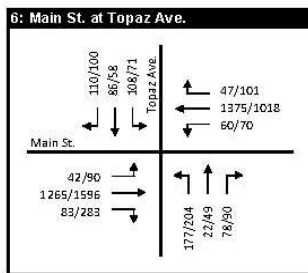
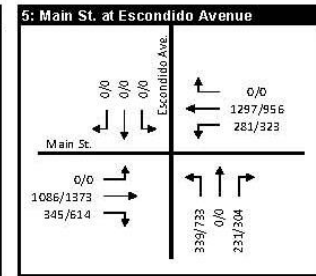
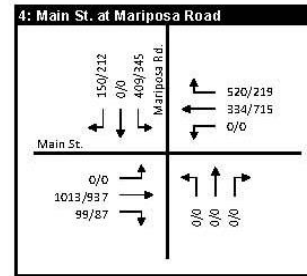
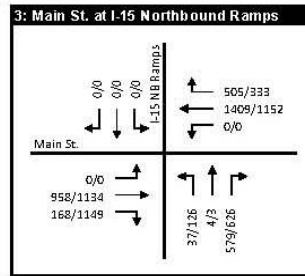
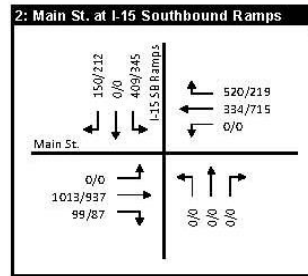
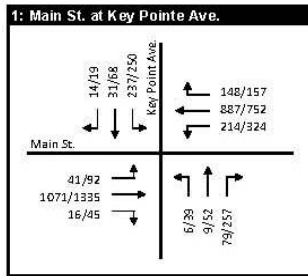
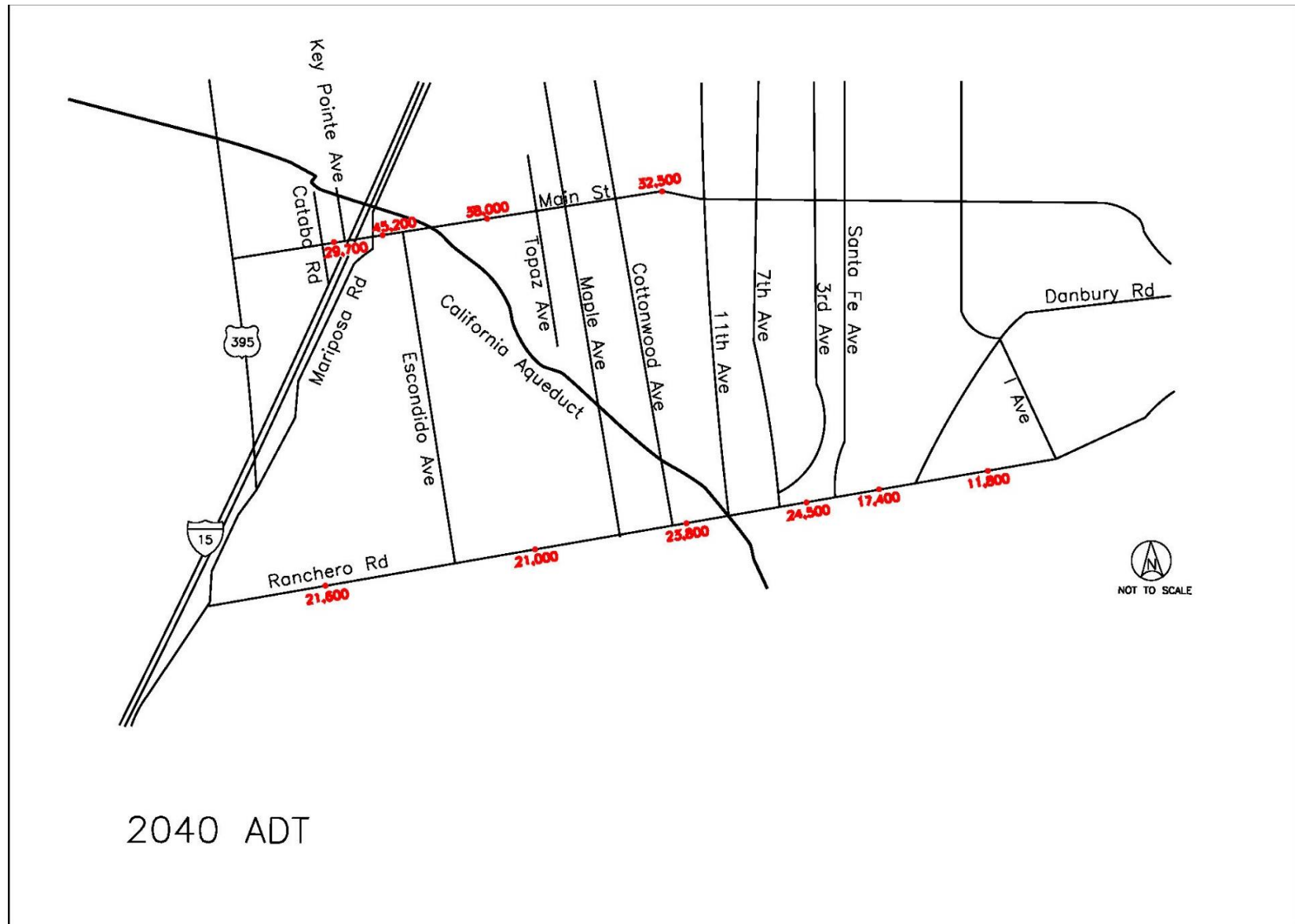




Figure 12: Horizon Year (2040) Average Daily Traffic on Study Roadway Segments



**Table 8: Intersection Levels of Service - 2040 Conditions**

INTERSECTION	S/U	AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	C	30.9	D	39.0
Main Street at I-15 Southbound Ramps	S	B	16.8	B	16.4
Main Street at I-15 Northbound Ramps	S	B	15.4	B	18.3
Main Street at Mariposa Road	S	C	27.8	D	36.1
Main Street at Escondido Avenue	S	C	21.2	C	25.6
Main Street at Topaz Avenue	S	C	23.4	C	24.6
Main Street at Maple Avenue	S	C	28.2	C	25.6
Ranchero Road at Escondido Avenue	S	C	23.6	B	18.5
Ranchero Road at Maple Avenue	S	C	22.6	B	15.4
Ranchero Road at Cottonwood Avenue	S	C	20.5	B	15.2
Ranchero Road at 11th Avenue	U	C	32.5	D	31.8
Ranchero Road at 7th Avenue	S	C	31.4	C	32.4
Ranchero Road at Santa Fe Avenue	S	C	27.2	C	30.6
Ranchero Road at Danbury Avenue	S	C	25.7	C	34.1

**Table 9: Roadway Segment Capacity Analysis - 2040 Conditions**

ROADWAY SEGMENT			NUMBER OF LANES	LOS CAPACITY	2040 DAILY TRAFFIC VOLUME	LOS D OR BETTER
ROADWAY	FROM	TO				
Main Street	Cataba Road	I-15	6D	46,100	29,700	YES
	I-15	Escondido Avenue	6D	46,100	45,200	YES
	Escondido Avenue	Maple Avenue	6D	41,600	38,000	YES
	Maple Avenue	3rd Avenue	6D	41,600	32,500	YES
Ranchero Road	Mariposa Road	Escondido Ave.	6D	41,600	21,600	YES
	Escondido Avenue	Maple Ave	6D	41,600	21,000	YES
	Maple Avenue	7th Ave	6D	41,600	23,800	YES
	7th Avenue	Santa Fe Ave	6D	41,600	24,500	YES
	Santa Fe Avenue	Danbury Ave	6D	41,600	17,400	YES
	Danbury Avenue	I Ave	4D	30,600	11,800	YES

## 5.0 IMPACT ASSESSMENT

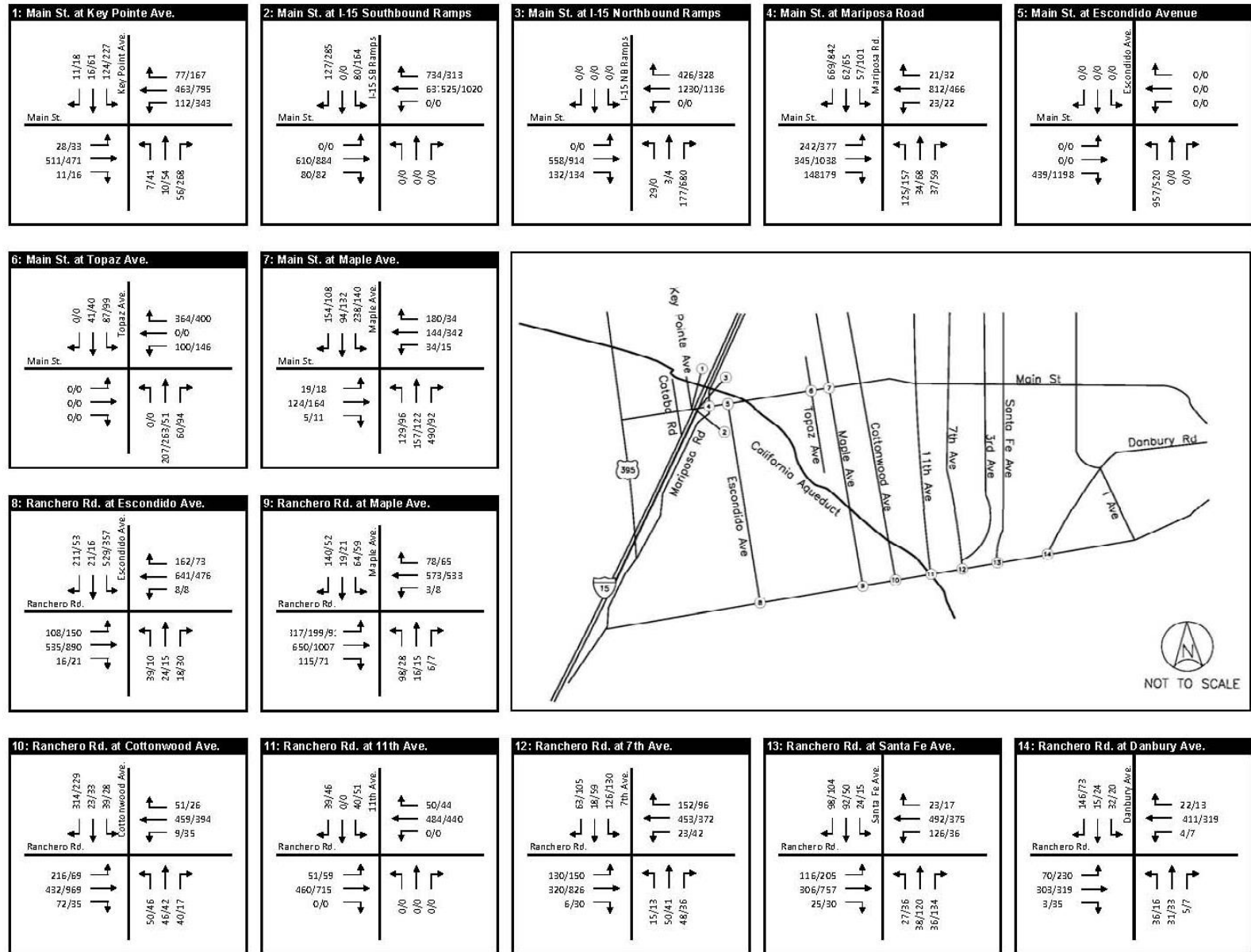
The proposed reconstruction of the California Aqueduct crossings at Main Street and at Ranchero Road is to accommodate the future widening of these two roadways to accommodate anticipated growth in traffic volume. Once complete, these projects will provide a positive impact on the surrounding transportation network in the City by increasing the potential capacity of Main Street and Ranchero Road. The expansion of the Main Street crossing will be accomplished by constructing a new bridge adjacent to the existing bridge; each bridge will accommodate a single direction of travel with the transitions occurring as the at-grade roadway sections approach the bridges. The City does not anticipate closing the existing Main Street bridge to traffic during the construction process for more than one or two days to complete the transitions between the roadway and the bridges. However, during construction on the Ranchero Road crossing, Ranchero Road will become discontinuous when the existing bridge over the California Aqueduct is demolished and reconstructed, a process that could take approximately 12 months to complete. This section identifies potential traffic related impacts during construction. Each project is evaluated separately, representing the scenario in which they are to be constructed sequentially, with only one bridge inaccessible at a time; and in combination, representing a concurrent construction scenario with both bridges under construction at the same time. This would represent a worst case scenario and, because of the potential traffic implications, one that the City does not intend to pursue. It was assumed that construction would occur during 2017.

### 5.1 2017 Conditions with the Main Street Aqueduct Crossing under Construction

During the construction of the Main Street Aqueduct Crossing, Main Street will remain open to through traffic. However, it may be necessary to reduce the capacity of the roadway from east of the Walmart Center (east of Escondido Avenue) to approximately Pyrite Avenue (west of Topaz Avenue) for a day or two to accommodate construction activities. Additionally, construction-related traffic and activities may temporarily impact traffic flow and operations along Main Street in the vicinity of the construction. It is expected that some of the traffic from I-15 that would normally exit at Main Street and travel east of Escondido Avenue will divert to alternative routes to avoid construction activities on Main Street. Travelers to destinations along Main Street between the Aqueduct and Cottonwood Road could travel along Mariposa Road to Live Oak Street to avoid the road closure at the Aqueduct. I-15 Corridor trips originating to the north of Main Street, travelling to destinations along Main Street east of Cottonwood Road, could exit I-15 at Bear Valley Road and travel to their destinations along local arterials such as Cottonwood Avenue, 7<sup>th</sup> Avenue and Santa Fe Avenue. Likewise, trips originating south of Main Street would use the same local arterials to bypass the Main Street Road closure; I-15 Corridor trips from the south could exist at Ranchero Road and again use roadways such as Cottonwood Avenue, 7<sup>th</sup> Avenue or Santa Fe Avenue to travel to destinations east of the Main Street Road closure. Figure 13 shows the resulting AM and PM peak hour traffic volume turning movements during construction.

The results of the levels of service analysis of study intersections during the Main Street Aqueduct Crossing construction are presented in Table 10. Table 10 compares 2017 conditions without project construction (Base Conditions) to 2017 conditions during construction. Review of Table 10 shows that the unsignalized intersections of Ranchero Road at Maple Avenue and Ranchero Road at Cottonwood Avenue, which are forecast to operate at unacceptable levels of service in 2017, will deteriorate further during the construction of the Main Street project. This is attributable to some traffic, which under the Base Conditions would exit northbound I-15 at Main Street and travel east of the Aqueduct, exiting instead at Ranchero Road and using Maple Avenue or Cottonwood Avenue to avoid construction activities on Main Street.

Figure 13: Near-Term (2017) AM and PM Peak Hour Traffic Volume Turning Movements with Main Street Project Construction







**Table 10: Near-Term (2017) Intersection Levels of Service during Main Street Project Construction**

INTERSECTION	S/U	BASE CONDITIONS				DURING CONSTRUCTION			
		AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	B	11.4	B	16.0	B	12.9	B	17.0
Main Street at I-15 Southbound Ramps	S	B	12.9	C	23.4	A	7.8	C	21.1
Main Street at I-15 Northbound Ramps	S	B	10.8	C	31.6	A	6.0	B	19.7
Main Street at Mariposa Road	S	C	23.1	C	24.8	D	44.5	D	50.4
Main Street at Escondido Avenue	S	B	19.1	C	20.8	C	22.4	C	27.5
Main Street at Topaz Avenue	S	B	11.5	B	12.0	B	19.5	B	19.9
Main Street at Maple Avenue	S	B	17.6	B	14.9	B	15.4	C	23.1
Ranchero Road at Escondido Avenue	S	B	17.1	B	13.9	C	24.6	B	19.0
Ranchero Road at Maple Avenue	U	D	30.5	F	51.2	F	249.0	F	275.8
Ranchero Road at Cottonwood Avenue	U	C	18.3	E	38.2	F	114.0	F	228.8
Ranchero Road at 11th Avenue	U	C	17.6	C	23.0	C	19.1	D	26.6
Ranchero Road at 7th Avenue	U	B	13.1	C	15.5	B	13.1	D	26.1
Ranchero Road at Santa Fe Avenue	S	B	12.7	B	15.0	B	12.7	B	13.6
Ranchero Road at Danbury Avenue	U	B	14.5	C	17.3	B	14.5	D	28.9

## 5.2 2017 Conditions with the Ranchero Road Aqueduct Crossing under Construction

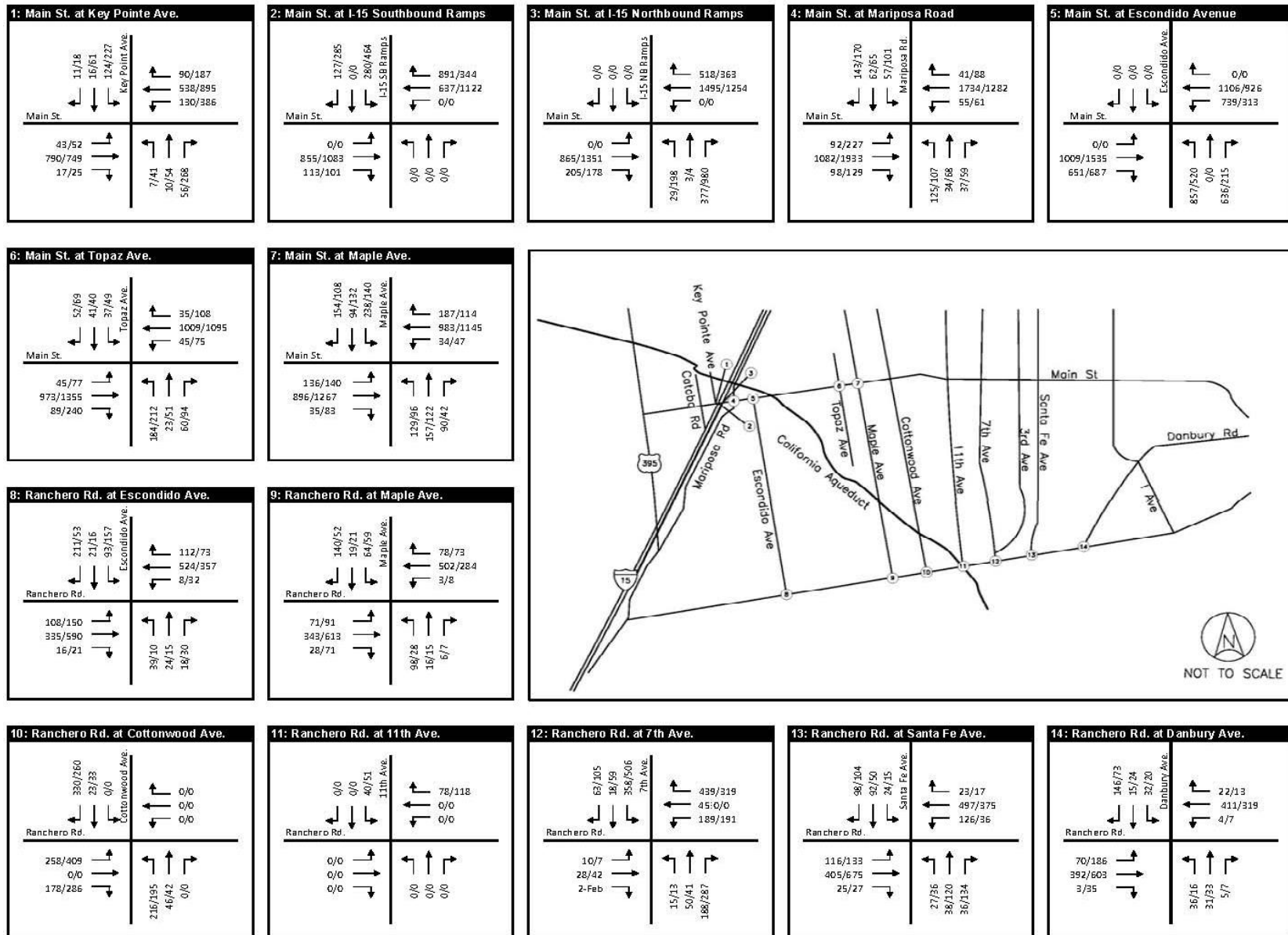
During the construction of the Ranchero Road Aqueduct Crossing, Ranchero Road will be closed to through traffic from west of Kern Avenue to east of 11<sup>th</sup> Street. I-15 Corridor trips exiting at Ranchero Road and travelling to destinations east of the Aqueduct Crossing will use Maple Avenue or Cottonwood Avenue to travel to Mesquite Avenue one-mile north of Ranchero Road or to Farmington Avenue one-half mile south of Ranchero Road to cross the Aqueduct, returning to Ranchero Road at 7<sup>th</sup> Avenue (from Mesquite Avenue) or at Santa Fe Avenue (from Farmington Avenue). These roads are currently two-lane roadways with stop-controlled intersections except at Ranchero Road and Santa Fe Avenue. Trips from east of the Aqueduct, travelling to destinations west of the Aqueduct will likewise use Farmington Avenue to Mesquite Avenue to bypass the construction closure on Ranchero Road.

The neighborhood immediately north of Ranchero Road and east of the Aqueduct currently has connections to Ranchero Road at 7<sup>th</sup> Avenue on the east and 11<sup>th</sup> Avenue on the west. Depending upon the alternative selected for the Ranchero Road Aqueduct Crossing and the means and methods of construction, 11<sup>th</sup> Avenue access to Ranchero Road may be closed during construction. As a result, traffic from the neighborhood travelling west of the Aqueduct will exit northbound on 11<sup>th</sup> Avenue to westbound Fir Street to southbound Cottonwood Avenue. Traffic with destinations to the east of the Aqueduct, will exit the neighborhood on 7<sup>th</sup> Avenue, southbound to Ranchero Road.

Figure 14 shows the forecast near-term (2017) AM and PM peak hour traffic volume turning movements during construction.

The results of the levels of service analysis of study intersections during the Ranchero Road Aqueduct Crossing construction are presented in Table 11. Table 11 compares 2017 conditions without project construction (Base Conditions) to 2017 conditions during construction. Review of Table 11 shows that the intersections of Ranchero Road at Maple Avenue and Ranchero Road at Cottonwood Avenue, which are estimated to operate at unacceptable levels of service E or F in 2017, will be slightly worsened with the changes in traffic patterns expected to occur with the Ranchero Road Project. Additionally, the intersection of Ranchero Road at 7<sup>th</sup> Street is estimated to operate at LOS F in the PM peak hour during construction of the Ranchero Road project. This is again attributable to increased turning movements at this intersection (northbound right, southbound left, and eastbound left and right) as vehicles divert to avoid the Ranchero Road closure at the Aqueduct.

Figure 14: Near-Term (2017) AM and PM Peak Hour Traffic Volume Turning Movements with Ranchero Road Project Construction



**Table 11: Near-Term (2017) Intersection Levels of Service during Ranchero Road Project Construction**

INTERSECTION	S/U	BASE CONDITIONS				DURING CONSTRUCTION			
		AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	B	11.4	B	16.0	B	11.4	B	16.0
Main Street at I-15 Southbound Ramps	S	B	12.9	C	23.4	B	12.9	C	23.4
Main Street at I-15 Northbound Ramps	S	B	10.8	C	31.6	B	10.8	C	31.6
Main Street at Mariposa Road	S	C	23.1	C	24.8	C	23.1	C	24.8
Main Street at Escondido Avenue	S	B	19.1	C	20.8	B	19.1	C	20.8
Main Street at Topaz Avenue	S	B	11.5	B	12.0	B	11.5	B	12.0
Main Street at Maple Avenue	S	B	17.6	B	14.9	B	17.6	B	14.9
Ranchero Road at Escondido Avenue	S	B	17.1	B	13.9	B	17.1	B	13.7
Ranchero Road at Maple Avenue	U	D	30.5	F	51.2	D	30.5	F	53.7
Ranchero Road at Cottonwood Avenue	U	C	18.3	E	38.2	B	14.5	E	40.6
Ranchero Road at 11th Avenue	U	C	17.6	C	23.0	A	8.6	A	8.7
Ranchero Road at 7th Avenue	U	B	13.1	C	15.5	C	21.7	F	50.3
Ranchero Road at Santa Fe Avenue	S	B	12.7	B	15.0	B	12.2	B	14.4
Ranchero Road at Danbury Avenue	U	B	14.5	C	17.3	C	16.4	C	24.4

### 5.3 2017 Post-Ranchero Road Crossing Construction with No 11<sup>th</sup> Avenue Connection to Ranchero Road

The intersection of 11<sup>th</sup> Avenue at Ranchero Road is located approximately 60 feet east of the existing Ranchero Road Bridge over the California Aqueduct. The proximity of the intersection to the Aqueduct potentially interferes with the design for an expanded bridge at this location, and even if the bridge could be designed to physically accommodate allow for the intersection, the close proximity would negatively impact the operations of the intersection and traffic flow along Ranchero Road. Therefore, the potential impacts of terminating 11<sup>th</sup> Avenue north of Ranchero Road have been evaluated.

A fairly small amount of traffic currently uses 11<sup>th</sup> Avenue to/from Ranchero Road (approximately 73 vehicles outbound from 11<sup>th</sup> Avenue to Ranchero Road and 70 vehicles inbound to 11<sup>th</sup> Avenue from Ranchero Road during the AM peak hour; 90 vehicles outbound from 11<sup>th</sup> Avenue to Ranchero Road and 86 vehicles inbound to 11<sup>th</sup> Avenue from Ranchero Road during the PM peak hour). This traffic is attributable to the immediately adjacent residences on 11<sup>th</sup> Avenue and on Wells Fargo Street.

If 11<sup>th</sup> Avenue is terminated in a cul-de-sac south of Wells Fargo Street (in order to maintain access to the residence located along 11<sup>th</sup> Avenue south of Wells Fargo Street), existing traffic would use Wells Fargo Street and 7<sup>th</sup> Avenue to access Ranchero Road. The intersection of Ranchero Road at 7<sup>th</sup> Avenue is currently controlled by four-way stop signs and operates at LOS B during both the AM and PM peak hours. In 2040, this intersection is estimated to continue to operate at acceptable levels of service of C or better with traffic signal control.

With the additional traffic forecast to use the intersection of Ranchero Road and 7<sup>th</sup> Avenue with the closure of the Ranchero Road/11<sup>th</sup> Avenue intersection, this intersection is estimated to continue to operate at LOS C or better in 2017 with 4-way stop control.

NEAR TERM(2017) INTERSECTION LOS WITH 11 <sup>TH</sup> AVENUE CLOSURE				
INTERSECTION	AM PEAK HOUR		PM PEAK HOUR	
	LOS	DELAY	LOS	DELAY
Ranchero Road at 7th Avenue	C	24.0	C	24.1

By 2040, it is assumed that the intersection of Ranchero Road at 7<sup>th</sup> Avenue will be controlled by traffic signals. Even with the additional traffic from the closure of the Ranchero Road/11<sup>th</sup> Avenue intersection, this intersection is estimated to operate at an acceptable LOS C operations during both peak hours.

HORIZON YEAR (2040) INTERSECTION LOS WITH 11 <sup>TH</sup> AVENUE CLOSURE				
INTERSECTION	AM PEAK HOUR		PM PEAK HOUR	
	LOS	DELAY	LOS	DELAY
Ranchero Road at 7th Avenue	D	32.5	C	34.7

With the closure of 11<sup>th</sup> Avenue south of Wells Fargo Street, Wells Fargo Street, which is currently an unpaved roadway, should be paved between 1<sup>st</sup> Avenue and 7<sup>th</sup> Avenue.

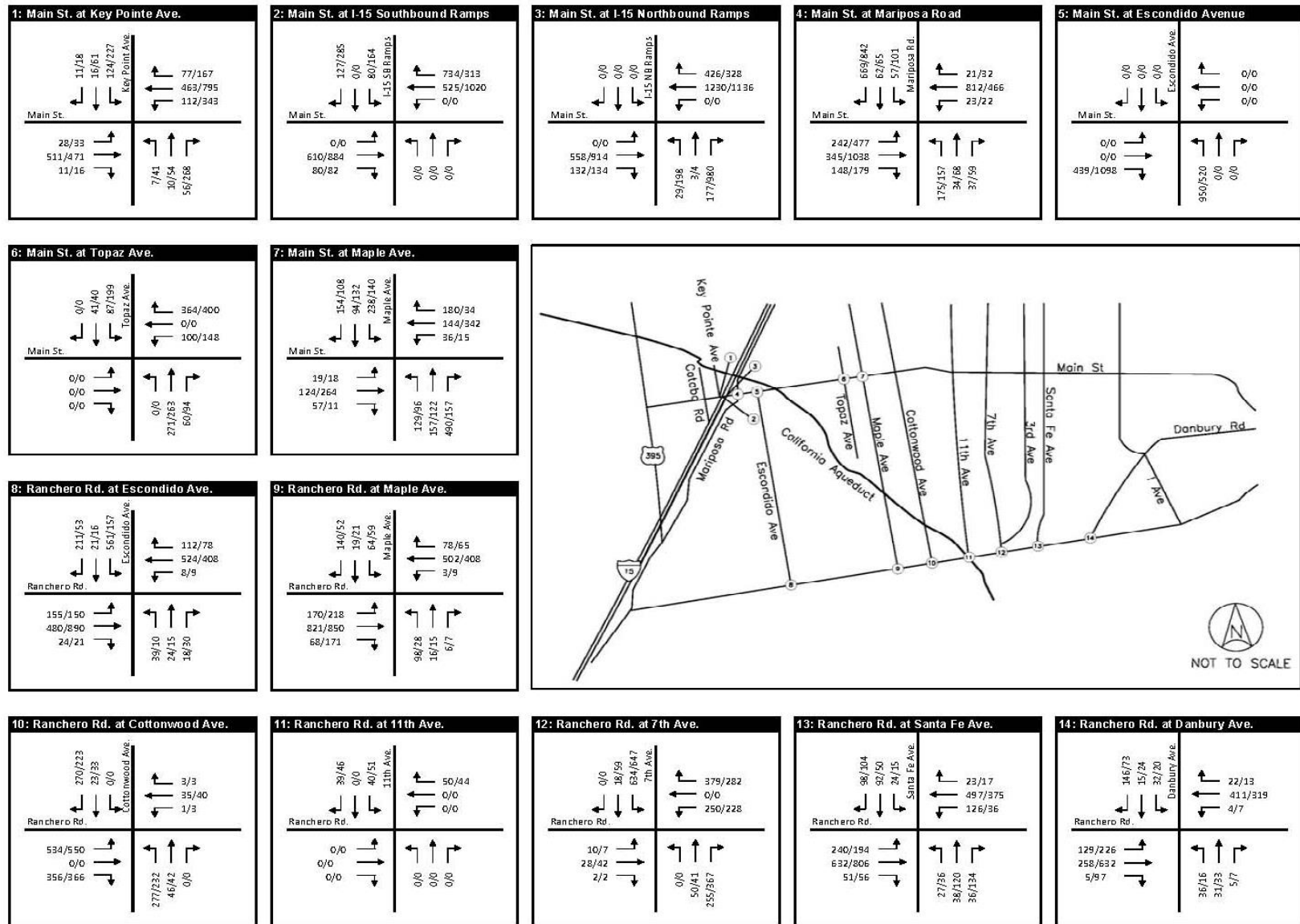
#### **5.4 2017 Conditions with Main Street and Ranchero Road Aqueduct Crossings under Construction**

In order to minimize the potential traffic related impacts of the construction of the Main Street and Ranchero Road aqueduct crossings, the City intends to construct the projects sequentially rather than concurrently. However, in order to evaluate a worst case scenario, the potential impacts of constructing both project simultaneously was analyzed. The California Aqueduct traverses the western portion of the City at an angle from northwest to southeast, crossing the arterial grid at skew angles. Because of this, there is the opportunity to accommodate traffic diversions from both construction projects simultaneously without creating a substantially increased traffic burden compared to accommodating each project individually. Figure 15 shows the Near-Term AM and PM peak hour traffic turning movement volumes at study intersection if both projects were to proceed concurrently.

The results of the levels of service analysis of study intersections assuming both the Main Street Project and the Ranchero Road Project were constructed concurrently are presented in Table 13. Table 13 compares 2017 conditions without project construction (Base Conditions) to 2017 conditions during construction. Review of Table 12 shows that the unsignalized intersections of Ranchero Road at Maple Avenue and Ranchero Road at Cottonwood Avenue, which are estimated to operate at unacceptable levels of service of E or F in 2017, and are expected to deteriorate further during construction of each of the projects individually, particularly with the construction of the Main Street Project. It will be similarly impacted by the two projects proceeding concurrently. Ranchero Road at 7<sup>th</sup> Avenue will also be impacted by increased turning movements as a result of traffic diverting to avoid the roadway closures associated with both of the Aqueduct Crossings. In addition, the signalized intersection of Main Street at Mariposa Avenue is estimated to be impacted, with its level of service deteriorating from C to E with the construction of the two projects occurring concurrently.



Figure 15: Near-Term (2017) AM and PM Peak Hour Traffic Volume Turning Movements with Concurrent Project Construction



**Table 12: Near-Term (2017) Intersection Levels of Service during Concurrent Projects Construction**

INTERSECTION	S/U	BASE CONDITIONS				DURING CONSTRUCTION			
		AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR	
		LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
Main Street at Key Pointe Avenue	S	B	11.4	B	16.0	B	12.9	B	17.0
Main Street at I-15 Southbound Ramps	S	B	12.9	C	23.4	A	7.8	C	21.1
Main Street at I-15 Northbound Ramps	S	B	10.8	C	31.6	A	6.0	C	23.3
Main Street at Mariposa Road	S	C	23.1	C	24.8	D	46.6	E	55.2
Main Street at Escondido Avenue	S	B	19.1	C	20.8	C	22.3	C	25.3
Main Street at Topaz Avenue	S	B	11.5	B	12.0	B	19.9	C	20.7
Main Street at Maple Avenue	S	B	17.6	B	14.9	B	16.0	C	21.3
Ranchero Road at Escondido Avenue	S	B	17.1	B	13.9	C	25.5	B	11.2
Ranchero Road at Maple Avenue	U	D	30.5	F	51.2	F	231.6	F	242.8
Ranchero Road at Cottonwood Avenue	U	C	18.3	E	38.2	F	125.9	F	126.8
Ranchero Road at 11th Avenue	U	C	17.6	C	23.0	A	8.6	A	8.7
Ranchero Road at 7th Avenue	U	B	13.1	C	15.5	F	88.8	F	109.0
Ranchero Road at Santa Fe Avenue	S	B	12.7	B	15.0	B	10.4	B	13.3
Ranchero Road at Danbury Avenue	U	B	14.5	C	17.3	D	27.8	D	27.6

## 6.0 FINDINGS AND CONCLUSIONS

### 6.1 Summary

- This analysis addresses the traffic related impacts of two proposed projects: widening of the Main Street Crossing of the California Aqueduct; and widening of the Ranchero Road Crossing of the California Aqueduct. The widening would accommodate the ultimate planned configurations of each of these roadways.
- Construction of the proposed projects is assumed to occur in 2017.
- Fourteen intersections, seven along Main Street and seven along Ranchero Road, were identified for analysis.
- Under Existing (2015) Conditions, all study area intersections currently operate at an acceptable LOS D or better except for the four-way stop controlled intersection of Ranchero Road at Maple Avenue; this intersection currently operates at LOS E during the PM peak hour.
- Currently, average daily traffic volumes on study roadway segments are within the LOS D capacity for all roadway segments.
- Under Near-Term (2017) Conditions, Ranchero Road at Maple Avenue is estimated to deteriorate to LOS F during the PM peak hour. Additionally, the four-way stop controlled intersection of Ranchero Road at Cottonwood Avenue is estimated to operate at LOS E during the PM peak hour. All other intersections are estimated to continue to operate at acceptable levels of service during both peak hours.
- Near-term average daily traffic volumes are forecast to be within the LOS D capacity for all study roadway segments
- In 2040, all study intersections are assumed to be constructed to their Traffic Circulation Plan configurations and controlled by traffic signals, except for the intersection of Ranchero Road at 11<sup>th</sup> Avenue. It was assumed that this intersection would continue to be controlled by stop signs on the minor approach (11<sup>th</sup> Avenue).
- In 2040, all study intersections are forecast to operate at LOS D or better during both peak hours.
- Construction of the Main Street Crossing of the California Aqueduct is estimated to impact two intersections along Ranchero Road: Ranchero Road at Maple Street and Ranchero Road at Cottonwood Avenue. Traffic exiting I-15 at Ranchero Road to avoid construction activities on Main Street and using local arterials to travel to destinations east of the Main Street Aqueduct Crossing result in increased traffic on Maple Avenue and on Cottonwood. These two roadways, which are each controlled by four-way stop at Ranchero Road, are estimated to operate at LOS F and E respectively, during the PM peak hour in 2017. With the Main Street project, they will both operate at LOS F during both peak hours.

- Construction of the Ranchero Road Crossing of the California Aqueduct is estimated to impact three intersections along Ranchero Road: Ranchero Road at Maple Street, Ranchero Road at Cottonwood Avenue and Ranchero Road at 7<sup>th</sup> Street.
- As described above, Ranchero Road at Maple Avenue and at Cottonwood Avenue are both four-way stop controlled and estimated to operate at LOS E and F during the PM peak hour under 2017 base conditions. During construction of the Ranchero Road project, these intersections will be slightly impacted by additional turning movements as vehicles divert to avoid the Ranchero Road closure at the Aqueduct.
- The intersection of Ranchero Road at 7<sup>th</sup> Street is estimated to operate at LOS F in the PM peak hour during construction of the Ranchero Road project, due to increased turning movements at this intersection as vehicles divert to avoid the Ranchero Road closure at the Aqueduct.
- If the two California Aqueduct Crossings are constructed concurrently in 2017, four intersections are forecasted to be impacted:
  - Ranchero Road at Maple Avenue
  - Ranchero Road at Cottonwood Avenue
  - Ranchero Road at 7<sup>th</sup> Avenue
  - Main Street at Mariposa Avenue
- Ranchero Road at Maple Avenue and at Cottonwood Avenue are both estimated to operate at unacceptable levels of service of E or F in 2017, and are expected to deteriorate significantly to LOS F during both peak hours with the two projects proceeding concurrently.
- Ranchero Road at 7<sup>th</sup> Avenue will be impacted by increased turning movements as a result of traffic diverting to avoid construction activity associated with both of the Aqueduct Crossings.
- The signalized intersection of Main Street at Mariposa Avenue is estimated to be impacted, with its level of service deteriorating from C to E with the construction of the two projects occurring concurrently.
- To avoid the potential traffic-related impacts of constructing both project simultaneously, the City of Hesperia intends to complete the projects sequentially.

## 6.2 Recommendations

- The traffic-related impacts of the Aqueduct Crossing projects at Main Street and at Ranchero Road are temporary during the construction of the actual facilities.
- The Main Street Aqueduct Crossing impacts two intersections during both the AM and PM peak hours during its construction:
  - Ranchero Road at Maple Avenue
  - Ranchero Road at Cottonwood Avenue

- The construction of the Ranchero Road Aqueduct Crossing impacts three intersections along Ranchero Road:
  - Ranchero Road at Maple Avenue
  - Ranchero Road at Cottonwood Avenue
  - Ranchero Road at 7<sup>th</sup> Avenue
- Concurrent construction of both Aqueduct Crossings impacts four intersections during construction:
  - Main Street at Mariposa Avenue
  - Ranchero Road at Maple Avenue
  - Ranchero Road at Cottonwood Avenue
  - Ranchero Road at 7<sup>th</sup> Avenue
- Construction of the Aqueduct Crossings is not estimated to create unacceptable operating conditions at the intersections along Main Street within the study area, with the exception of Main Street at Mariposa Road if both projects are constructed concurrently.
- The four-way stop-controlled intersections of Ranchero Road at Maple Avenue and at Cottonwood Avenue are estimated to operate at unacceptable levels of service during the PM peak hour in 2017 prior to construction of the Aqueduct Crossings. Both of these intersections are estimated to be significantly impacted by construction of each of the projects individually, or with concurrent construction.
- As an arterial that interchanges with I-15, Ranchero Road will serve as an alternative to Main Street during the construction of the Main Street Aqueduct Crossing. However, from I-15 to 7<sup>th</sup> Avenue, Ranchero Road is a two-lane roadway with stop-controlled intersections, significantly limiting the traffic carry capacity of this roadway.
- It may be advisable to complete Phase III of the Ranchero Road Corridor Project prior to initiating the Main Street Aqueduct Crossing Project in order to provide a higher capacity roadway alternative to Main Street during Main Street construction.
- In conjunction with construction of Phase III, signaling the intersections of Ranchero Road at Maple Avenue, Cottonwood Avenue and 7<sup>th</sup> Avenue should be considered. Estimated peak hour traffic volumes at these intersections in 2017 satisfy traffic signal warrants for minimum vehicular volume and interruption of continuous traffic.
- The Ranchero Road Aqueduct Crossing could proceed in parallel with completion of the Ranchero Road Corridor Project Phase III, or concurrently with the Main Street Project if Ranchero Road Corridor Project Phase III was completed first.
- Both the Main Street Aqueduct Crossing project and the Ranchero Road Aqueduct Crossing project are estimated to have significant temporary traffic-related impacts during construction, with impacts to three intersections along Ranchero Road. Upon completion, both projects are estimated to have a positive overall benefit to the existing and future roadway network within the study area.

- Because of its close proximity to the Aqueduct Crossing and associated traffic operations and safety issues, it may be desirable to eliminate the intersection of 11<sup>th</sup> Avenue at Ranchero Road, terminating 11<sup>th</sup> Avenue in a cul-de-sac south of Wells Fargo Street. The traffic from this intersection would primarily divert to the intersection of Ranchero Road at 7<sup>th</sup> Avenue. The intersection of Ranchero Road at 7<sup>th</sup> Avenue is estimate to operate at acceptable levels of service with four-way stop control in the near-term, and with a traffic signal in 2040.
- With the closure of 11<sup>th</sup> Avenue south of Wells Fargo Street, Wells Fargo Street, which is currently an unpaved roadway, should be paved between 1th Avenue and 7<sup>th</sup> Avenue.