Hesperia

Background Technical Reports



2010



TECHNICAL REPORTS FOR THE CITY OF HESPERIA GENERAL PLAN 2010

TECHNICAL REPORTS

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LAND USE TECHNICAL REPORT LU-1

CIRCULATION TECHNICAL REPORT CI-1

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CONSERVATION TECHNICAL REPORTS ..... REFER TO GP EIR APPENDICES
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LAND USE TECHNICAL REPORT

CITY OF HESPERIA
GENERAL PLAN UPDATE

September 2009

Prepared for:
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I. Introduction

The Background Technical Report for the Land Use Element identifies the current conditions, issues, opportunities, and constraints that characterize the built environment of the City of Hesperia and Sphere of Influence. The Background Technical Report is a snapshot of the City's current environment and provides an inventory of existing conditions. This report will measure progress since the last General Plan update and provide a framework for the community, decision makers, and staff to consider goals, policies, and implementation programs for land use at the eventual build out of the City. Information in this report will influence and inform the community and its leaders in setting development priorities, understanding necessary trade-offs, and choosing among alternatives.

The City of Hesperia has been divided into 11 Planning Areas for purposes of analysis in the Background Technical Report. Boundaries of planning areas were drawn to reflect logical community divisions such as the local street system, existing neighborhoods, and the boundaries between the City limits and the Sphere of Influence. (Exhibit 1)

The Background Technical Report begins with a summary table of the current General Plan Land Use designations and corresponding Zoning districts (Table 1), then lists each planning area and provides an overview of the Land Use designations as they are distributed today (Table 2). An area-by-area analysis of existing conditions within each planning area follows with the Issues, Opportunities, and Constraints affecting how land use alternatives are formulated.

II. Background

The City of Hesperia is currently utilizing a two-map system, with a separate Zoning and Land Use designation for each parcel in the city. Many parcels throughout the city have conflicting designations and zoning, which require a General Plan amendment or Zone Change to resolve this problem. Historically the city has been rectifying the discrepancy between the General Plan designations and Zoning on a case-by-case basis. This General Plan update will be condensing the General Plan map and Zoning map into a single map that contains the same designation and zoning for each parcel, eliminating this conflict. As a result of this consolidation, any proposed changes to the General Plan map will require a General Plan amendment as well as a Zone change.

In addition, this update will also incorporate the City's adopted Main Street and Freeway Corridor Specific Plan.

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Exhibit 1: Planning Areas Map

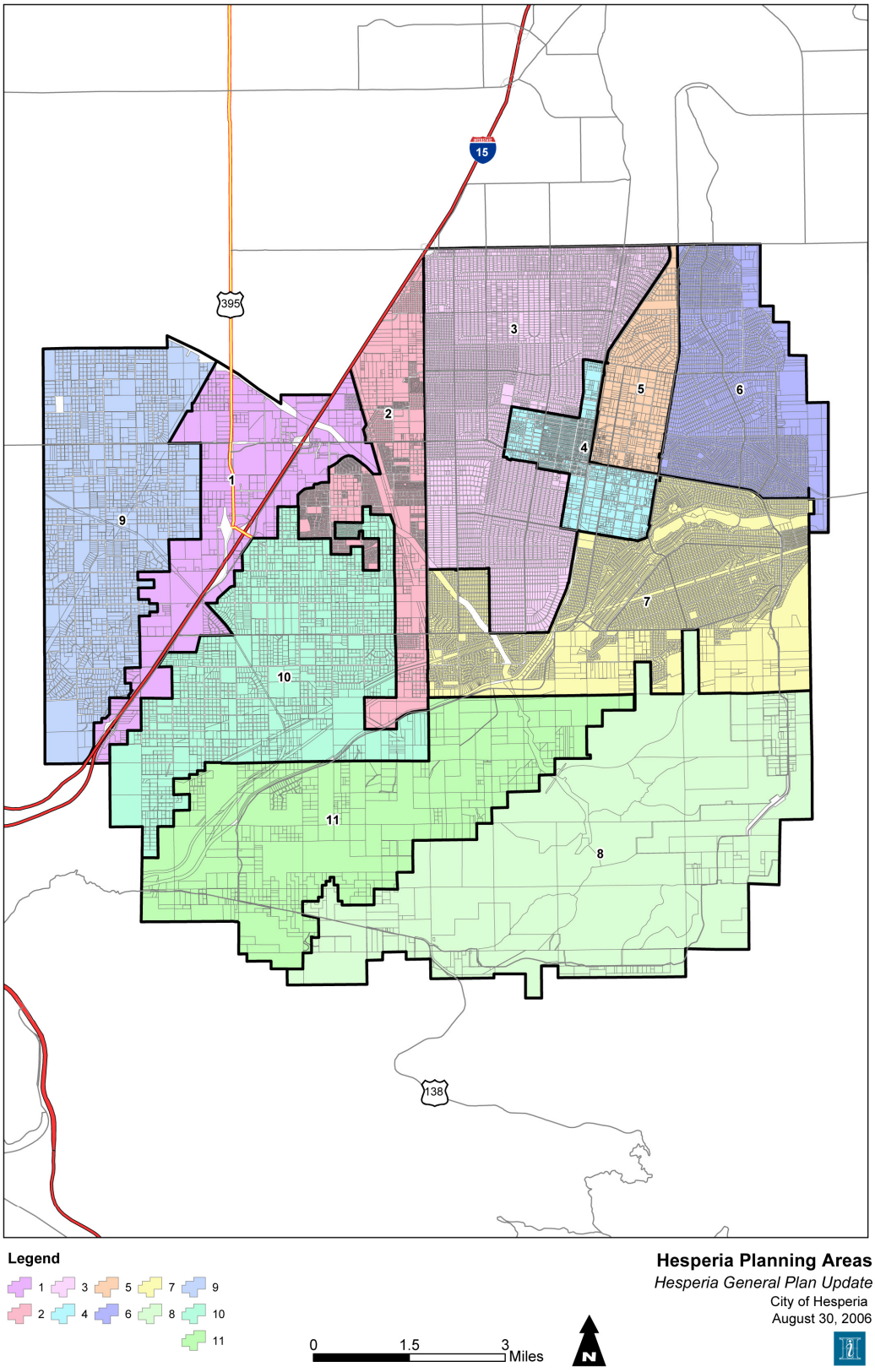


Table 1: Current General Plan Land Use Designations and Consistent Zoning Categories

1991 General Plan Designation	Zoning Designation	Maximum Permissible Intensity/Density
Residential		
Rural Estate (RE)	A2, A1, RR	Max 0.4 DU/AC
Very Low Residential (VL)	A1, RR, R1	0.25- 1.0 DU/AC
Low Residential (L)	A1, RR, R1	0.75 – 2.0 DU/AC
Medium Low Residential (ML)	RR, R1	1.5 – 4.0 DU/AC
Medium Residential (M)	R1, R3	3.0 – 6.0 DU/AC
Medium High Residential	R1, R3	5.0 – 10.0 DU/AC;
High Residential (H)	R3	8.0 – 15.0 DU/AC
Special Development (SD)	SP	Max 1.0 DU/AC
Commercial/Office		
Commercial (COM)	C-1, C-2, C-4	N/A
Office Professional (OF)	AP	N/A
Planned Commerce Development (PCD)	PCD[1]	
Commercial/Special Development (C/SD)	C-4, CR	
Industrial		
Industrial (IND)	I-1, I-2	N/A
Industrial/Commercial (IND/COM)	C-3, I-1, I-2	N/A
Other		
Open Space (OS)	FW	N/A
Community Center Development[2] (CCD)	CCD[1]	Max 4.0 DU/AC
Resource Conservation/Oak Hills[2] (RC/OH)	RC[1]	N/A
Planned Mix Use (PMU)	SP	Max 4.0 DU/AC
Public (P)	P-I	N/A

DU/AC=Dwelling Units per Acre

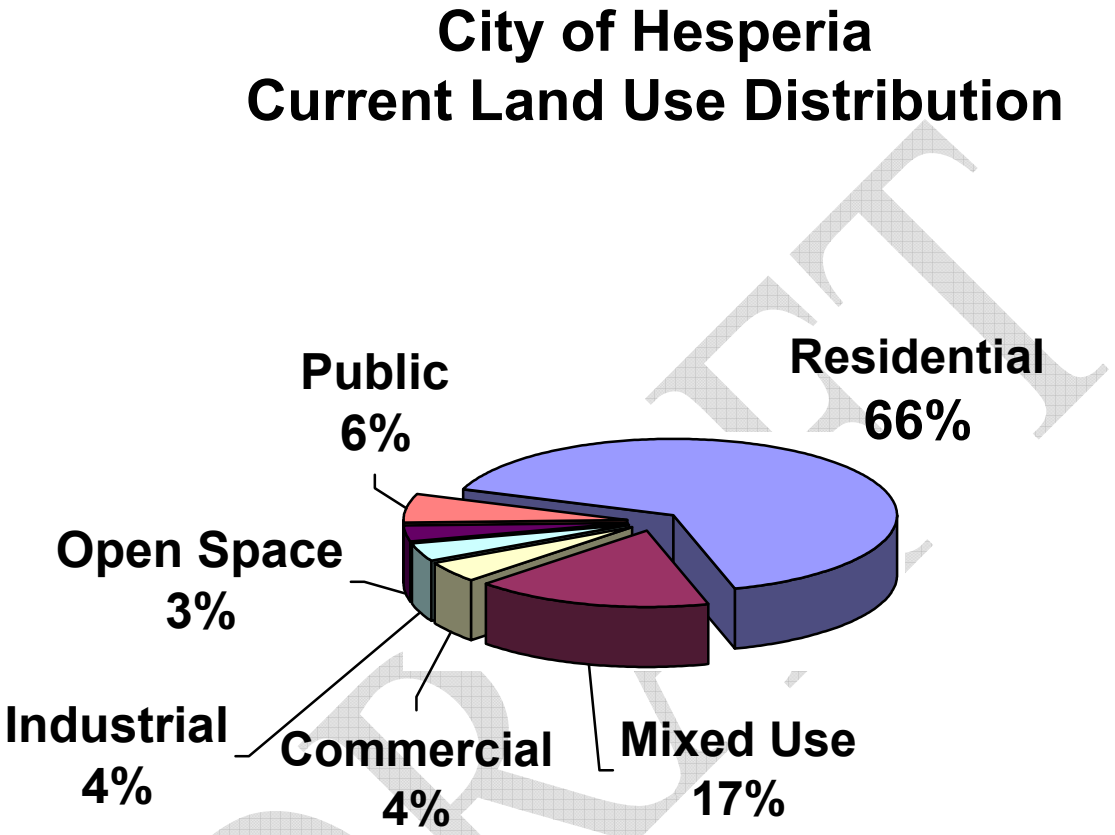
[1] Zoning district within the Oak Hills Community Plan
[2] Land use designation within the Oak Hills Community Plan

The following table lists the General Plan Land Use Categories, citywide, by acreage. The table illustrates the concentration of various land uses by Planning Area, and each Planning Area as a percentage of the City and Sphere of Influence as a whole.

Table 2: Current Acreage of Land Use Designations by Planning Area

General Plan Land Use Designation	PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10	PA11	Total	% of City & SOI
Residential													
RE	380.72	71.06	325.52	0.00	0.00	183.33	342.03	0.00	6169.66	6658.06	40.16	**14170.55**	20.11%
VL	0.00	437.48	4480.96	0.00	0.07	1929.52	402.80	0.00	0.00	517.09	84.74	**7852.65**	11.14%
L	0.00	87.65	2190.34	75.63	0.00	1560.38	5347.88	115.98	0.00	0.13	0.00	**9377.98**	13.31%
ML	63.52	673.87	0.00	166.99	0.00	0.00	0.00	0.00	0.00	48.68	0.00	**953.06**	1.35%
M	11.68	589.44	0.00	69.07	0.00	0.00	0.00	0.00	0.00	1.31	0.00	**671.50**	0.95%
MH	56.45	554.86	21.12	223.93	0.00	0.00	65.10	0.00	0.00	0.00	0.00	**921.45**	1.31%
H	28.40	56.46	151.92	443.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**679.78**	0.96%
SD	0.00	72.05	0.00	0.00	0.00	0.00	283.76	3261.07	0.00	9.91	7638.31	**11265.09**	15.99%
Commercial													
C	734.79	375.23	370.98	380.51	91.93	94.93	41.09	0.00	24.53	81.71		**2195.70**	3.12%
OF	8.17	13.99	0.00	25.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**47.87**	0.07%
PCD	160.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.24	0.00	**172.29**	0.24%
C/SD	750.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**750.54**	1.07%
Industrial													
IND	456.33	10.08	0.00	0.00	0.00	0.00	90.62	0.00	2.44	55.63	0.02	**615.11**	0.87%
IND/COM	656.04	0.00	0.00	0.00	1488.73	21.48	0.00	0.00	1.43	0.00	0.00	**2167.68**	3.08%
Mixed Use													
PMU	157.27	6.07	0.00	0.00	0.00	0.00	12.23	10760.17	0.00	0.01	652.75	**11588.51**	16.45%
CCD	363.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.00	**364.90**	0.52%
Other													
OS	659.68	0.00	0.00	0.00	0.00	404.41	824.53	0.01	154.25	98.23	0.04	**2141.15**	3.04%
RC/OH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	287.05	0.00	0.00	**287.05**	0.41%
P	537.29	597.39	126.31	139.64	130.01	48.08	688.88	359.84	341.89	461.03	806.18	**4236.53**	6.01%
Totals	**5,024.65**	**3,545.63**	**7,667.15**	**1,524.48**	**1,710.74**	**4,242.13**	**8,098.91**	**14,497.07**	**6,982.42**	**7,944.02**	**9,222.19**	**70,459.39**	100.00%
% of City & SOI	7.13%	5.03%	10.88%	2.16%	2.43%	6.02%	11.49%	20.58%	9.91%	11.27%	13.09%	100.00%	

Figure 1:
This figure illustrates the current distribution of land use within the City of Hesperia under the City's current General Plan.



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Table 3: Existing Building Areas (In Square Feet)[1]

Planning Areas	Commercial	Industrial
1	1,957,547	325,798
2	210,861	39,232
3	787,128	0
4	1,218,541	0
5	966,022	1,437,712
6	80,122	6,328
7	187,484	44,734
8	9,916	0
9	11,000	0
10	3,588	0
11	1,342	0
TOTALS	**5,433,551**	**1,853,804**

Table 4: Current Population and Dwelling Unit Densities [1]

PLANNING AREA	ACRES	POPULATION	PEOPLE/ACRE	DWELLING UNITS	DWELLING UNITS/ACRE
1	4,036	1,261	0.31	382	0.09
2	3,571	10,766	3.01	3,319	0.93
3	7,628	23,804	3.12	7,367	0.97
4	1,491	9,017	6.05	3,017	2.02
5	1,632	244	0.15	76	0.05
6	4,246	12,268	2.89	3,721	0.88
7	7,706	25,019	3.25	7,600	0.99
8	12,657	317	0.03	96	0.01
9	7,135	4,128	0.58	1,251	0.18
10	7,719	5,191	0.67	1,573	0.20
11	10,695	363	0.03	110	0.01
Total	**68,518**	**92,377**		**28,512**	

1. Building areas and population counts based on 2004-2005 Assessor's Parcel information.

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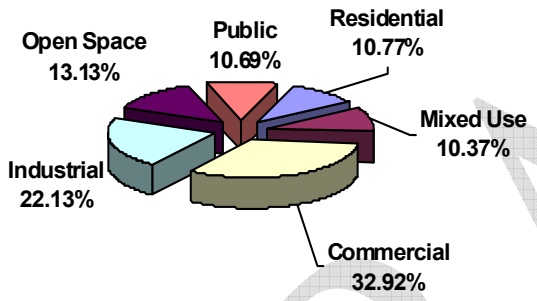
III. Planning Areas

PLANNING AREA 1: Freeway Corridor

Planning Area 1 consists of 5,025 acres and represents approximately 7% of the gross City and Sphere of Influence land area. This Planning Area is situated on both sides of Interstate 15 from the intersection of the Southern California Edison power lines and the California Aqueduct to the north to the southern City limits. The western and southeastern boundaries of Planning Area 1 follow the City limits along the Interstate 15 freeway. Planning Area 1 generally follows the existing commercial zoning north to the aqueduct from Muscatel Street north on the east side of the Interstate 15 freeway.

Land Use Distribution- Planning Area 1

Figure 2



Planning Area 1 is primarily composed of commercial and industrial land use designations. 55% of the gross land area in Planning Area 1 is designated Commercial, Industrial, Industrial/ Commercial, Commercial/ Special Development, or Planned Commerce Development. In addition, Planned Mixed Use and Community Center Development comprise 10% of the Planning Area, and are intended for master planned residential communities with supportive commercial, office, or light industrial uses. Residential uses make up 11% of the Planning Area and mostly consist of rural residential (2½ acre) parcels. There are 1,261 people residing in 382 dwelling units.

Public Facilities

Planning Area 1 contains Summit Elementary School. Fire Station #305 was opened last year on Caliente Road. This station is an engine station and is staffed with one fire engine (4 firefighters), one fire truck (2 firefighters) and one ambulance (2 paramedics).

Oak Hills Community Plan

The southern portion Planning Area 1 (south of Mesquite Road) is located within the Oak Hills Community Plan. This area contains limited infrastructure and therefore little recent development. New residential development within the Oak Hills Community Plan is limited to one dwelling unit per 2½ gross acres due to the lack of infrastructure and the community's objective to maintain a rural lifestyle.

Specific Plan Areas

The entire Planning Area is located within the proposed Main Street/Freeway Corridor Specific Plan. This Specific Plan establishes a clear vision and implementation strategy for revitalizing Main Street and Downtown for the community as well as transforming

the mostly vacant freeway corridor into a regional commercial, industrial, and office-commercial center. The Specific Plan addresses market potential, land uses, circulation and parking, housing strategies, and design of the two corridors.

In addition, the southwestern portion of Planning Area 1 is within the Oak Hills Community Plan.

Issues, Opportunities, & Constraints

Issues:

Open Space
Approximately 660 acres of Open Space are located within Planning Area 1. The Open Space designation has resulted in split designations for many of the parcels located adjacent to or within the Oro Grande Wash or the un-named wash to the east of Interstate-15 freeway. Clarifying allowable uses, recreational trails, and delineation of the actual Open Space areas is an issue that will need to be addressed within the General Plan update.

Vacant Land
77% (3,907 acres) of the gross land area in Planning Area 1 is undeveloped. Vacant land provides an opportunity for future regional commercial and industrial growth along the Interstate 15 Freeway corridor, with construction of the appropriate infrastructure.

Parks
There are no developed parks for active recreation in Planning Area 1. However, the Oro Grande Wash west of Interstate 15 freeway and the un-named wash east of the Interstate 15 freeway offer a unique opportunity for recreational activities such as nature and equestrian trails.

Public Services
Fire Station #305 will reduce response times to this planning area. Police services are dispatched out of the main station. The Sheriff Department's operations are planned to work from patrol cars rather than substations.

Opportunities:

Commercial/Industrial Corridor along Interstate 15 Freeway
Due to the convergence of Interstate 15 freeway, Highway 395, and Main Street, there is much opportunity for regional commercial, industrial, and office uses in Planning Area 1. According to the 2004/2005 Assessor's information, there is over 2.2 million square feet of existing commercial and industrial space located in Planning Area 1. The collective land uses bring jobs and retail uses that generate sales tax revenue for the City. Commercial visibility and transportation access to Interstate 15 freeway are important for encouraging economic growth in this area. In addition, many of the parcels located along

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Highway 395 and on the west side of the freeway are undeveloped and remain in large parcels.

Future Multi-modal Complex
A possible major multi-modal (air, rail, and truck) complex near the Southern California Logistics Airport in Victorville would provide potential for commercial and industrial growth along Highway 395.

Highway 395 Realignment
The future realignment of Highway 395 would provide greater access to regional commercial and industrial centers and present opportunities to expand Hesperia's employment base.

Constraints:

Freeway Interchanges
Currently, the lack of access to commercial development along the Interstate 15 freeway is a constraint, but the additional freeway interchanges will result in extensive opportunities for commercial development when they are completed. The proposed freeway interchanges at Ranchero Road and Mojave Street will provide greater access to commercial development along the Interstate 15 freeway corridor and help alleviate traffic congestion on Main Street and Bear Valley Road.

Infrastructure Development
The lack of existing development and the lack of infrastructure in this Planning Area are interrelated. The high cost of required infrastructure often inhibits future development. Existing sewer is concentrated on the west side of the Interstate 15 freeway, north of Mesquite Street between the I-15 freeway and Highway 395. This is where the majority of new development in this Planning Area has occurred. Existing sewer is also located on the east side of the Interstate 15 freeway approximately 660 feet north of Sultana Street. Commercial, industrial, and office development along the Interstate 15 freeway corridor will require improved roads, sewer, and some storm drains.

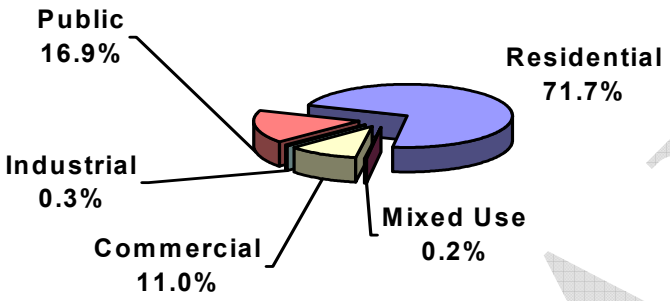
Escondido Avenue
The northern portion of Escondido Avenue currently ends at Main Street. The future alignment of Escondido Avenue, as indicated on the City's Master Plan of Arterial Highways, crosses the Southern California Aqueduct approximately ¼ of a mile north of Main Street. The northerly extension of Escondido Avenue will connect to a realignment of Mariposa Road through the City's future commercial area north of Main Street. This realignment of Mariposa Road and the extension of Escondido Avenue over the aqueduct will be driven by the influx of commercial development along the Interstate 15 Freeway and Main Street corridors.

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PLANNING AREA 2: Maple Avenue West

Planning Area 2 consists of 3, 546 acres, and represents approximately 5% of the gross City and Sphere of Influence land area. This Planning Area is bounded on the east by Maple Avenue, the north by the Interstate 15 freeway, the west by Planning Area 1 and the City limits, and the south by the City limits. Planning Area 2 covers portions of the Main Street and Freeway Corridors Specific Plan.

Land Use Distribution- Planning Area 2
Figure 3



The majority of the recent single-family residential development in the City is located within Planning Area 2. The land uses in this Planning Area constitute a mix of commercial, office professional, industrial, and residential land uses. The majority of the land in Planning Area 2 is designated for residential development, which makes up 71.7% of the gross land area.

Currently, there are 2,938 single-family dwelling units, 70 mobile homes, and 311 multi-family dwelling units in Planning Area 2.

Public Facilities

Hesperia Unified School District has four schools within this Planning Area: Hesperia High School, Maple Elementary School, Mesquite Trails Elementary School, and Topaz Elementary School.

Planning Area 2 contains three existing parks and two proposed parks: The 30-acre Hesperia Community Park, Palm Street Park, and Malibu Park (within Mission Crest) have been partially or completely constructed, and there are proposed parks to be located at Mesa Street and Topaz Avenue, as well as west of Maple Avenue, north of Ranchero Road.

Specific Plan Areas

Much of the Planning Area north of Sultana Street is part of the adopted Main Street/Freeway Corridor Specific Plan. The land use alternatives for Planning Area 2 include low to medium density residential and either regional commercial or business park along the Interstate 15 freeway.

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Issues, Opportunities, & Constraints

Issues:

Housing
Many of the residential projects in the Planning Area north of Sultana Street will be developed in small-lot subdivisions, which will increase the housing stock density in the City and accommodate people of various income levels.

Opportunities:

Vacant Land
Although Planning Area 2 has seen the construction or approval of several residential developments, 62% (2,197 acres) of the planning area is undeveloped, including properties along the Interstate 15 freeway and Main Street that have potential for commercial uses.

Future Interchanges
Two proposed interchanges at Mojave Street and Eucalyptus Street will improve access to vacant properties along the Interstate 15 freeway with potential for commercial uses.

Commercial Transition
Main Street provides a transition from the regional commercial uses near the Interstate 15 freeway to the general commercial uses toward the City center.

Constraints:

Main Street
Main Street contains a large number of lots within this Planning Area that are 100 feet or less in width; resulting in multiple strip-mall style commercial developments. In addition, these lots are relatively shallow in depth (many less than 200 feet) that makes commercial center development difficult to achieve.

Sewer
The residential area bounded by Main Street to the south, Pyrite Avenue to the west, Topaz Avenue to the east, and Smoke Tree Street to the north has limited sewer lines to service the parcels within this area. These parcels are roughly 18,000-20,000 square feet in size and designated for High density residential. Lahonton guidelines allow no more than two dwelling units per acre on properties served by septic. Therefore, sewer will need to be extended to this area prior to additional High density residential development.

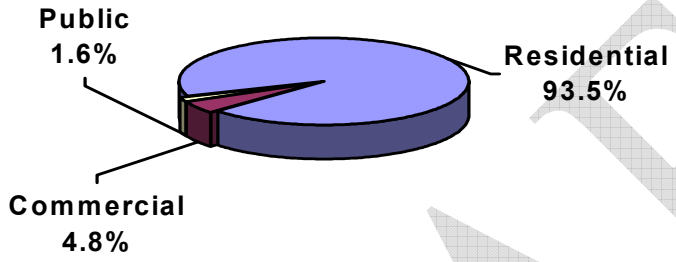
The farthest south sewer extends in this Planning Area is north of the California Aqueduct in Maple Avenue. In order to increase the density south of the Aqueduct from the current general plan designation of 1.0 Dwelling Units per Acre, sewer will need to be extended past the aqueduct.

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PLANNING AREA 3: Large Lot Residential

Planning Area 3 consists of 7,667 acres and represents approximately 11% of the gross City and Sphere of Influence land area. Planning Area 3 is bounded on the north by Bear Valley Road and on the west by Maple Avenue. From Maple Avenue, the southern boundary extends east on Mesquite Street, south on 11th Avenue, and east on Ranchero Road. To the east, Planning Area 3 is bounded by the Burlington, Northern, and Santa Fe Railroad, the Downtown Core, and the Mesa area.

Land Use Distribution- Planning Area 3
Figure 4



Planning Area 3 is the most developed Planning Area with 18% (1,397 acres) of the gross land area left vacant. Planning Area 3 is characterized by residential and some agricultural uses on large lots. 91% of the gross land area in Planning Area 3 is designated as Rural Estate, Very Low Residential, or Low Residential. There are scattered multi-family developments and commercial district links along Bear Valley Road, Hesperia Road and Main Street. Planning Area 3 is the second most populated Planning Area with a total of 23,804 persons residing in 6,521 single-family dwellings and 846 multi-family dwellings.

Public Facilities
Hesperia Unified School District has five schools within this Planning Area: Cottonwood, Eucalyptus, and Mesa Grande Elementary Schools; Cypress Academy; and Hesperia Junior High School. Fire Stations 301 and 304 are both located within Planning Area 3.

Housing
As noted above, most of the land in Planning Area 3 consists of single-family residences on large lots.

Issues, Opportunities, & Constraints

Issues:

Mixed Zoning
The area bounded by Orange Street, Muscatel Street, Hickory Avenue, and Maple Avenue contains a mix of Limited Agricultural-1 (A1) and Limited Agricultural-2½ (A1-2½) zoned properties (Appendix 1). The majority of the lots in this area have houses

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built to one side of the lot for future subdivisions. However, a Zone Change is currently required to subdivide parcels in this area.

Opportunities:

Commercial Districts
Commercial districts along Bear Valley Road, Hesperia Road, and Main Street serve the commuters on these roadways and the many residents nearby. These areas are zoned for General Commercial uses. Some vacant parcels still exist, which present the opportunity to create commercial developments that promote pedestrian activities along these arterial streets.

Constraints:

Commercial Development
Main Street contains a large number of lots within this Planning Area that are approximately 100 feet or less in width; resulting in multiple strip-mall style commercial developments. These lots are also relatively shallow in depth (many less than 200 feet) that makes commercial center development difficult to achieve. In addition, most of the commercially designated sites that are developed along Main Street contain single-family residences instead of commercial projects.

Streets
Many of the lots in this Planning Area are accessed through dirt roads. This limits the density of residential development within this Planning Area.

Sewer
Most of the residentially developed areas in Planning Area 3 do not have sewer connections as the larger lots do not require it. A sewer line was recently extended along Main Street between Maple Avenue and Hickory Avenue to serve existing and future commercial projects.

Railroad
The Burlington, Northern, and Santa Fe Railroad is a constraint on east-west movements through the Planning Area.

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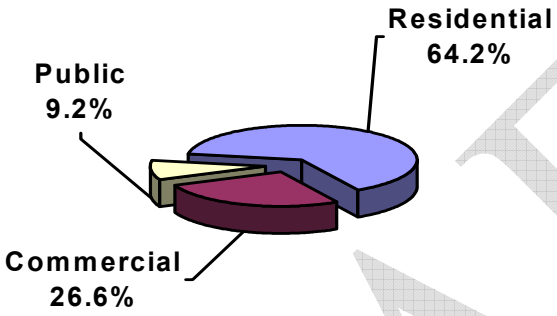
PLANNING AREA 4: Downtown Core

Located around the Main Street and Hesperia Road intersection, Planning Area 4 is the downtown core of Hesperia. Planning Area 4 consists of 1,524 acres and represents approximately 2% of the gross City and Sphere of Influence land area. 58% of the gross land area in Planning Area 4 is undeveloped.

Although it is the smallest planning area in size it includes the majority of the multi-family dwelling units in the City, the second most commercial square footage, and the new Civic Center. 65% of the High density designated parcels in the City are located within this Planning Area. 29% (443 acres) of the gross land area in Planning Area 4 is designated as High Density Residential, which is the densest residential land use in the City. Planning Area 4 contains a portion of the City's main commercial hub with Main Street running east and west across the center of the Planning Area. 26.6% (406 acres) of the gross land area in Planning Area 4 is designated Commercial. Main Street is also one of only two crossings over the Burlington, Northern, and Santa Fe (BNSF) Railroad Line in the City. The BNSF Railroad runs north and south across PA-4.

Land Use Distribution- Planning Area 4

Figure 5



Public Facilities

Hesperia Unified School District has four schools within this Planning Area: Joshua Circle and Lime Street Elementary Schools, and Sultana High School and Mojave Continuation School. Fire Station 302 is located within this Planning Area, as is Lime Street Park. Lime Street Park consists of 20 acres including playground equipment, basketball courts, a horseshoe pit, picnic areas, swimming pools, tennis courts, lighted ball fields, a rodeo arena, group picnic, and an equestrian area.

Housing

The majority of the residential land use designations in Planning Area 4 are Medium High or High Density Residential. The highest density that is permitted under High Density Residential is 20 dwelling units per acre. Planning Area 4 has the highest population density of 6.05 persons per acre as well as the highest residential density of 2.02 dwelling units per acre.

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Commercial Core
Planning Area 4 is the commercial/service core of the City. 26% (406 acres) of the gross land area in Planning Area 4 is designated Commercial or Office/ Professional.

Specific Plan
Planning Area 4 is located almost entirely within the adopted Main Street/Freeway Corridor Specific Plan.

Issues, Opportunities, & Constraints

Issues

Main Street Lot Sizes
As in Planning Areas 2 and 3, much of the commercial property fronting Main Street contains narrow, shallow lots that are not conducive to shopping centers unless merged with multiple other parcels. However, Planning Area 4 does have sewer available to these parcels along Main Street.

Railroad
The Burlington Northern and Santa Fe Railroad is a constraint on east-west movements across the City, isolating areas east of Hesperia Road from the City Center. The Main Street and Burlington, Northern, and Santa Fe railroad bridge creates an awkward circulation pattern that does not permit direct access from Main Street to Hesperia Road. The existing bridge above the BNSF Railroad at Main Street discourages pedestrian movement westward.

Opportunities

Civic Center
The new Civic Center and park will provide a gathering place for all residents and be the anchor of Planning Area 4. The center currently includes City Hall and the Library, and will contain a park and amphitheater. In addition, a new police station and County offices will be located north of City Hall and will result in higher demand for pedestrian uses in this area.

Downtown Revitalization
The City is currently designing a Downtown Revitalization program to provide street improvements, as well as new sewer and water lines to the older housing area east of the Civic Center. This revitalization program is intended to create vehicular and pedestrian connectivity within the residential area and west to the Civic Center.

Vacant Land
56% (859 acres) of the gross land area in PA-4 is undeveloped, which allows opportunity to direct development patterns in the future.

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Constraints

Multiple-Family Lot Sizes

The downtown core adjacent to the Civic Center, located between Willow Street and Juniper Street and east of Third Avenue, contains a multitude of parcels that were subdivided into lots as small as 25 feet by 100 feet. These lots require consolidation prior to development in order to meet the City's Development Code minimum setbacks. In addition, sewer does not completely service this area and has limited the amount of development that may occur on many of these parcels. This area is designated to be developed at a density of 8.0-15.0 dwelling units per acre, but has developed with single-family residences on one lot because the lack of infrastructure and lot size has limited the number of units per acre. As a result, single-family residences are mixed in with duplexes and triplexes through most of this area.

Sewer

Sewer is not available to many of the multiple-family residential zoned properties within Planning Area 4. To achieve the minimum density standards of the General Plan, sewer is required for the multi-family parcels. Therefore, much of this area is undeveloped or land that would otherwise permit two or more dwelling units.

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PLANNING AREA 5: Industrial Core

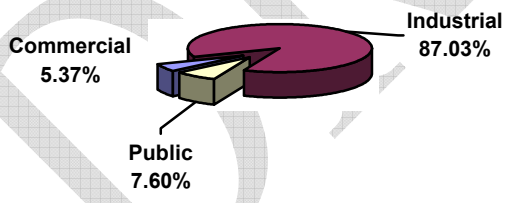
Planning Area 5 consists of 1,711 acres and represents approximately 2% of the gross City and Sphere of Influence land area. It is bounded on the west by Santa Fe Avenue, to the east by "I" Avenue, to the north by Bear Valley Road, and to the south by Main Street. This Planning Area is exclusively composed of industrial, commercial, and public designations. As the industrial core of the City, there are no residentially designated parcels; however, a few non-conforming residences exist in the Planning Area. Planning Area 5 includes a portion of the Main Street/Freeway Corridor Specific Plan.

Planning Area 5 is mainly designated for industrial development, with 1, 489 acres of the gross land area designated Industrial/Commercial (IND/COM). This Planning Area is separated from residential uses within the City by the Burlington, Northern, and Santa Fe railroad and two arterial streets- Main Street and I Avenue. This has allowed the area to develop heavy industrial uses without impacting residential development.

There are 2.4 million square feet (55.2 acres) of existing commercial and industrial buildings within this Planning Area. As the Downtown Core area grows, Planning Area 5 presents the opportunity to grow into the heavy industrial core of the City.

With access to the Burlington, Northern, and Santa Fe and the Atchison, Topeka, & Santa Fe rail lines, Planning Area 5 is currently a hub for industrial development. In addition to the two railroad lines that traverse the Planning Area, a new spur is proposed along the "G" Avenue alignment north to Lemon Street. The City also plans rail overpasses at Lemon Street and Eucalyptus Street. These railroad crossings would improve access and movement of goods between the commercial and industrial City centers.

Land Use Distribution PA 5
Figure 6



Public Facilities

There are no public schools within this Planning Area. The Fire Department's Hazardous waste collection center and Live Oak Park are both located within this Planning Area. The City's animal control facility and the public works yard are also located in this area.

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Issues, Opportunities, & Constraints

Issues

Access to Transportation Corridors
Access to Interstate 15 and Highway 395 from Planning Area 5 exists only from Main Street and Bear Valley Road. Limited truck traffic access to the Interstate 15 freeway contributes to congestion on Main Street. The future Interstate 15 freeway interchanges at Ranchero Road and Eucalyptus Street would help alleviate traffic between the Industrial Core and the major transportation corridors within the City.

Opportunities

Vacant Land
72% (1,228 acres) of Planning Area 5 is vacant. With the commercial and industrial land use designations and the existing rail lines, the planning area has tremendous potential for future development and job growth.

Railroad Access
As mentioned above, the City plans a railroad spur on the "G" Avenue alignment north of Live Oak Street to Lemon Street and rail overpasses at Lemon Street and at Eucalyptus Street. Access to the Burlington, Northern, and Santa Fe and the Atchison, Topeka, & Santa Fe rail lines has allowed this area to become the hub for industrial development within the City. Vacant properties adjacent to the railroad still exist and present the opportunity for increased heavy industrial uses in this area.

"I" Avenue
The possible extension of "I" Avenue would connect PA-5 to the southern City limits, and to Highway 138 and Interstate 15 beyond. This would connect the mostly undeveloped southern City limits to the main industrial corridor, and the industrial area to the freeway.

Constraints

Sewer
Planning Area 5 does not have existing sewer in the majority of the planning area, except along "I" Avenue and "E" Avenue. Therefore, development of smaller parcels or proposed uses that require sewer must extend sewer lines prior to development. The required extension of sewer lines may be over great distances, causing development to be cost prohibitive.

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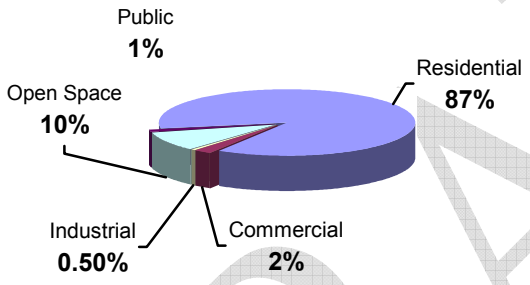
PLANNING AREA 6: Northeast Hesperia

Planning Area 6 consists of 4,242 acres and occupies the northeast corner of the City. The planning area is bounded to the north by Bear Valley Road and to the west by "I" Avenue. The southern boundary follows Main Street and the eastern boundary is formed by the northeastern city limits along the Mojave River.

Planning Area 6 is characterized by large lot residential developments, including limited agricultural uses. The majority of the gross land area (82%) is designated as Very Low Residential or Low Residential. Approximately 31% (1,334 acres) of the gross land area is undeveloped. Planning Area 6 is adjacent to the Mojave River, and 404 acres are designated as Open Space.

Land Use Distribution PA 6

Figure 7



Public Facilities

There are two schools located within this Planning Area: Carmel and Juniper Elementary Schools. Timberlane Park is located in this Planning Area. There are no fire stations within this Planning Area, but Station #22, located in Victorville, serves the area.

Issues, Opportunities, & Constraints

Issues

Commercial Districts

Commercial districts along Bear Valley Road serve commuters and residents in the planning area. However, the smaller parcels along Bear Valley Road limit the ability to develop larger commercial projects in this area. The undeveloped parcels adjacent to the Mojave River represent the City's best opportunity to create a development to serve the residents and commuters.

Opportunities

Open Space and Recreation

Large undeveloped parcels near the Mojave River are excellent recreational opportunities for residents of the planning area and the community as a whole. 404 acres are currently designated for Open Space. A trail along the river is planned to connect to a similar trail

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extending south from the City of Victorville. In addition, Timberlane Park is located north of Main Street.

Constraints

Circulation

Movement for residents in Planning Area 6 west to the Downtown Core and Interstate 15 Freeway is limited by the Burlington, Northern, and Santa Fe Railroad tracks. Access to the western portion of the City from this planning area can only be achieved through Bear Valley Road and Main Street.

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PLANNING AREA 7: The Mesa

Planning Area 7 consists of 8,001 acres and includes what has been historically called "The Mesa" and surrounding neighborhoods. It is bounded to the north by Main Street and Rock Springs Road and to the east by the Mojave River. The western boundary follows "I" Avenue, Santa Fe Avenue, and includes parcels near Maple Avenue. The southern boundary generally follows Whitehaven Road. Ranchero Road is a major arterial that runs east and west through Planning Area 7. The California Aqueduct runs across the southwest corner of the Planning Area.

Planning Area 7 is the most populated planning area in the City and Sphere of Influence with more single-family dwellings than any other area (25,009 residents). Most of the land in the Planning Area is designated Low Residential and zoned R-1 on 18,000 square foot lots. The Hesperia Golf and Country Club is located in the Antelope Valley Wash that runs in a southwest to northeast direction. The Planning Area also includes the Hesperia Lake Park and campgrounds situated near the Mojave River.

The Mesa's circulation constraints limit Downtown commercial access for residents. Improvements along Ranchero Road would provide direct access to the Interstate 15 for residents on the Mesa, as well as for future residents in the Rancho Las Flores and Summit Valley Ranch, Specific Plan areas. Arrowhead Lake Road is another major arterial running north and south on the eastern edge of the Planning Area. Summit Valley Road is now paved and provides an additional link to Highway 138 and Interstate 15.

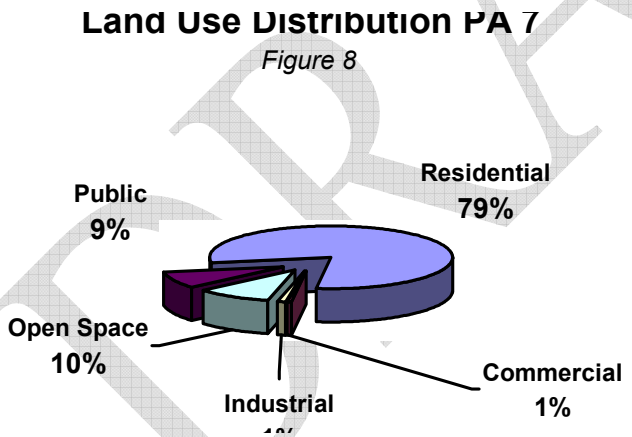


Figure 8

Public Facilities

Hesperia Unified School District has three schools within this Planning Area: Kingston Elementary School; Oxford Academy; and Ranchero Middle School. The Planning Area also includes the Hesperia Lake Park and Campgrounds situated near the Mojave River. There are no fire stations within this Planning Area.

Hesperia Lake Park

Hesperia Lake Park consists of 200 acres with playground equipment, lake fishing, picnic areas, soccer fields, group picnic, equestrian area, and campground sites. The John Swisher museum is near Hesperia Lake. The museum also serves as a community center and a children's day camp.

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Established Residential Development
This planning area contains the majority of the City's existing single-family residences. These residents have two small retail centers along Danbury at "I" Avenue and at Arrowhead Lake Road, as well as commercial centers adjacent to this area on Main Street, west of "I" Avenue.

Issues, Opportunities, & Constraints

Issues

Hesperia Airport
The privately-owned Hesperia Airport is located near Santa Fe Avenue and Ranchero Road. With the Rancho Las Flores development, the value of the airport could be an opportunity. However, Hesperia Airport's location surrounded by residential areas limits its growth.

Public Services

There are no fire stations in the Planning Area.

Opportunities

Open Space and Recreation
Although this planning area is the most populous in the City and Sphere of Influence, there is only the Hesperia Lake recreation area for residents. The Mojave River along the eastern boundary provides future recreational opportunities.

"I" Avenue Extension
With the development of Rancho Las Flores, an arterial from the south will connect with "I" Avenue at Ranchero Road. This roadway would bring thousands of residents through the Planning Area every day. "I" Avenue will become a major arterial that serves the needs of Mesa residents and future Rancho Las Flores residents. The frontage along "I" Avenue north of Preston Street and south of Danbury Avenue is currently designated for Neighborhood Commercial (C1) uses. The "I" Avenue frontage contains several vacant properties that provide an opportunity to create a neighborhood-friendly commercial area within the Mesa.

Ranchero Road Corridor Project
Grade separation under the Burlington, Northern, and Santa Fe (BNSF) Railroad at the extension of Ranchero Road is the first phase of the project. The City also plans an Interstate 15 interchange at Ranchero Road. Other plans include the widening of Ranchero Road to accommodate east-west commuter traffic.

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Constraints

Topography
The Antelope Valley Wash isolates the Mesa from most of the City. Commercial districts along Ranchero Road and "I" Avenue are difficult to develop because of the lack of sewer available for projects. Sewer installation would require significant construction due to the decrease in elevation at the wash.

Arrowhead Lake Road
Arrowhead Lake Road and Summit Valley Road are the only arterials connecting the southern Sphere of Influence area and Summit Valley Ranch to the existing City. The possible extension of "I" Avenue to the southern City limits would provide Rancho Las Flores and Summit Valley Ranch with a second link to Planning Area 7 and the Downtown Core.

Summit Valley Road/Southern Beltway
Summit Valley Road is now paved and provides commuters with an alternative to Highway 138 and Interstate 15. Summit Valley Road may be extended east, to eventually cross Arrowhead Lake Road and the Mojave River, south of Ranchero Road.

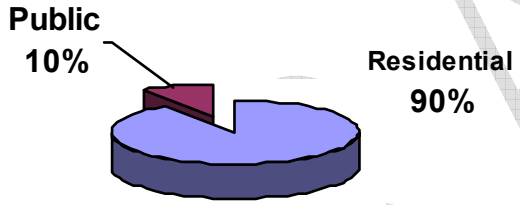
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PLANNING AREA 8: Rancho Las Flores/Summit Valley Ranch

Planning Area 8 consists of 14,437 acres and is the largest planning area in the City and Sphere of Influence. It is located primarily within City limits and makes up the southeast corner of Hesperia. Three pockets of land in the south and southeast portion of the Planning Area are located outside City limits within the Sphere of Influence. The Planning Area is characterized by sloping hills and valleys running generally east-west. Two Specific Plans make up the majority of the Planning Area: Rancho Las Flores and Summit Valley Ranch. Combined, the Specific Plans propose over 16,000 dwelling units, but today it is mostly undeveloped and will require significant infrastructure improvements. There are currently 96 single-family dwelling units and 9,916 square feet of commercial space in the Planning Area.

The majority of Planning Area 8 is comprised of two General Plan land use designations: Planned Mixed Use and Special Development. Both land use designations call for comprehensive planning prior to development due to the topography and lack of infrastructure in this area.

Land Use Distribution- PA 8
Figure 9



Issues, Opportunities, & Constraints

Issues

State Highways
State Highways 138 and 173 run through the Planning Area bringing travelers to and from the San Bernardino Mountains. A Caltrans project to straighten Highway 138 has been halted due to reallocated funding. As mentioned above, Summit Valley Road is now paved and may be extended east to the Mojave River as the southern beltway.

Opportunities

Land Use Planning
The availability of goods and services are limited in the area. The addition of over 16,000 dwelling units in Rancho Las Flores and Summit Valley Ranch will provide an opportunity for commercial development.

Parks
The Mojave River Forks Regional Park is located within this Planning Area and offers camping, equestrian camping, and hiking and equestrian trails with direct access to the Pacific Crest Trail. In addition, the Specific Plans within this planning area propose over 4,900 acres of passive and active open space.

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Mojave River
The Mojave River runs along the eastern boundary of Planning Area 8 and provides further recreational opportunities for the future residents of Ranch Las Flores and Summit Valley.

Constraints

Infrastructure Development
Due to the lack of existing development in this planning area, there is little infrastructure. The area will require substantial infrastructure funding and construction concurrent with new development.

Specific Plan Areas

Rancho Las Flores. The Rancho Las Flores Specific Plan area encompasses 9,867 acres and includes single-family dwellings, attached dwellings, neighborhood and community-serving commercial, open space areas, drainage features, and community facilities. At build-out, the Specific Plan has been designated to accommodate up to 15,980 new dwelling units. Highway commercial development will be located at the main entrance to the site near the intersection of Routes 138 and 173. Neighborhood and general commercial uses will be located in a Town Center area of approximately 80 acres. 5,337 acres of public facilities are also planned.

Table 5: Rancho Las Flores Specific Plan Land Uses

Land Use	Acres
Residential	
Very Low Density (VL) 1 unit per acre	488.3
Low Density (L) 4 units per acre	2,052.3
Low Medium Density (LM) 6 units per acre	901.4
Medium Density (M) 10 units per acre	317.5
Medium-High Density (MH) 18 units per acre	50.7
Commercial	
Commercial (C)	79.9
Town Center (Mixed Use)	
Town Center (TC)	314.3
Public Use, Open Space, Drainage	
School Sites	248.3
Church/Fire/Day Care	19.0
Open Space/Agriculture/Indian Preserve	4,204.6
Community Parks/Golf	326.5
Local Parks/Trailhead/Lake	48.7
Las Flores Ranch	490.7
Roads	
Roadways	325.10

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Summit Valley Ranch. Summit Valley Ranch is a 788 acre planned mixed use development that offers a variety of residential housing types, supporting commercial, office professional uses and recreational opportunities. The Specific Plan proposes up to 1,668 dwelling units and 9.8 acres of commercial and office area.

Table 6: Summit Valley Ranch Specific Plan Land Uses	
Land Use	**Acres**
Residential	
Medium Low Density (ML-7000) 3.5 units per acre	90.9
Medium Density (M-6000) 4.1 units per acre	76.3
Medium Density (M-5000) 5.5 units per acre	49.3
Medium High Density (MH-Duplex) 8.0 units per acre	39.6
High Density (H-T.H./Condo) 15.0 units per acre	21.4
High Density (H-Apartment/Condo) 20.0 units per acre	13.4
Commercial/Office	
Convenience Commercial	2.9
Office Professional	6.9
Recreational	
Golf	210.8
Natural Open Space	165.8
Community Recreation Facility	7.6
Passive Park	25.7
Active Park	9.2
Public Facilities	
School	10.7

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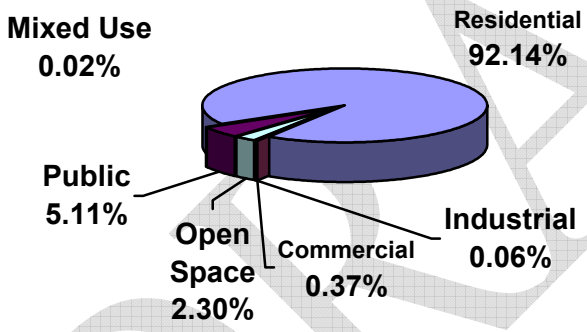
PLANNING AREA 9: West Oak Hills

Planning Area 9 consists of 6,981 acres and represents approximately half of the Oak Hills Community Plan area. The Planning Area is located west of Interstate 15 and makes up the western boundary of Hesperia's Sphere of Influence. The Oak Hills Community Plan area is structured around County Service Area 70, Zone J, a special district formed by San Bernardino County in 1972. Zone J was created to serve lower density residential development such as what has occurred in Oak Hills.

With the exception of a 287-acre Resource Conservation district and 341-acres of land owned by utility companies, Planning Area 9 is mostly residential with homes built on 2½-acre lots. Approximately 88% (6,168 acres) of the gross land area in Planning Area 9 is designated Rural Estate. There are currently 1,251 dwelling units in the planning area.

Land Use Distribution PA 9

Figure 10



Sphere of Influence

No portion of the Planning Area is within City limits as the entire area is in Hesperia's Sphere of Influence. Current land use designations are residential; and support single family homes on larger lots.

Rural Lifestyle

The majority of the land in the planning area is residential on 2½-acre lots and contributes to the rural lifestyle that residents enjoy.

Public Facilities

Police services in Oak Hills are provided by the San Bernardino County Sheriff's Department. In West Oak Hills, school services are provided by the Snowline School District, although no schools are located within West Oak Hills.

Resource Conservation

The Resource Conservation district encourages limited rural development that maximizes preservation of open space and wildlife habitat areas.

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Issues, Opportunities, & Constraints

Issues

Parks
There are no developed parks for active recreation in Planning Area 9.

Opportunities

Vacant Land
Half of the land (50%) in Planning Area 9 is vacant.

Constraints

Infrastructure Development
Due to the lack of existing infrastructure, there is little non-residential development in this planning area. Most of the planning area consists of single-family residential homes on large lots, with frontage on un-paved roads.

Public Services
There are no police and fire stations located in Planning Area 9 leading to increased emergency response times to portions of the Planning Area.

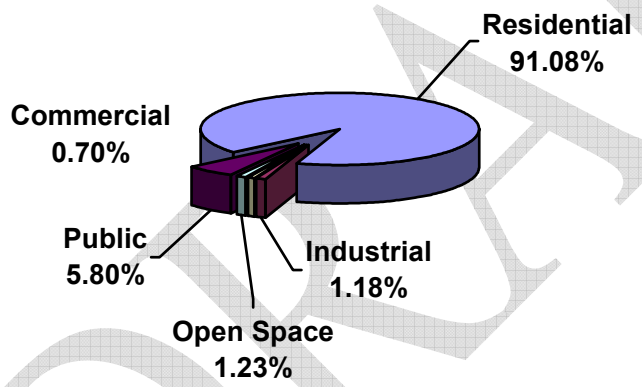
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PLANNING AREA 10: East Oak Hills

Planning Area 10 consists of 7,944 acres and represents approximately half of the Oak Hills Community Plan area. The Planning Area is situated on the eastern side of Interstate 15 bordering City limits on the east, west and north. Unincorporated land lies to the south.

Planning area 10 is located entirely within the Oak Hills Community Plan. The Oak Hills Community Plan area is structured around County Service Area 70, Zone J, a special district formed by San Bernardino County in 1972. Zone J was created to serve lower density residential development such as what has occurred in Oak Hills.

Land Use Distribution PA 10
Figure 11



The land use plan in Planning Area 10 is almost exclusively residential with homes built on 2½ acre lots fronting unpaved roads. Approximately 84% (6,658 acres) of the gross land area in Planning Area 10 is designated Rural Estate. There are currently 1,573 dwelling units in the planning area.

Public Services

Police services in Oak Hills are provided under a City contract with the San Bernardino County Sheriff's Department. For East Oak Hills, school services are provided by the Hesperia Unified School District, although no schools are located within Oak Hills.

Sphere of Influence

No portion of the Planning Area is within City limits, as the entire area is in Hesperia's Sphere of Influence. Current land use designations are mostly residential.

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Issues, Opportunities, & Constraints

Issues

Topography
While the southern portion of Planning Area 10 contains sloping terrain, the majority of the land in the planning area is flat.

Opportunities

Rural Living
Residents of Oak Hills enjoy rural living with single-family residences on large lots.

Constraints

Parks
There are no developed parks for active recreation in Planning Area 10.

Infrastructure Development
Due to the lack of existing infrastructure, there is little development in this planning area. Most of the planning area consists of single-family residential homes on large lots, with frontage on un-paved roads. Development of the Ranchero Corridor projects (the interchange, underpass and road widening) will enhance the area's development potential.

Public Services
There are no fire stations located in Planning Area 10. Oak Hills High School opened in 2009.

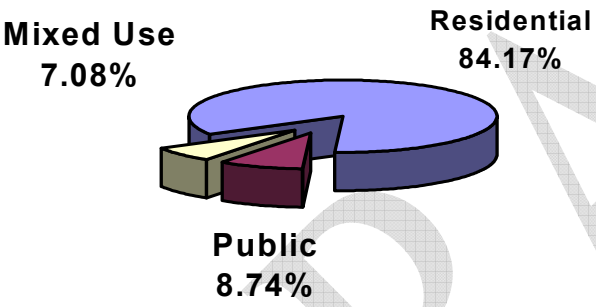
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PLANNING AREA 11: Sphere of Influence

Planning Area 11 consists of 9,222 acres and is located entirely within the Hesperia Sphere of Influence; west of Rancho Las Flores, and south of East Oak Hills. The Planning Area is characterized by rolling terrain and a few paved roads. The General Plan land use designation for the Planning Area is primarily Special Development, which, due to lack of infrastructure; limited public services; topography; environmental sensitivity; and development constraints; requires comprehensive planning prior to development. The area has not been pre-zoned, but the current General Plan designation allows a maximum of one dwelling unit per acres without a Specific Plan. It is almost entirely undeveloped and will require significant infrastructure improvements. There are only 110 dwelling units in the Planning Area and no open public facilities. Planning Area 11 has the lowest population density of any planning area.

Land Use Distribution PA 11

Figure 12



Vacant Land

The majority of the land (74%) in Planning Area 11 is vacant.

Sphere of Influence

No portion of the Planning Area is within City limits as the entire area is within Hesperia's Sphere of Influence. Current land use designations are residential.

Issues, Opportunities, & Constraints

Issues

Parks

There are no developed parks for active recreation in Planning Area 11.

San Bernardino County Zoning

Parcels within Planning Area 11 are generally zoned for single-family residential development on one acre (RS-1). The current City General Plan designates this area as Rural Estate, which requires a minimum of 2 ½ acre parcels. This conflict of zoning and designation will need resolution.

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Opportunities

Maple Avenue
Maple Avenue is currently proposed to be extended south from its current terminus through Planning Area 11 into Rancho Las Flores. This will result in increased ease of access for residents in the unincorporated area north into the City and in the future, east into Rancho Las Flores. As mentioned above, Summit Valley Road is now paved to connect with the City and will improve the road network in Rancho Las Flores.

Constraints

Infrastructure Development
Due to the lack of existing infrastructure, there is little development in this planning area. The area will require substantial infrastructure funding and construction concurrent with new development.

Public Services
Paid Call Fire Station #4 is located on Summit Valley Road. The long-term plan will include converting this station onto a full-time engine station, in conjunction with development of Specific Plans, such as Rancho Las Flores or Summit Valley Ranch.

Terrain
The rugged terrain in the Planning Area is a constraint on future growth. Existing conditions will make development difficult and expensive, and will create challenges for drainage, grading and constructing in-ground infrastructure.

Railroad
Two railroad lines traverse Planning Area 11 and provide a constraint on future development.

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IV. Public Facilities

Infrastructure:

Storm Water Drainage System

Storm drains and flood control are administered by Hesperia's Public Works Department. There are nineteen separate regional drainage and flood control systems within the city.

The San Bernardino County Department of Public Works Flood Control District is responsible for providing flood control and related services throughout the County, including the incorporated areas within cities. The San Bernardino Flood Control District has developed a very extensive system of facilities including dams, conservation basins, channels, and storm drains. The purpose of these facilities is to intercept and convey flood flows through and away from the major developed areas of the County. The principle functions are flood protection on major streams, water conservation, and storm drain construction.

Hesperia Water District

Hesperia's water supply is provided by the Hesperia Water District. The water district is a division of Development Services and is a subsidiary of the City of Hesperia; organized pursuant to Section 30.000 et seq. of the California Water Code. The District has two powers enabled by law—water and sewer utility service. The District maintains the closed conduits of the storm drain system. The District operates as a totally self-sustaining utility business enterprise, which means that virtually all of its income is generated from Water and Sewer Service Charges and facilities connection fees.

The water supply is obtained entirely from groundwater located in the Alto Sub-Basin of the Mojave River Watershed and groundwater aquifer. The City's municipal water system extracts all of its water supply from the underground aquifers through 18 active groundwater wells located throughout the City. Water is conveyed from the wells to the consumers via a distribution system with pipe sizes ranging between 2 and 24 inches in diameter. The ongoing waterline replacement program has removed most of the smaller waterlines and replaced them with 8" or larger lines. In December 2009, the City maintained 14 storage reservoirs within the distribution system with a total capacity of 64.5 million gallons.

Wastewater Facilities

Sewer collection lines, which are discharged to a regional treatment facility, are maintained and operated by the Hesperia Water District. Sewer is provided at a cost of

$40.15 bi-monthly per Equivalent Dwelling Unit (EDU), which is equal to twenty Plumbing Fixture Units.

The Sewer Division of the Hesperia Water District ensures the delivery and continuous unobstructed flow of sewage to the regional plant. The quality of the effluent must meet the requirements of the Victor Valley Wastewater Reclamation Authority (VVWRA), a joint-exercise-of-powers agency comprised of Hesperia and other local area entities providing sewer service.

VVWRA was originally formed by the Mojave Water Agency to help meet the requirements of the federal Clean Water Act and provide wastewater treatment for the growing area. The original treatment plant, with supporting pipelines and infrastructure, began operating in 1981,and now provides secondary level treatment for up to 18 million gallons per day (MGD). The VVWRA is a joint powers authority and public agency of the state of California.

Over the years, VVWRA has completed treatment plant upgrades and several capacity increases. The regional treatment plant is currently capable of treating a portion of the flow to a tertiary level and the remaining flow to a secondary level for percolation. A majority of the highly treated wastewater is discharged into the Mojave River Basin and a smaller amount is currently used to irrigate landscaping at the treatment plant.

Public Services:

Schools

The Hesperia Unified School District serves the City of Hesperia as well as portions of the Oak Hills Community Plan. In addition, the Snowline Joint Unified School District serves the Oak Hills Community Plan area.

Currently, Hesperia School District has thirteen elementary schools, two middle schools, two sixth grade academies, and five high schools. However, as noted below, the school district's enrollment exceeds the existing capacity for students.

EXISTING SCHOOL FACILITIES
CAPACITY AND STUDENT ENROLLMENT

School Level	2009-10 Facilities Capacity[1]	2009-10 Student Enrollment[2]	Excess/ (Shortage) Capacity
Elementary School (Grades K – 6)	9,651	10,996	(-1,345)
Middle School (Grades 7 & 8)	3,750	3,429	(321)
High School (Grades 9 – 12)	3,672	7,033	(-3,361)
Total	***17,073***	***21,428***	***(-4,385)***

1. SAB Form 50-02. (Plus additional State Funded projects) 2005 CBEDS

Construction of additional schools will be necessary to meet the number of students currently enrolled in the district, as well as future increases in student population.

Parks

The Hesperia Parks and Recreation District is a separate The Hesperia Parks and Recreation District maintains retention basins, public landscaping, street lights, and parks within the City. There are a total of 14 parks and recreational facilities throughout the City. Additional information on the Recreation and Parks District is located within the Open Space element.

Fire Stations

The City of Hesperia and the Sphere of Influence are served by the San Bernardino County Fire Department. Currently there are four fire stations within the City of Hesperia, stations 301-304, and two stations outside of the city, stations 22 and 40.

The following is a list of locations, areas served, and equipment and services for each fire station:

Station 301 9430 11th Avenue
Serves the southwestern portion of the City west of the Burlington, Northern, and Santa Fe railroad tracks. Onsite there is a paramedic engine company; brush engine; heavy rescue unit; paramedic ambulance; and reserve ambulance.

Station 302 17288 Olive Street
Serves the northeastern and southeastern portions of the City east of the Burlington, Northern, and Santa Fe railroad tracks. Onsite there is a paramedic engine company; brush engine; paramedic ambulance; and a reserve ambulance.

Station 303 17443 Lemon Street
This station serves as the City of Hesperia Hazardous Waste Collection Facility. There are no full time personnel or equipment assigned to this station.

Station 304 15660 Eucalyptus Street
Serves the northwestern portion of the City, including Bear Valley Road. Onsite, there is a paramedic truck company; engine company; water tender; utility vehicle; and a paramedic ambulance.

Station 305 8331 Caliente Road
This fire station opened last year on Caliente Road. This station is an engine station and is staffed with one fire engine (4 firefighters), one fire truck (2 firefighters) and one ambulance (2 paramedics).

Station 22 12550 Jacaranda Avenue, Victorville
Serves Spring Valley Lake in Victorville as well as the northeastern portion of the City, including Bear Valley Road from Ridgecrest Avenue to the Mojave River and everything east of the Burlington, Northern, and Santa Fe railroad tracks south to Eucalyptus Street. Onsite there is a paramedic engine company and a brush engine.

Station 40 6584 Caliente Road
Serves the southwestern portion of the City and Sphere of Influence including Interstate 15 and areas west, and the area between Main Street and Oak Hills Road. Onsite there is a brush engine and brush patrol.

Station 48 4691 Summit Valley Road
Serves the community of Summit Valley, as well as Highway 138 between the Interstate15 Freeway and Silverwood Lake. This station is currently staffed by paid-call firefighters living in the community.

Utilities

Natural Gas
Natural gas is administered by the Southwest Gas Corporation, located at 13471 Mariposa Road, Victorville. Southwest Gas has a special rate analysis service to help determine all rate options, giving each establishment its most beneficial rate.

Electricity
Electrical power is provided by Southern California Edison, located at 12353 Hesperia Road, Victorville. Economic Development rates are available to qualified industrial users.

Solid Waste
Sanitation services are administered by Advance Disposal, located at 17105 Mesa Street, Hesperia. The Class C landfill is permitted for 600 tons per day. A Materials Recovery Facility (MRF) is also available at Advance Disposal.

Hazardous waste can be taken to the Hesperia Fire Station located at 17443 Lemon Avenue in Hesperia.

Cable Television
Falcon Cable Inc. is the cable service provider for the city of Hesperia.

DRAFT

HESPERIA GENERAL PLAN UPDATE

Transportation Technical Report

Prepared for:

Hogle-Ireland, Inc.

Prepared by:

Kimley-Horn and Associates, Inc.

September 21, 2009

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1. INTRODUCTION

1.1 Overview

This report has been prepared as part of the City of Hesperia's General Plan Update and provides a technical analysis of the future transportation needs in the City. This report addresses the local and regional traffic conditions associated with future buildout of the General Plan. The assumptions in the analysis take into account the San Bernardino County Congestion Management Program (CMP), the City's Master Plan of Arterial Highways, the City's currently adopted General Plan, potential alternative future land use scenarios in the City, and planned future growth in other parts of the Victor Valley.

The analysis serves as the basis for the recommended improvements to the future transportation system – including the roadway network, intersection enhancements, transit, freight rail and trucking, and bicycle and pedestrian facilities. The recommendations present policies and strategies for improving mobility in the Circulation Element of the General Plan Update.

This report is comprised of the following sections:

- Existing Conditions (including existing and planned components of the circulation system and existing traffic conditions);
- Transportation issues and opportunities;
- Evaluation of Alternatives (future traffic conditions under alternative future land use scenarios);
- Preferred Alternative (future traffic conditions with the preferred land use scenario); and
- Recommended Transportation Plan.

2. EXISTING CONDITIONS

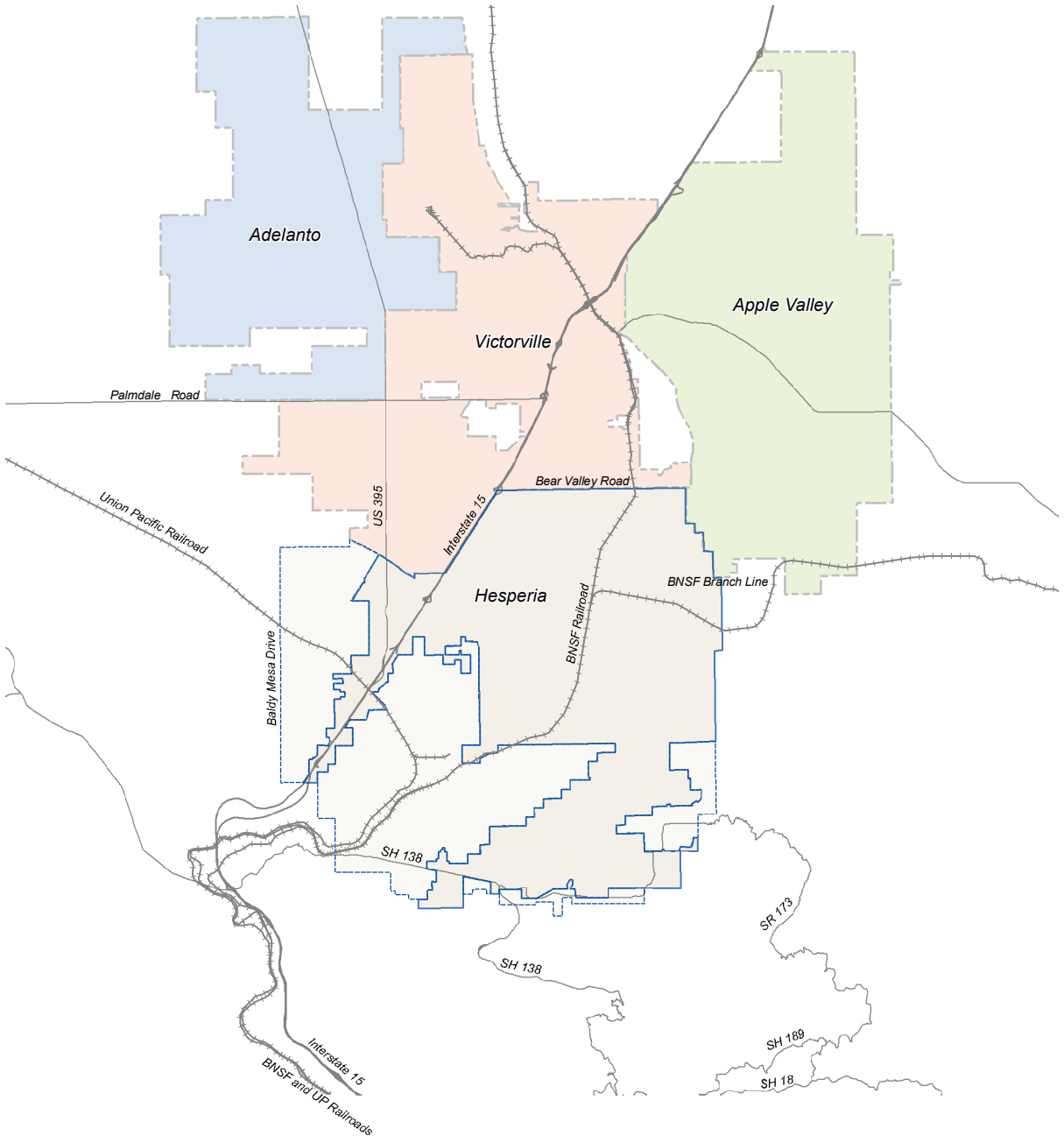
2.1 Physical Setting

The City of Hesperia is shown in its regional setting on **Figure 2-1** (Vicinity Map). The City is served by one Interstate highway – Interstate 15 runs through the western portion of the city in a north-south direction.

In terms of local circulation facilities, the City is generally laid out in a grid pattern. Traffic circulation within the City is facilitated by a developing street system, with some specific areas in the City that experience barriers to efficient movement. The railroad is currently a significant barrier within the city, concentrating east-west traffic onto Bear Valley Road and Main Street, due to the lack of other grade separated crossings (a new grade separation at Ranchero Road is under construction.) The California Aqueduct is a barrier that transverses through the center of the city creating access limitations for all streets except Main Street, Maple Avenue, Mesquite Street, Cottonwood Avenue, and Ranchero Road. The Mojave River serves as a barrier at the city's eastern boundary with crossings only available at Bear Valley Road and Rock Springs Road.

Because the City has attracted industrial and warehousing businesses, a substantial number of trucks travel on City streets contributing to general traffic congestion.

Three rail lines and a branch line traverse the City of Hesperia; one Union Pacific Railroad (UPRR) rail line in the northwest-southeast direction and two Burlington Northern Santa Fe (BNSF) rail lines in the north-south direction with a branch line running from the BNSF tracks easterly. The UPRR line connects West Colton to Palmdale through the southwest portion of Hesperia's sphere. The UPRR rail line is entirely utilized by freight trains. The BNSF rail lines that bisect the City are part of their major transportation corridor that transports goods and services from the ports in Long Beach and Los Angeles to the western and central portions of the United States. A branch line to Lucerne Valley runs easterly from the BNSF mainline, crossing Hesperia's eastern city boundary into Apple Valley near the Rock Springs Road crossing. The BNSF mainlines are also utilized by Amtrak passenger trains.



Legend

- City Of Hesperia Boundary
- Hesperia Sphere of Influence Boundary
- Railroad

Miles

0 1.5 3 6

February 2007

Figure 2-1

Kimley-Horn and Associates, Inc.

Vicinity Map

2.2 Regulatory Setting

The City of Hesperia is affected by a number of other regulatory bodies due to its location in an area that includes state and local vehicular and rail facilities and a number of adjacent cities. These regulatory bodies include:

- The County of San Bernardino
- San Bernardino Associated Governments (SANBAG)
- Southern California Association of Governments (SCAG)
- Caltrans
- Adjacent cities: Victorville, Apple Valley, Adelanto

The preparation of the circulation portion of the general plan update must be cognizant of these agencies' plans and their potential effect on the City of Hesperia. In particular, plans for development in adjacent communities will contribute to traffic using Hesperia's street system, and SANBAG and Caltrans plans for the freeway system will affect regional mobility.

The process and standards applied to planning the City's roadway system in this study will be consistent with the regional traffic and level of service standards promulgated by SANBAG, as described below.

2.2.1 Regional Traffic Analysis Standards and Guidelines

Analysis of the existing roadway segments and intersections in the City of Hesperia follow standards set forth in the City of Hesperia General Plan Circulation Element and Appendix C of the Congestion Management Program (CMP) for San Bernardino County. Appendix C of the CMP document presents the Guidelines for CMP Traffic Impact Analysis Reports.

2.2.2 City of Hesperia and SANBAG CMP Level of Service Standards

Circulation Policy C.P.1 of the City of Hesperia General Plan Circulation Element states the City's Level of Service standard as follows: Strive to achieve and maintain level of service (LOS) C on all roadways and intersections; LOS D during peak hours shall be considered acceptable within commercial and industrial areas.

The SANBAG CMP document indicates that the CMP standard is LOS E. However, if the lead agency or affected jurisdiction requires mitigation to a higher LOS, that takes precedence over the CMP requirements. In the case of Hesperia, the City standards take precedence.

2.2.3 Methodologies Used to Determine Level of Service

Both the City of Hesperia and SANBAG require that intersection analysis be conducted using the methodologies following the most recent edition of the Highway Capacity Manual (HCM). In the case of this study, the HCM methodologies have been

accomplished through the SYNCHRO traffic analysis software. The specific input data as outlined in Appendices A and C of the CMP was used. A summary of each Level of Service (LOS) and the corresponding delay is provided in the **Table 2-1**.

Table 2-1 Intersection LOS Standards per the *Highway Capacity Manual (HCM)*

LOS	Average Total Delay Per Vehicle (seconds)	
	Signalized	**Unsignalized**
A	0 to 10.00	0 to 10.00
B	10.01 to 20.00	10.01 to 15.00
C	20.01 to 35.00	15.01 to 25.00
D	35.01 to 55.00	25.01 to 35.00
E	55.01 to 80.00	35.01 to 50.00
F	Over 80	Over 50

Table 2-2 is a description of the LOS standards for roadway segments for a LOS D capacity. LOS D capacity is the standard for industrial and commercial areas during peak periods, which are the areas of most traffic within the City of Hesperia. The capacities for LOS D volume thresholds for each facility type were determined based on the procedure outlined in the Florida Tables from the Florida Department of Transportation (FDOT). The LOS D volume thresholds are based on Class II State Two-way Arterials taken from the FDOT generalized annual average daily volumes table. The capacities for two-lane divided, four-lane undivided, six-lane undivided, and eight-lane divided were generated using appropriate percentages as defined in the table notes. (It should be noted that these daily capacity values relate to current conditions, in which the peak hour represents about 10% of total daily traffic and intersection capacity falls within the typical midblock cross-section, i.e., very few intersections have been widened to provide additional turn lanes.)

Table 2-2 Roadway Segment LOS Standards

Segment	LOS D Capacity (veh/day)
2/undivided	14,500
2/divided*	17,400
4/undivided**	24,480
4/divided	30,600
6/undivided***	36,880
6/divided	46,100
8/divided****	60,100

Note:
* LOS D capacity is based on 2 lane undivided increased by 20%
** LOS D capacity is based on 4 lane divided decreased by 20%
*** LOS D capacity is based on 6 lane divided decreased by 20%
**** LOS D capacity is based on 6 lane divide increased by 14,000 veh/day

2.3 Existing Traffic Conditions

2.3.1 Roadway Characteristics

The existing conditions roadway analysis is based on review of aerial photographs and field observations made in December 2006. These existing roadway characteristics are provided in **Table 2-3**.

2.3.2 Traffic Volumes on Roadway Segments

The existing traffic volumes were obtained from two sources: daily traffic count data collected as part of recent studies conducted for the City of Hesperia, and counts conducted by the City. Count volumes reflect conditions in the Year 2006. The existing average daily traffic volumes on roadways in the City of Hesperia are shown on Table 2-3, previously referenced. Count worksheets are provided in **Appendix A**.

2.3.3 Level of Service on Roadway Segments

Table 2-3, previously referenced, presents the number of travel lanes, the median type and a comparison of the daily traffic volume to the LOS D capacity of the roadway segment.

The results of the roadway analysis indicate that 16 of the 99 roadway segments currently operate at LOS E or F. **Figure 2-2** presents the levels of service on the study area roadway segments for existing conditions.

2.3.4 Intersection Characteristics

The existing intersection analysis includes 51 key intersections as identified with the assistance of City of Hesperia Traffic Engineering staff. **Figure 2-3** presents the locations of the study intersections. Traffic signals control traffic at 19 of the existing intersections while the remaining 32 intersections are stop sign-controlled.

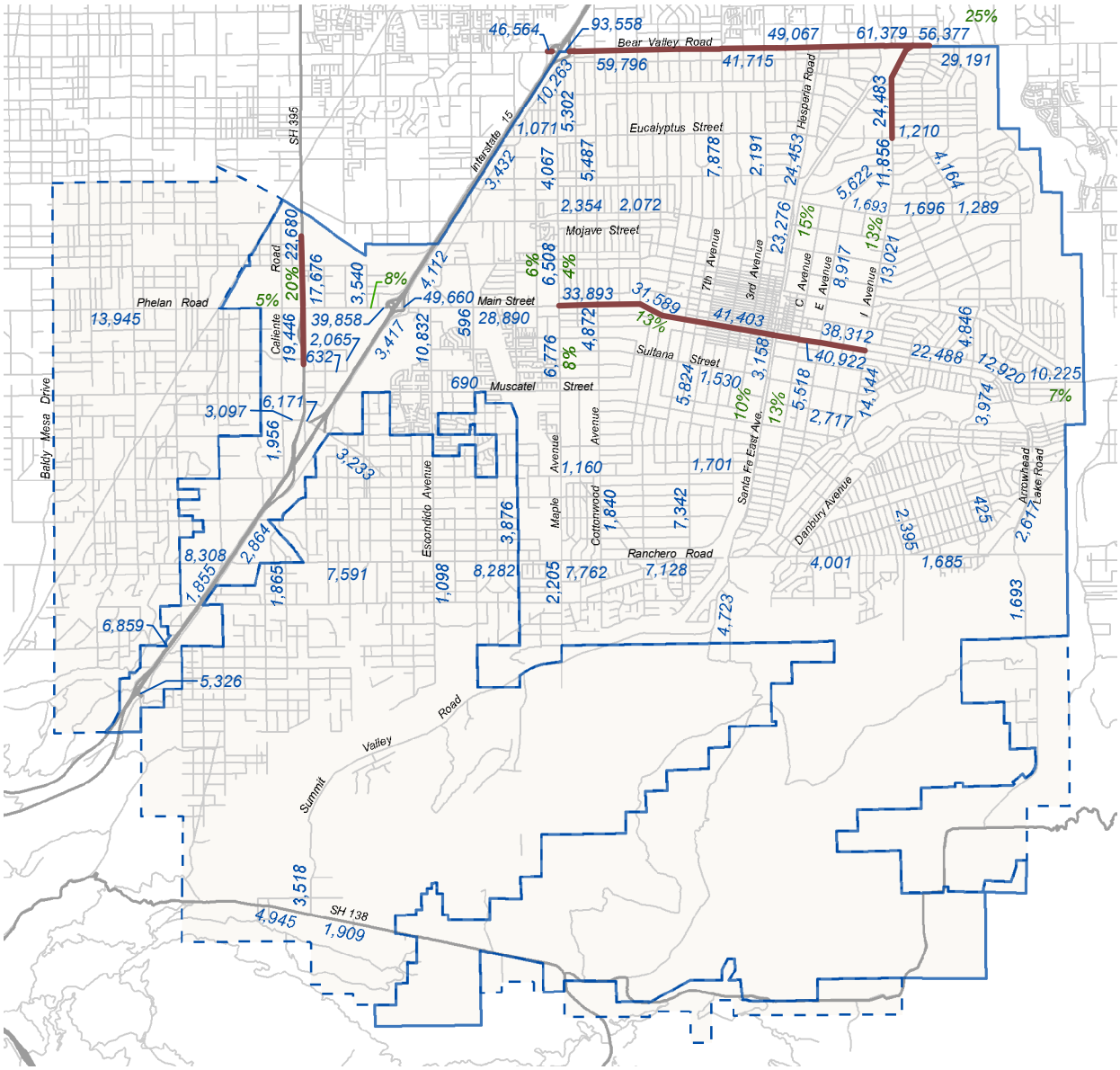
Table 2-3 Summary of Roadway Operations LOS, Existing Conditions

Roadway Segment	No. of Lanes/ Median Type	Existing ADT	LOS D Roadway Capacity	LOS D or better
Caliente Road				
South of Ranchero Rd	2/undivided	1,865	14,500	Yes
South of Joshua Street	2/undivided	1,956	14,500	Yes
North of Oak Hill Road	2/undivided	1,855	14,500	Yes
Escondido Avenue				
South of Ranchero Rd	2/undivided	1,098	14,500	Yes
South of Main Street	4/divided	10,832	30,600	Yes
Summit Valley Road				
South of Ranchero Road	2/undivided	4,723	14,500	Yes
North of SR 138	2/undivided	3,518	14,500	Yes
Arrowhead Lake Road				
South of Ranchero Road	2/undivided	1,693	14,500	Yes
Ranchero Road between				
Santa Fe Avenue and "I" Avenue	2/undivided	4,001	14,500	Yes
"I" Avenue and Peach Avenue	2/undivided	1,685	14,500	Yes
Mariposa Road and Escondido Avenue	2/undivided	7,951	14,500	Yes
Maple Avenue and Escondido Avenue	2/undivided	8,282	14,500	Yes
Maple Avenue and Cottonwood Avenue	2/undivided	7,762	14,500	Yes
Cottonwood Avenue and 7th Avenue	2/undivided	7,128	14,500	Yes
Joshua Street between				
NB 15 ramp and Mariposa Road	2/undivided	3,233	14,500	Yes
Caliente and US 395	2/undivided	3,097	14,500	Yes
US 395 and I-15 SB Ramp	2/undivided	6,171	14,500	Yes
Muscatel Street between				
Escondido Avenue and Fuente Avenue	2/undivided	690	14,500	Yes
Mesquite Street				
East of Maple Avenue	2/undivided	1,160	14,500	Yes
East of 7th Avenue	2/undivided	1,701	14,500	Yes
Baldy Mesa Road				
South of Phelan Road	2/undivided	2,683	14,500	Yes
North of Phelan Road	2/undivided	6,834	14,500	Yes
Phelan Road between				
Baldy Mesa Road and US 395	2/divided	13,945	17,400	Yes

Roadway Segment	No. of Lanes/ Median Type	Existing ADT	LOS D Roadway Capacity	LOS D or better
Main Street between				
Cataba Rd and SB 15 ramp	6/divided	39,858	46,100	Yes
NB 15 ramp and Mariposa Road	8/divided	49,660	60,100	Yes
Mariposa Road and Maple Avenue	6/divided	28,890	46,100	Yes
Maple Avenue and Cottonwood Avenue	4/divided	33,893	30,600	No
Cottonwood Avenue and 7th Avenue	4/divided	31,589	30,600	No
7th Avenue and Hesperia Road	6/undivided	41,403	36,880	No
"C" Avenue and "E" Avenue	4/divided	40,922	30,600	No
"E" Avenue and "I" Avenue	4/divided	38,312	30,600	No
"I" Avenue and Peach Avenue	4/undivided	22,488	24,480	Yes
Peach Avenue and Rock Springs Road	2/divided	12,920	17,400	Yes
Sultana Street between				
7th Avenue and Hesperia Road	2/undivided	1,530	14,500	Yes
"E" Avenue and "I" Avenue	2/undivided	2,717	14,500	Yes
Mauna Loa Street between				
Maple Avenue and Cottonwood Avenue	2/undivided	2,354	14,500	Yes
Cottonwood Avenue and 7th Avenue	2/undivided	2,072	14,500	Yes
7th Avenue and 3rd Avenue	2/undivided	251	14,500	Yes
Lemon Street between				
"E" Avenue and "I" Avenue	2/undivided	1,693	14,500	Yes
"I" Avenue and Peach Avenue	2/undivided	1,696	14,500	Yes
East of Peach Avenue	2/undivided	1,289	14,500	Yes
Eucalyptus Avenue between				
Mariposa Road and Maple Avenue	2/undivided	1,071	14,500	Yes
3rd Avenue and 7th Avenue	2/undivided	2,564	14,500	Yes
"I" Avenue and Peach Avenue	2/undivided	1,210	14,500	Yes
Bear Valley Road between				
Amargosa Road and SB 15 ramp	6/divided	46,564	46,100	No
NB 15 ramp and Mariposa Road	6/divided	93,558	46,100	No
Mariposa Road and 11th Avenue	6/divided	59,796	46,100	No
3rd Avenue and 7th Avenue	6/undivided	41,715	36,880	No
West of Ridgecrest Road	6/undivided	61,379	36,880	No

Roadway Segment	No. of Lanes/ Median Type	Existing ADT	LOS D Roadway Capacity	LOS D or better
I Avenue and Peach Avenue	6/divided	56,377	46,100	No
West of 2nd Avenue	6/divided	49,067	46,100	No
At Mojave River	6/undivided	29,191	36,880	Yes
Hwy 395 between				
South of Phelan Road	2/undivided	19,446	14,500	No
North of Phelan Road	2/undivided	17,676	14,500	No
South of Bear Valley Road	4/undivided	22,680	24,480	Yes
Cataba Road between				
North of Main Street	2/undivided	3,540	14,500	Yes
Mariposa Road between				
North of Main Street	2/undivided	4,112	14,500	Yes
South of Eucalyptus Street	2/undivided	3,432	14,500	Yes
South of Bear Valley Road	2/undivided	10,263	14,500	Yes
Joshua Street and Ranchero Road	2/undivided	2,864	14,500	Yes
Ranchero Road and Oak Hill Rd	2/undivided	8,308	14,500	Yes
Oak Hill Road and I-15 NB Ramp	2/undivided	6,859	14,500	Yes
South of Main Street	2/undivided	3,417	14,500	Yes
Maple Avenue between				
North of Ranchero Road	2/undivided	3,876	14,500	Yes
Muscatel Street and Sultana Street	4/undivided	6,776	24,480	Yes
Main Street and Willow Street	4/divided	6,508	30,600	Yes
Eucalyptus Street and Mariposa Road	2/undivided	5,302	14,500	Yes
South of Eucalyptus Street	2/undivided	4,067	14,500	Yes
South of Ranchero Road	2/undivided	2,205	14,500	Yes
Hesperia Road between				
Eucalyptus and Lemon Street	2/divided	24,453	17,400	Yes
Lemon Street and Main Street	2/divided	23,276	17,400	Yes
Santa Fe Avenue East				
South of Main Street	2/undivided	3,158	14,500	Yes
E Avenue between				
"I" Avenue and Lemon Street	2/undivided	5,622	14,500	Yes
Lemon Street and Main Street	2/undivided	8,917	14,500	Yes
South of Main Street	2/undivided	5,518	14,500	Yes
I Avenue between				
Bear Valley Road and Eucalyptus Street	2/divided	24,483	17,400	No
Eucalyptus Street and Lemon	2/divided	11,856	17,400	Yes

Roadway Segment	No. of Lanes/ Median Type	Existing ADT	LOS D Roadway Capacity	LOS D or better
Street				
Lemon Street and Main Street	2/divided	13,021	17,400	Yes
South of Main Street	2/divided	14,144	17,400	Yes
North of Ranchero Road	2/undivided	2,395	14,500	Yes
Arrowhead Lake Road				
North of Ranchero Road	2/undivided	2,617	14,500	Yes
SR 138 between				
West of Summit Valley Road	2/undivided	4,945	14,500	Yes
East of Summit Valley Road	2/undivided	1,909	14,500	Yes
Poplar				
East of Hwy 395	2/undivided	632	14,500	Yes
Mesa Linda				
South of Main Street	2/undivided	2,065	14,500	Yes
Cottonwood Avenue				
South of Eucalyptus Street	2/undivided	5,487	14,500	Yes
South of Main Street	2/undivided	4,872	14,500	Yes
North of Ranchero Road	2/undivided	1,840	14,500	Yes
7th Avenue between				
South of Eucalyptus Street	2/undivided	7,878	14,500	Yes
South of Main Street	2/undivided	5,284	14,500	Yes
Mesquite Street and Ranchero Road	2/undivided	7,342	14,500	Yes
3rd Avenue				
South of Eucalyptus Street	2/undivided	2,191	14,500	Yes
Peach Avenue				
South of Eucalyptus Street	2/undivided	4,164	14,500	Yes
North of Main Street	2/undivided	4,846	14,500	Yes
South of Main Street	2/undivided	3,974	14,500	Yes
North of Ranchero Road	2/undivided	425	14,500	Yes
Fuente Avenue				
South of Main Street	2/undivided	596	14,500	Yes
Oak Hill Road between				
I-15 SB Ramp and I-15 NB Ramp	2/undivided	5,326	14,500	Yes
Rock Springs Road				
At Mojave River	2/undivided	10,225	14,500	Yes



Legend

- City Of Hesperia Boundary
- Sphere of Influence Boundary
- Road Segment LOS E or F
- 1,234 Existing ADT
- X% Heavy Truck Percentage

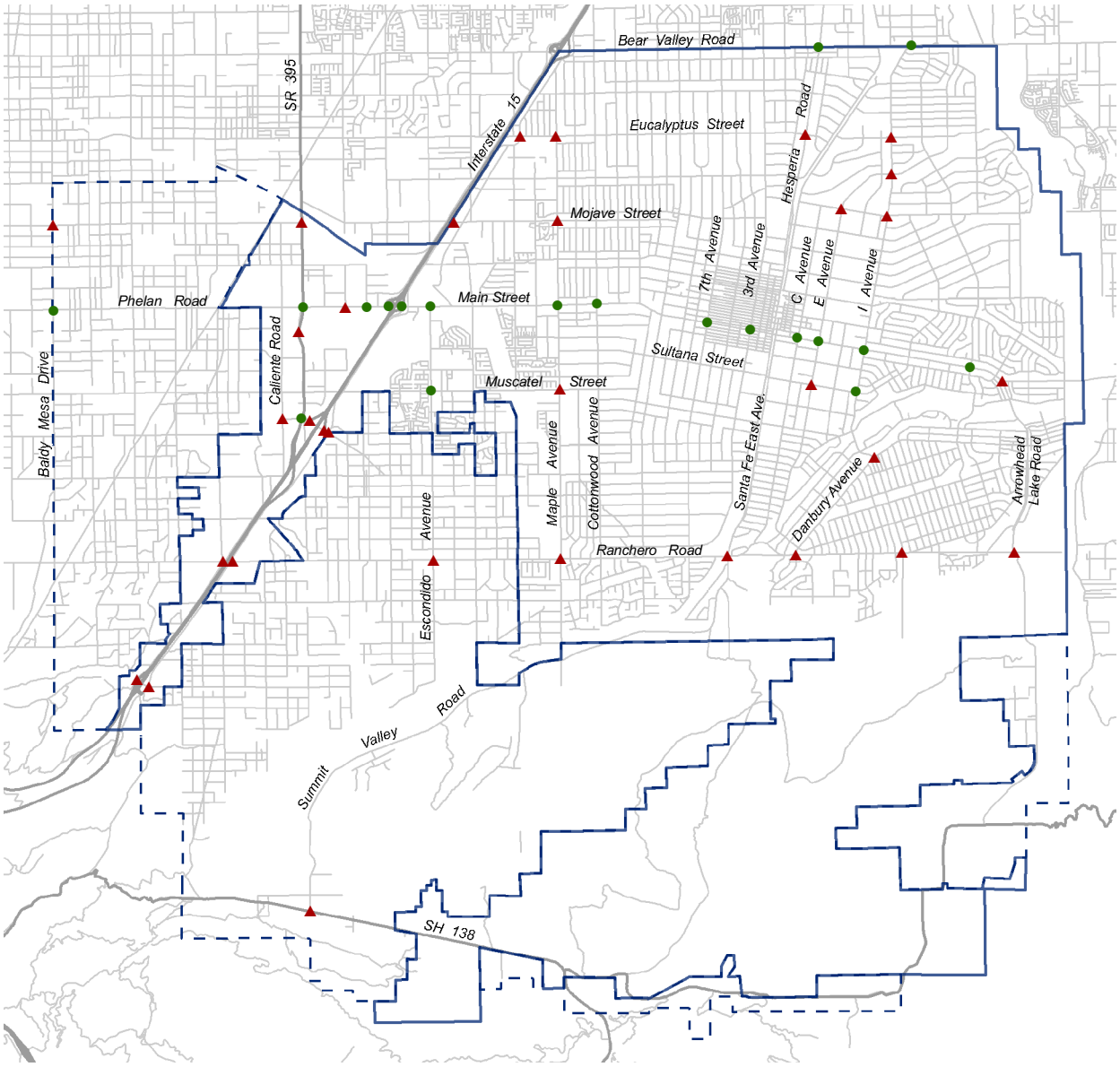
Not to Scale

February 2007

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Figure 2-2

Existing Average Daily Traffic and Deficient Roadway Segments



Legend

- City Of Hesperia Boundary
- Sphere of Influence Boundary
- Non-Signalized Intersections
- Signalized Intersections

Not to Scale

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Figure 2-3

Locations of Study Intersections

2.3.5 Peak Hour Traffic Volumes at Intersections

Morning and afternoon peak hour turning movement counts were obtained for 15 intersections from approved traffic studies provided by city staff, where available. New counts were conducted at 36 locations where counts were not available from the city. Count worksheets are provided in **Appendix A**.

2.3.6 Peak Hour Level of Service at Intersections

Table 2-4 summarizes the analysis results of the study intersections under existing traffic conditions generated from SYNCHRO traffic analysis software. All signalized intersections were analyzed as actuated-uncoordinated controller types. The results of the intersection analysis indicate that 11 of the 51 intersections analyzed operate at LOS F:

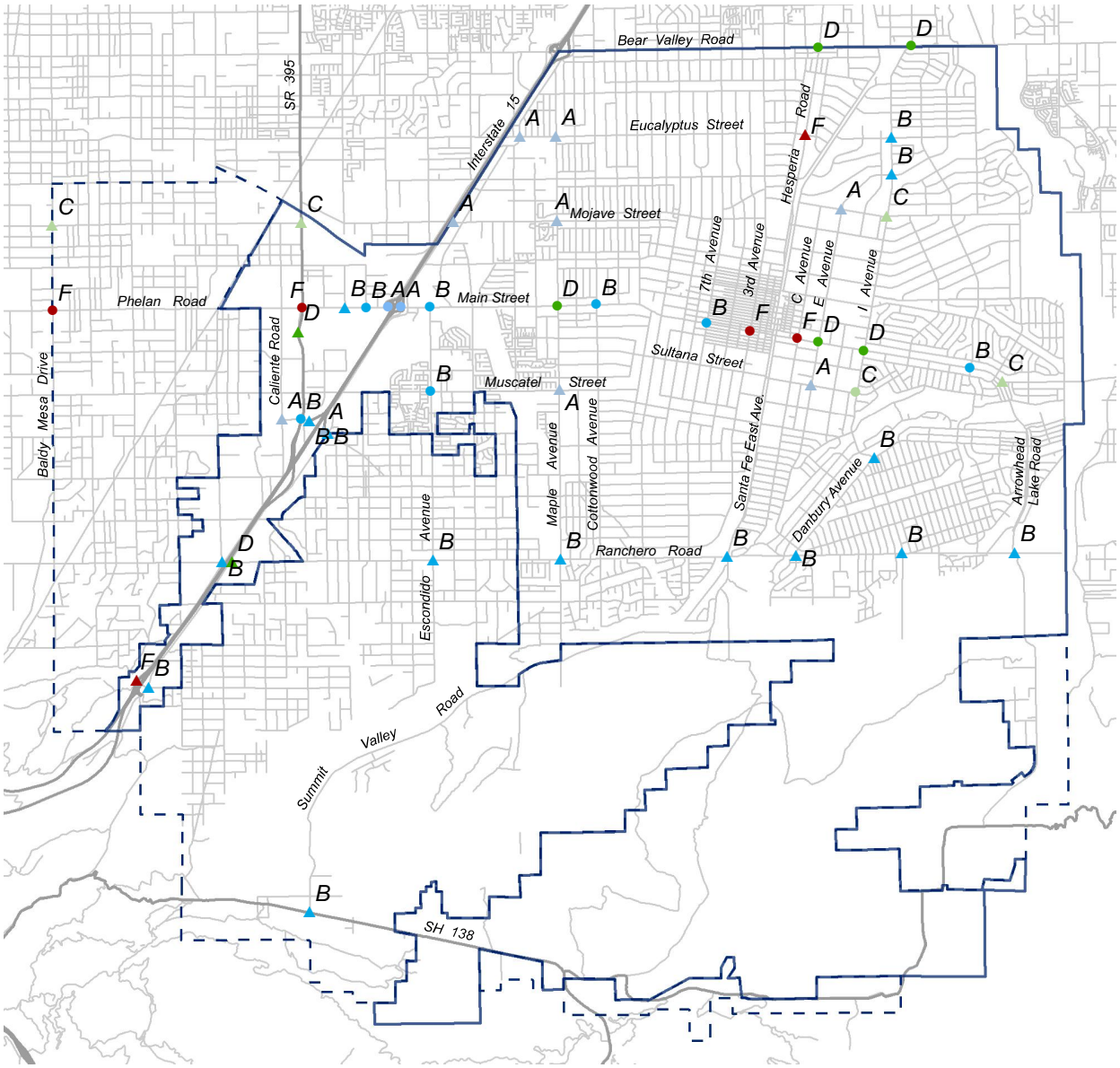
- Arrowhead Lake Rd/Main Street at Rock Springs Road
- Hwy 395 at Phelan Road
- I-15 SB Ramp at Oak Hill Rd
- I-15 NB Ramp at Bear Valley Road
- Baldy Mesa Drive at Phelan Road
- I Avenue at Bear Valley Road
- E Avenue at Main Street
- C Avenue at Main Street
- 3rd Avenue at Main Street
- Hwy 395 at Smoke Tree Road
- Hesperia Road at Eucalyptus Street

The remaining 40 intersections currently operate at LOS E or better. **Figures 2-4** and **2-5** present the LOS at the study intersections for existing conditions for the AM and PM peak hour periods, respectively. SYNCHRO analysis worksheets are provided in **Appendix B**.

Table 2-4 Summary of Intersection Operations, Existing Conditions

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
1	Summit Valley Rd at Hwy 138	CSS	11.5	B	10.8	B
5	I-15 SB Ramp at Oak Hill Rd	CSS	64.5	F	20.2	C
6	I-15 NB Ramp at Mariposa Ave	CSS	12.9	B	65.6	F
9	Caliente Rd at Ranchero Rd	CSS	10.0	B	10.7	B
12	Mariposa Road at Ranchero Rd	AWS	29.1	D	14.9	B
13	Escondido Ave at Ranchero Rd	CSS	15.0	B	18.8	C
14	Maple Ave at Ranchero Rd	AWS	13.5	B	30.4	D
15	I Ave at Ranchero Rd	CSS	13.5	B	9.4	A
16	Arrowhead Lake Rd at Ranchero Rd	CSS	10.0	B	11.5	B
17	Caliente Rd at Joshua St	CSS	9.5	A	9.2	A
18	Mariposa Rd at Joshua St	CSS	10.7	B	11.0	B
19	Escondido Ave at Muscatel St	S	10.6	B	27.9	C
20	Arrowhead Lake Rd at Main St	CSS	24.7	C	526.2	F
21	Baldy Mesa Dr at Phelan Rd	S	188.0	F	35.5	D
22	Hwy 395 at Phelan Rd	S	147.7	F	128.6	F
23	Maple Avenue at Eucalyptus St	AWS	9.2	A	10.6	B
24	Mesa Linda at Main St	CSS	11.1	B	11.5	B
25	Cataba Rd at Main St	S	10.8	B	12.3	B
26	I-15 SB Ramp at Main St	S	5.8	A	6.6	A
27	Escondido Ave at Main St	S	16.4	B	27.4	C
28	Maple Ave at Main St	S	49.1	D	29.9	C
29	I Ave at Bear Valley Rd	S	48.0	D	216.6	F
30	3rd Ave at Main St	S	178.3	F	355.8	F
31	C Ave at Main St	S	169.5	F	314.1	F
32	E Ave at Main St	S	39.2	D	345.3	F
33	I Ave at Main St	S	53.1	D	53.3	D
34	Baldy Mesa Dr at Smoke Tree Rd	CSS	20.8	C	12.4	B
35	Hwy 395 at Smoke Tree Rd	CSS	21.4	C	62.3	F
36	Mariposa Rd at Mojave St	CSS	0.1	A	13.6	B
40	Maple Ave at Mojave St	CSS	9.7	A	12.4	B
41	Hesperia Rd at Bear Valley Road	S	35.2	D	53.1	D
42	E Ave at Lemon St	AWS	8.3	A	8.8	A
43	I Ave at Lemon St	AWS	22.9	C	47.7	E
46	Mariposa Rd at Eucalyptus St	CSS	9.8	A	11.7	B
47	Hesperia Rd at Eucalyptus St	CSS	185.5	F	147.1	F
48	E Ave at I Ave	AWS	11.4	B	15.4	C
49	I Ave at Eucalyptus St	AWS	12.9	B	13.5	B

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
52	I-15 SB Ramp at Joshua St	CSS	13.9	B	12.0	B
53	I-15 NB Ramp at Joshua St	CSS	4.2	A	3.2	A
54	Santa Fe East Ave at Ranchero Rd	CSS	10.4	B	11.9	B
55	E Ave at Sultana St	AWS	9.3	A	9.8	A
56	I Ave at Sultana St	S	30.4	C	18.6	B
57	Hwy 395 at Joshua St	S	18.7	B	14.1	B
58	I-15 NB Ramp at Main St	S	6.5	A	16.0	B
70	Hwy 395 at Poplar St	CSS	26.8	D	35.1	E
73	Maple Ave at Muscatel St	AWS	8.1	A	9.5	A
74	Main St at Cottonwood	S	13.6	B	20.4	C
75	Main St at 7th Ave	S	14.2	B	18.8	B
76	Main St at Peach Ave	S	13.9	B	13.7	B
77	I Ave at Danbury Ave	AWS	10.4	B	45.2	E
78	Danbury Ave at Ranchero Rd	CSS	12.0	B	11.5	B



Legend

- City Of Hesperia Boundary
- Sphere of Influence Boundary
- Non-signalized, Level of Service A
- Non-signalized, Level of Service B
- Non-signalized, Level of Service C
- Non-signalized, Level of Service D
- Non-signalized, Level of Service E
- Non-signalized, Level of Service F
- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

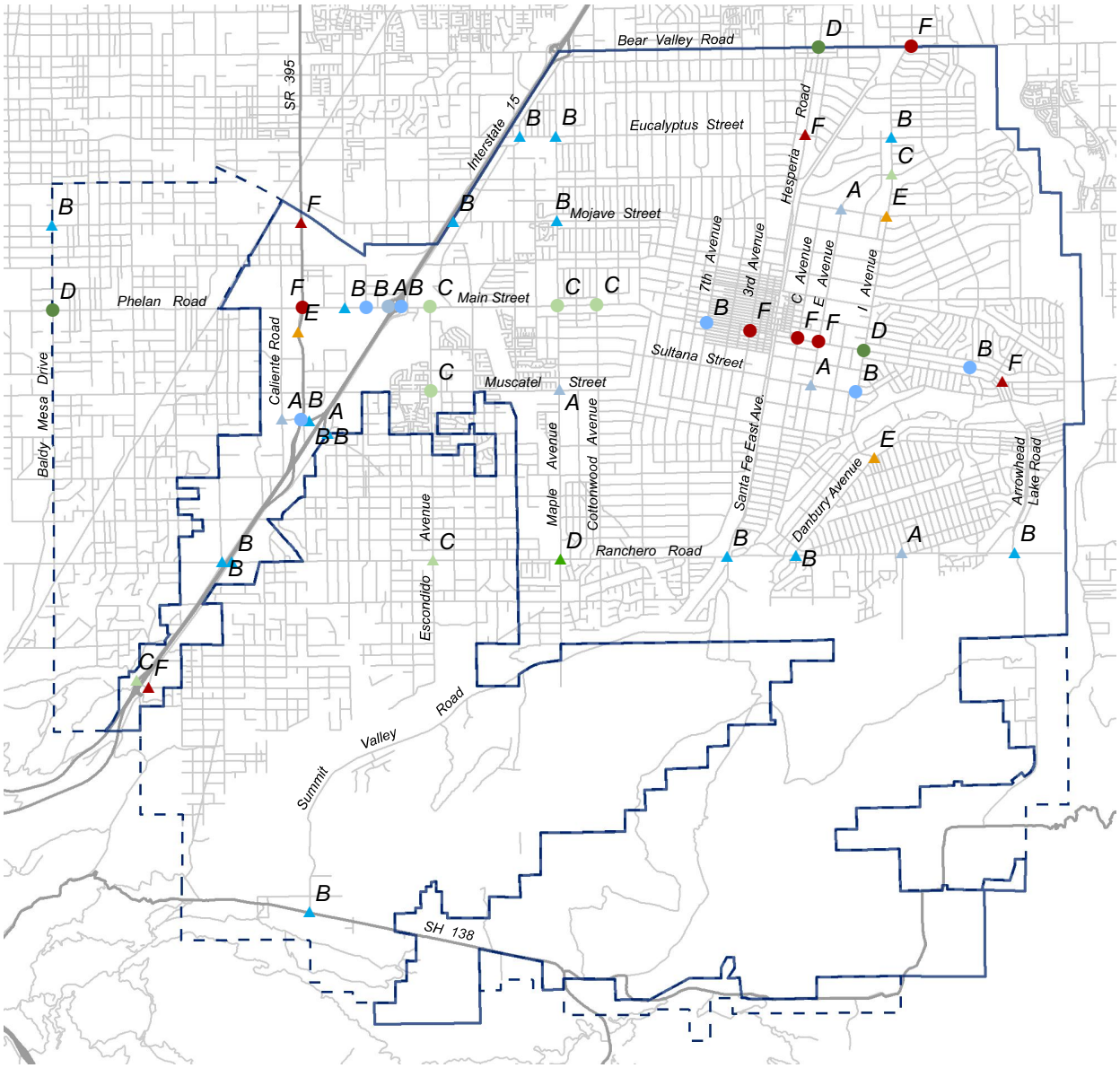
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Figure 2-4

AM Peak Hour Intersection Level of Service
Existing Conditions



Legend

- City Of Hesperia Boundary
- Sphere of Influence Boundary
- Non-signalized, Level of Service A
- Non-signalized, Level of Service B
- Non-signalized, Level of Service C
- Non-signalized, Level of Service D
- Non-signalized, Level of Service E
- Non-signalized, Level of Service F
- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

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Figure 2-5

PM Peak Hour Intersection Level of Service
Existing Conditions

2.4 Truck Traffic

The significant amount of truck traffic in the City of Hesperia is directly related to the development of industrial land uses and truck transfer terminals. Streets with heavy volumes of truck traffic can experience the following effects:

- Greater levels of general traffic congestion and inefficient traffic flow;
- Increased potential for passenger vehicle/truck conflicts;
- Greater physical impacts to road surfaces (requiring increased road maintenance and cost); and
- Noise and air quality impacts associated with heavy diesel trucks.

2.5 Rail Lines and Crossings

Three major rail lines and a branch line run through the City of Hesperia. The UPRR line traverses the city in the northwest-southeast direction. The BNSF lines traverse the city in the north-south direction with a branch line to the Lucerne Valley running from the BNSF tracks eastbound. The Amtrak Southwest Chief runs on the north-south tracks.

UPRR has one at-grade crossing at Ranchero Road and one grade-separated crossing at Mariposa Road. BNSF has only two grade-separated crossings at Main Street and Bear Valley. The spur to Lucerne Valley has at-grade crossings at I Avenue and Peach Avenue with a bridge traveling over the Mojave River.

2.6 Existing Transit and Passenger Rail Service

Bus Transit

The Victor Valley Transit Agency (VVTA) provides local bus service for the communities of Adelanto, Apple Valley, Hesperia, Victorville, and San Bernardino County. In this study's base year (2006) VVTA operated five bus routes in Hesperia, providing bus connections between shopping centers and the Victor Valley Mall, hospitals, schools and colleges, and residential areas. The five routes include:

- Route 21 Victor Valley Mall-Serrano High School-Wrightwood Community Center
  (Phelan-Baldy Mesa-Bear Valley)
- Route 43 Victor Valley Mall-Victor Valley College-Apple Valley High School
  (Bear Valley-7th Avenue)
- Route 44 Victor Valley Mall-Hesperia City Hall-Mojave High School-Hesperia Post Office-Sultana High School
  (Bear Valley-Cottonwood-Main Street-7th-3rd-E-I-Sultana-Danbury-Arrowhead Lake)
- Route 45 Dessert Valley Hospital-Victor Valley College-Hesperia Post Office
  (Bear Valley-Main-Sultana- I-E-C-Muscatel-Santa Fe)
- Route 52 Victorville-Victor Valley Mall)
  (Bear Valley)

VVTA also offers paratransit services for persons with special needs on any paved street within Hesperia as long as it is within their service boundaries. The VVTA paratransit services do not travel a fixed route. Certified passengers are required to schedule rides at least one day in advance.

Amtrak

Amtrak has one route that regularly passes through Hesperia, the Southwest Chief route, which typically travels between Los Angeles and Chicago, Illinois. There is no Amtrak stop in Hesperia. The closest Amtrak stop to Hesperia is in its neighboring city, Victorville.

3. ISSUES AND OPPORTUNITIES

This chapter discusses the key circulation issues to be addressed as part of the Hesperia General Plan Update. The discussion focuses on specific locational issues related to railroad crossings, river crossings, freeway crossings and interchanges, as well as other specific questions to be addressed. The Circulation Element update analysis also includes a citywide analysis of future roadway lanes and capacity needed to serve the future mobility needs of the City (see Chapters 4 and 5).

3.1 Railroad Crossings

The Burlington Northern Santa Fe (BNSF) mainline constitutes a major barrier to east-west circulation across the City. Two grade separated crossings currently cross the BNSF line at Bear Valley Road and Main Street. A new crossing at Ranchero Road is under construction. The City's current Master Plan of Arterial Highways (MPAH) also shows planned railroad crossings at Eucalyptus Street, Lemon Street/Mauna Loa Road, and Sultana Avenue. The following discussion addresses issues associated with the planned future crossings.

Eucalyptus Street: The crossing is viable. There is an offset in the alignment of Eucalyptus at the railroad, so acquisition of properties will be necessary to construct it. Eucalyptus is planned to have an interchange at I-15.

Lemon Street/Mauna Loa Road: There is an offset in the alignments of the two streets near the railroad, but the MPAH shows them as one continuous street. The City has conceptually evaluated alignment possibilities and believes the crossing is viable. Lemon/Mauna Loa is planned to be connected with Mojave Drive further west, which is planned to have an interchange at I-15. To the east, a bridge across the Mojave River is planned which would connect Lemon Street with Tussing Ranch Road.

Sultana Avenue: Sultana has a slight alignment offset at the railroad and there is development in the northeast quadrant, but City staff believes it is a viable crossing point. The MPAH includes this new crossing of the railroad just south of Main Street as a way to relieve traffic on Main Street, since it would be difficult for the segment of Main Street between I Street and 7th Avenue to ever be expanded to more than four lanes. An option to Sultana may be to develop Muscatel as an arterial all the way across the City including a grade separation of the railroad, if an alignment can be found that does not have too much impact. East of the railroad, Muscatel might be extended to the north of Lime Street Park to connect back to Sultana, or it might be extended only to a terminus at E Street.

Maple Street: With substantial future development planned for the southern part of the City, an extension of Maple Street southerly across the railroad (not currently shown on the MPAH) could provide these new areas with a railroad crossing west of the California Aqueduct.

Whitehaven Road: Another potential east-west crossing of the BNSF line has been discussed for Whitehaven Road (south of Ranchero Road in unincorporated San Bernardino County), though it is not shown on the current MPAH. This crossing would not be needed if Maple Street is extended across the BNSF rail line.

3.2 River Crossings

The Mojave River constitutes a major barrier to east-west circulation at the eastern boundary of the City. Two crossings currently exist: a bridge at Bear Valley Road and a two-lane at-grade crossing through the river channel at Rock Springs Road. The MPAH shows future bridge crossings at Lemon Street (4 lanes, connecting with Tussing Ranch Road), Rock Springs Road (4 lanes), and Ranchero Road (6 lanes). The following discussion addresses issues associated with future crossings.

Lemon Street: The crossing is viable, and it has also been identified in the Victor Valley Area Transportation Study (VVATS) conducted by SANBAG as an important future connection.

Rock Springs Road: The County would be responsible for construction. It is shown as a four-lane bridge on the County plan as well as on the City MPAH. This crossing was recommended in VVATS for future upgrade to a four-lane bridge.

Ranchero Road: The planned crossing has some alignment issues – the current terminus of Ranchero Road on the west side of the river is at a wide part of the river channel, so the bridge would be longer than if it could be put at other locations. Also, the street passes through a residential area just west of the river, with driveways directly onto the street – not a desirable situation for future a condition with through traffic using this part of Ranchero Road to cross the river. VVATS determined that in the long-term future only one river crossing will be needed south of Rock Springs Road, and identified an initial alignment for the Southeast Beltway (whether built as a highway corridor or an arterial) that would cross the river where the channel is much narrower and may have fewer problems for implementation.

3.3 I-15 Freeway Interchanges and Crossings

Interchanges on I-15 currently exist at Bear Valley Road, Main Street, Joshua Lane/US-395, and Oak Hills Road (though the latter two are not designed to accommodate large volumes of traffic). As local and regional traffic volumes increase, additional interchanges are expected to be needed to provide efficient access to the regional highway system. The MPAH shows future interchanges at Eucalyptus Street, Mojave Street, and Ranchero Road, as well as crossings at Willow Street and Muscatel Street. The following discussion addresses issues associated with these interchanges and crossings.

Eucalyptus Street: Both the Cities of Hesperia and Victorville (the jurisdiction west of I-15 at this location) are planning for an interchange at this location, and initial design plans have been initiated.

Mojave Street: Victorville currently feels that this proposed interchange may not be needed. An interchange at this location would provide a connection to the Lemon Street corridor that has planned crossings of the railroad and Mojave River.

Willow Street: Hesperia staff feels this overcrossing will no longer be needed, and the VVATS study found that the other interchanges on I-15 could function effectively without it in the system.

Muscatel Street: Hesperia currently favors a full interchange at Muscatel (rather than an overcrossing), with Joshua Lane converted from a partial interchange to an overcrossing.

Ranchero Road: Design studies are underway, and near-term construction of this interchange is a high City priority.

3.4 Highway Corridors

Future improvements are planned for I-15, and two new highway corridors are being planned or studied, which could pass through part of Hesperia. The following discussion presents the current status of planning for each.

I-15: The I-15 Major Corridor Study recommended that I-15 be widened to accommodate an additional general purpose lane and a high occupancy vehicle (HOV) lane in each direction between US-395 and the Mojave River.

US-395: VVATS and other studies project the need for a future major highway corridor to replace the existing US-395 through the Victor Valley. Recent development has precluded development of a major highway along the existing alignment, so Caltrans is studying alternatives that start with an interchange on I-15 (at either the current US-395 interchange or near Ranchero Road) and swing to the west. The existing alignment of US-395 is being planned as a six-lane arterial.

Southeast Beltway: VVATS evaluated the need for a major highway corridor around the southeast part of the Victor Valley. The VVATS recommendations include a future major highway corridor from I-15 (near SR-138) to approximately the intersection of SR-138 and Summit Valley Road. From there, the two arterials are projected to provide sufficient capacity with six lanes on SR-138 and four lanes on Summit Valley Road, which would be extended easterly through the Rancho Las Flores planning area to a new crossing of the Mojave River.

3.5 Other Issues

Other circulation issues identified through review of documents and discussions with City staff are highlighted below.

- Cataba Road is no longer viewed as needing to be an arterial street, and can be considered for removal from the MPAH.
- Mariposa (the frontage road on the east side of I-15) has varying classifications in different parts of the City. The classifications should be reviewed in light of the updated General Plan traffic forecasts.
- Peach Avenue is currently shown on the MPAH as a secondary arterial south of Bear Valley Road. It may be more appropriate to consider having the arterial on Jacaranda instead.
- Main Street: Between 11th Avenue and "I" Avenue Main Street has a downtown feel and it would be very difficult to widen it to more than four lanes because of the existence of commercial development near the street. The updated General Plan traffic forecasts should evaluate measures that will provide alternate routes to remove through traffic from this segment of Main Street (such as the Sultana or Muscatel railroad overcrossing, Muscatel/I-15 interchange, etc.).
- In the Summit Valley and Rancho Las Flores areas, arterials may need to be added to the MPAH (or modified) to serve planned future development. This could include extending Maple Avenue south to Summit Valley Road or to SR-138.
- Consideration should be given to extending Whitehaven Road west to connect in the future with the Oak Hill interchange with I-15.
- The City's typical right-of-way cross-sections should be reviewed for adequacy, so that appropriate parkway and landscaping elements can be provided within them.

4. EVALUATION OF ALTERNATIVES

This chapter evaluates projected traffic conditions in the City under alternative future scenarios. The purpose of this analysis is to evaluate traffic conditions under different future scenarios to help define preferred land use and transportation components for the updated General Plan. Two alternative land use scenarios were tested, and one of the land use scenarios was tested with two different regional transportation networks to evaluate the impact of regional highway improvements on traffic conditions in the City.

The chapter includes a description of the two land use scenarios, forecasts of future traffic volumes in each scenario, and evaluation of projected future traffic conditions.

4.1 Description of Alternatives

Three alternative future scenarios are analyzed in this chapter:

- Current General Plan (assumes full buildout of land uses envisioned in the City's current General Plan; assumes that potential regional highway corridor improvements in the Victor Valley will be constructed)
- High Intensity Buildout with new Corridors (assumes full buildout of land use in the City with a higher intensity of development, especially commercial uses in the Main Street and I-15 corridors; assumes that potential regional highway corridor improvements in the Victor Valley will be constructed)
- High Intensity Buildout no new Corridors (assumes full buildout of land use in the City with a higher intensity of development, especially commercial uses in the Main Street and I-15 corridors; assumes that potential regional highway corridor improvements in the Victor Valley will not be constructed)

Future traffic conditions for the Current General Plan and High Intensity ("with new Corridors") scenarios were analyzed with the potential highway corridor improvements for I-15, US-395 and the Southeast Beltway included in the traffic model network. **Figure 4-1** depicts the location of those planned improvements. An additional alternative was analyzed for the High Intensity scenario without the planned improvements ("no new Corridors").

4.2 Future Land Use

The City's General Plan consultant (Hogle-Ireland, Inc.) provided socioeconomic data (dwelling units, population, and employment) by traffic analysis zone (TAZ) for the Current General Plan and the High Intensity Buildout scenarios. Future traffic conditions for each land use scenario were analyzed by converting the data to units of socioeconomic data (SED) that represent residential population, number of households, employment and school enrollment. Assumed future Citywide development totals are summarized and compared with existing development in **Table 4-1**. The future development assumptions by TAZ are provided in **Appendix C**.



Legend

- Potential Southeast Beltway
- Widened I-15
- Potential US-395 Realignment

Not to Scale

September 2009

Figure 4-1

Potential Highway Corridor Improvements

Table 4-1 Summary of Development Scenarios

	Population	Households			Employment				School
	TotPop	SDU	MDU	TotalDU	Retail	Service	Other	Total	Enrollment
2003									
CITY & SPHERE	82,550	22,869	2,329	25,198	3,040	6,012	5,277	14,330	17,776
CITY	79,296	21,634	2,329	23,963	2,994	5,786	5,003	13,783	17,029
SPHERE	3,254	1,235	-	1,235	46	227	274	547	746
GENERAL PLAN BUILDOUT									
CITY & SPHERE	318,592	79,004	10,139	89,143	30,481	26,905	24,644	82,030	62,011
CITY	242,005	56,915	10,139	67,054	27,761	20,957	18,606	67,324	46,193
SPHERE	76,587	22,089	-	22,089	2,720	5,948	6,038	14,706	15,818
HIGH INTENSITY BUILDOUT LAND USE									
CITY & SPHERE	257,008	58,747	26,759	85,505	47,873	9,101	91,206	148,181	70,951
CITY	202,687	43,755	24,909	68,663	44,269	8,090	88,147	140,506	57,544
SPHERE	54,321	14,992	1,850	16,842	3,604	1,011	3,059	7,675	13,407

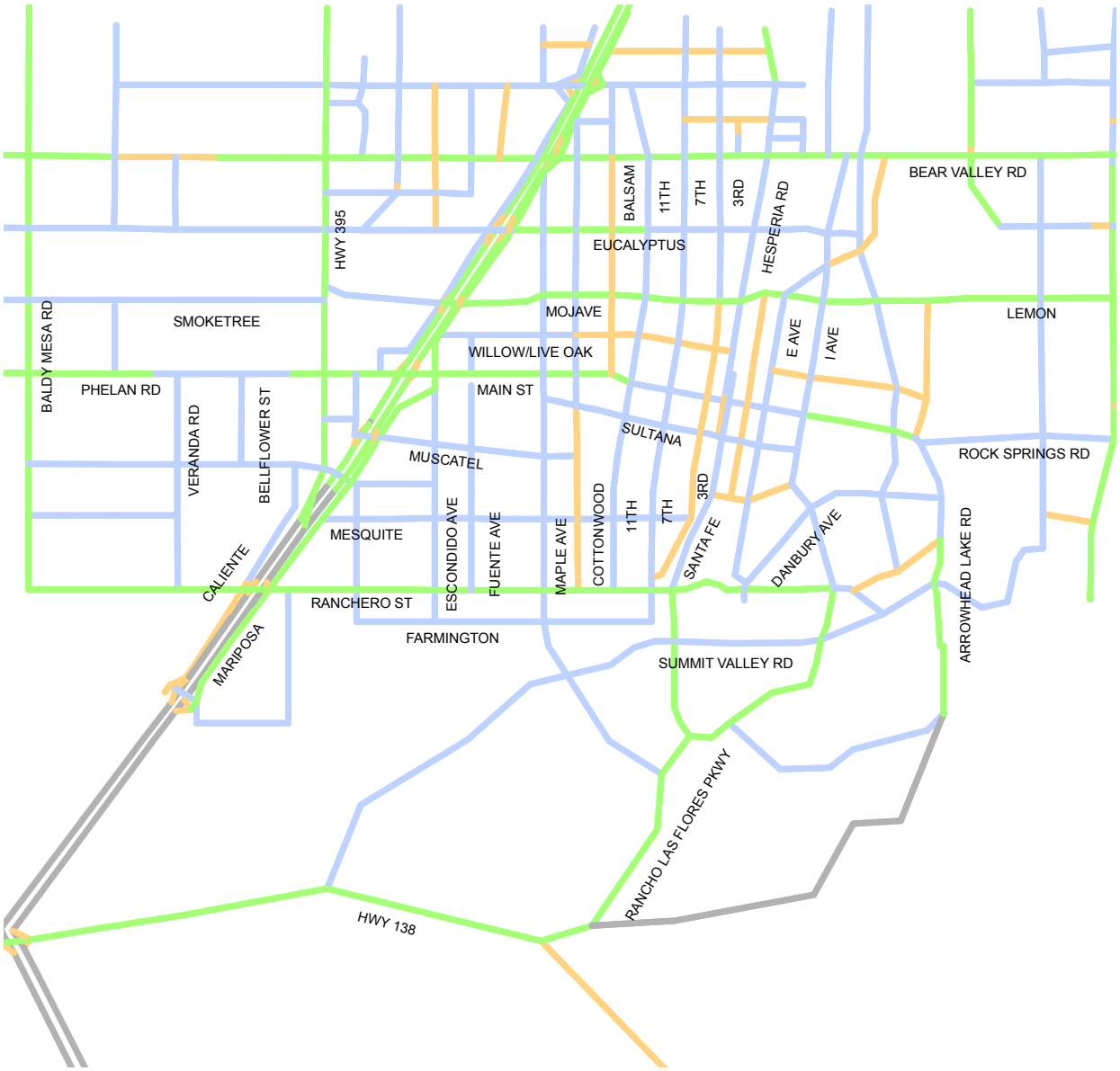
The current General Plan represents nearly four times the current population, more than triple the current number of dwelling units, five and a half times the total employment, and three and a half times the school enrollment for the city and sphere of influence areas. The High Intensity scenario has 19% less total population than the Current General Plan scenario and 4% fewer total dwelling units, but 81% more employment and 14% higher school enrollment.

4.3 Future Traffic Conditions

Future traffic volumes were estimated using the validated City traffic model and post-processing methodology. To compare the how the three alternatives would affect future traffic congestion, midblock level of service analysis was conducted assuming full development of the street system as shown on the current Master Plan of Arterial Highways (MPAH), with capacity or alignment changes in some areas to reflect the City's current expectations regarding future circulation needs. (**Figure 4-2** shows the arterial lane assumptions used in the alternatives analysis.) In addition, peak hour LOS was analyzed for the study intersections with consistent assumptions about lane geometry in each alternative.

The future conditions analysis for key intersections assumes the following changes from the existing conditions analysis:

- All intersections are signalized in the future; and
- Study intersections associated with the I-15 at Joshua St. interchange are replaced by the study intersections at I-15 and Muscatel Ave.
- Study intersection lane geometry is based on the number of lanes that can be accommodated within the typical future cross-section, with additional turn lanes as needed to achieve peak hour LOS D or better in the High Intensity Buildout (no new Corridors) alternative. For this analysis and comparison of alternatives, the maximum lanes assumed for an intersection approach was two left turn lanes, one right turn lane, and the number of through lanes shown on the MPAH.



Legend

Number of lanes each direction

- 1
- 2
- 3
- 4

Not to Scale

JULY 2009

Figure 4-2

Kimley-Horn and Associates, Inc.

Future Lane Assumptions

4.3.1 Current General Plan

The forecast average daily traffic volumes are summarized in **Table 4-2**. The table shows the number of lanes, the daily traffic volume, the capacity of the roadway segment at LOS D, and whether the forecast LOS would exceed LOS D for the segment. (Note: the segment LOS results may not match the intersection LOS results at the same locations, since the intersection analysis assumes additional capacity at many of the intersection due to the inclusion of additional turn lanes in the intersection LOS calculations.)

Under the Current General Plan, 76 out of the 118 roadway segments are projected to operate at LOS D or better. **Figure 4-3** depicts the roadway segment LOS throughout the City for the Current General Plan scenario.

The intersection LOS for the Current General Plan alternative was analyzed using the intersection lane geometry from the High Intensity Buildout (with no new Corridors) alternative. The forecasted peak hour LOS for the study intersections is summarized in **Table 4-3**. The forecast indicates that 5 of the study intersections are projected to operate at LOS E or F during the AM peak hour and 21 study intersections are projected to operate at LOS E or F during the PM peak hour.

Figure 4-4 and Figure 4-5 depict the intersection LOS for the Current General Plan scenario. SYNCHRO analysis worksheets are provided in **Appendix B**.

Table 4-2 Future Daily Traffic Volumes, Current General Plan

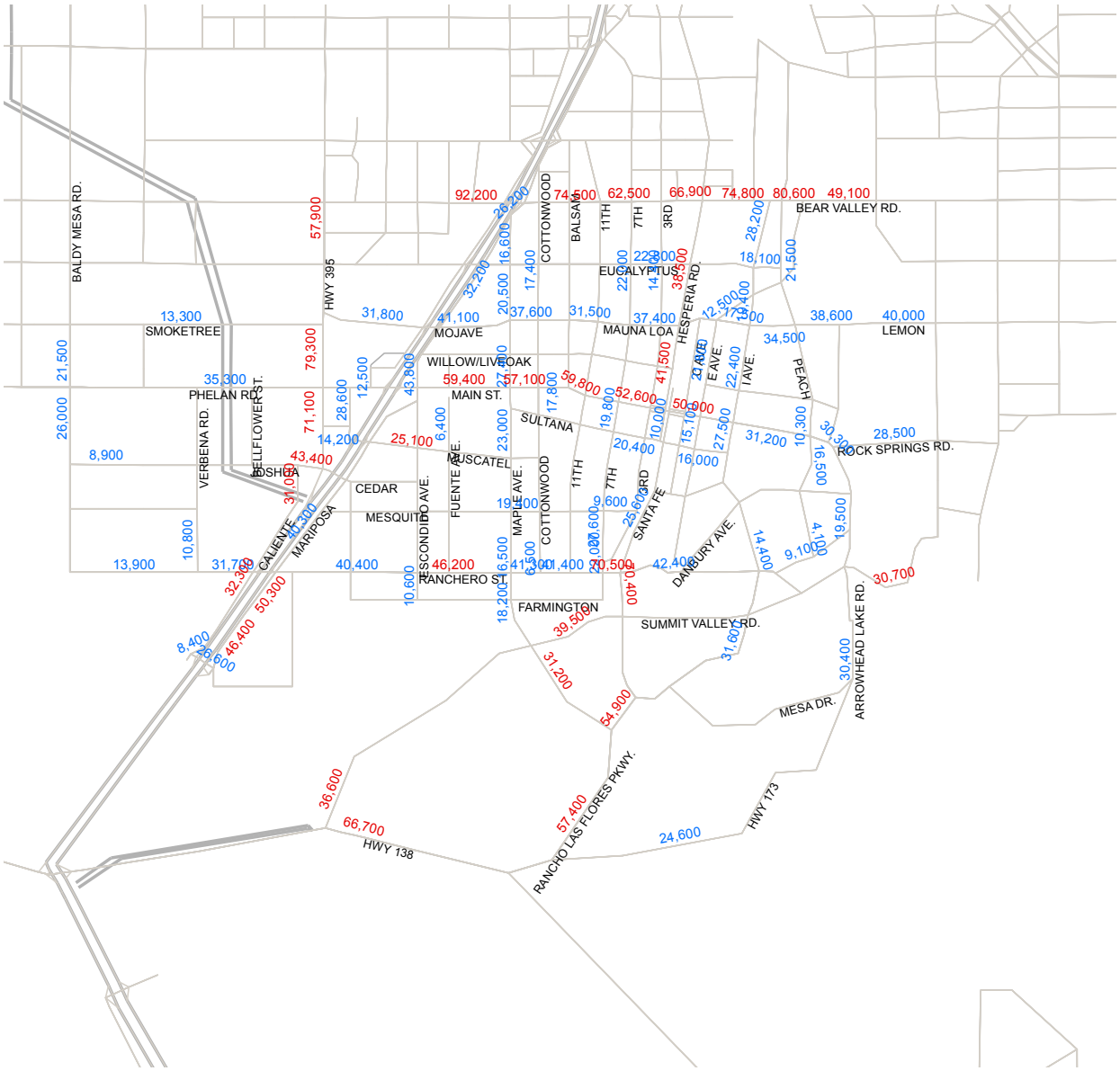
Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Caliente Road				
South of Ranchero Rd	2/undivided	32,300	14,500	No
South of Joshua Street	4/divided	31,000	30,600	No
North of Oak Hill Road	2/undivided	8,400	14,500	Yes
Escondido Avenue				
South of Ranchero Rd	4/divided	10,600	30,600	Yes
South of Main Street	4/divided	52,900	30,600	No
Summit Valley Road				
North of SR 138	4/divided	36,600	30,600	No
Arrowhead Lake Road				
South of Ranchero Road	6/divided	17,500	46,100	Yes
Ranchero Road between				
Santa Fe Avenue and "I" Avenue	6/divided	42,400	46,100	Yes
"I" Avenue and Peach Avenue	2/undivided	9,100	14,500	Yes
Mariposa Road and Escondido Avenue	6/divided	40,400	46,100	Yes
Maple Avenue and Escondido Avenue	6/divided	46,200	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	41,300	46,100	Yes
Cottonwood Avenue and 7th Avenue	6/divided	41,400	46,100	Yes
Joshua Street between				
NB 15 ramp and Mariposa Road	4/divided	42,700	30,600	No
Caliente and US 395	4/divided	38,700	30,600	No
US 395 and I-15 SB Ramp	4/divided	43,400	30,600	No
Muscatel Street between				
Escondido Avenue and Fuente Avenue	4/undivided	25,100	24,480	No
Mesquite Street				
East of Maple Avenue	4/undivided	14,400	24,480	Yes
East of 7th Avenue	4/undivided	9,600	24,480	Yes
Baldy Mesa Road				
South of Phelan Road	6/divided	26,000	46,100	Yes
North of Phelan Road	6/divided	21,500	46,100	Yes
Phelan Road between				
Baldy Mesa Road and US 395	6/divided	35,300	46,100	Yes
Main Street between				
Cataba Rd and SB 15 ramp	6/divided	80,900	46,100	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
NB 15 ramp and Mariposa Road	6/divided	79,900	46,100	No
Mariposa Road and Maple Avenue	6/divided	59,400	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	57,100	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	59,800	46,100	No
7th Avenue and Hesperia Road	4/divided	52,600	30,600	No
"C" Avenue and "E" Avenue	4/divided	50,000	30,600	No
"E" Avenue and "I" Avenue	4/divided	40,400	30,600	No
"I" Avenue and Peach Avenue	6/divided	31,200	46,100	Yes
Peach Avenue and Rock Springs Road	6/divided	30,300	46,100	Yes
Sultana Street between				
7th Avenue and Hesperia Road	4/divided	22,000	30,600	Yes
"E" Avenue and "I" Avenue	4/divided	16,000	30,600	Yes
Mauna Loa Street between				
Maple Avenue and Cottonwood Avenue	6/divided	37,600	46,100	Yes
Cottonwood Avenue and 7th Avenue	6/divided	31,500	46,100	Yes
7th Avenue and 3rd Avenue	6/divided	37,400	46,100	Yes
Lemon Street between				
"E" Avenue and "I" Avenue	6/divided	33,400	46,100	Yes
"I" Avenue and Peach Avenue	6/divided	34,500	46,100	Yes
East of Peach Avenue	6/divided	38,600	46,100	Yes
Eucalyptus Avenue between				
Mariposa Road and Maple Avenue	6/divided	32,500	46,100	Yes
3rd Avenue and 7th Avenue	4/divided	22,800	30,600	Yes
"I" Avenue and Peach Avenue	4/divided	18,100	30,600	Yes
Bear Valley Road between				
Amargosa Road and SB 15 ramp	6/divided	92,200	46,100	No
NB 15 ramp and Mariposa Road	6/divided	129,200	46,100	No
Mariposa Road and 11th Avenue	6/divided	74,500	46,100	No
3rd Avenue and 7th Avenue	6/divided	62,500	46,100	No
West of Ridgecrest Road	6/divided	74,800	46,100	No
I Avenue and Peach Avenue	6/divided	80,600	46,100	No
West of 2nd Avenue	6/divided	66,900	46,100	No
At Mojave River	6/divided	49,100	46,100	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Hwy 395 between				
South of Phelan Road	6/divided	71,100	46,100	No
North of Phelan Road	6/divided	79,300	46,100	No
South of Bear Valley Road	6/divided	57,900	46,100	No
Cataba Road between				
North of Main Street	4/divided	12,500	30,600	Yes
Mariposa Road between				
North of Main Street	6/divided	43,800	46,100	Yes
South of Eucalyptus Street	6/divided	32,200	46,100	Yes
South of Bear Valley Road	6/divided	26,200	46,100	Yes
Joshua Street and Ranchero Road	6/divided	40,300	46,100	Yes
Ranchero Road and Oak Hill Rd	6/divided	50,300	46,100	No
Oak Hill Road and I-15 NB Ramp	6/divided	46,400	46,100	No
South of Main Street	6/divided	46,400	46,100	No
Maple Avenue between				
North of Ranchero Road	4/divided	16,500	30,600	Yes
Muscatel Street and Sultana Street	4/divided	23,000	30,600	Yes
Main Street and Willow Street	4/divided	27,400	30,600	Yes
Eucalyptus Street and Mariposa Road	4/undivided	16,600	24,480	Yes
South of Eucalyptus Street	4/divided	20,500	30,600	Yes
South of Ranchero Road	4/divided	18,200	30,600	Yes
Hesperia Road between				
Eucalyptus and Lemon Street	4/divided	38,500	30,600	No
Lemon Street and Main Street	4/divided	41,500	30,600	No
Santa Fe Avenue East				
South of Main Street	4/divided	10,000	30,600	Yes
E Avenue between				
"I" Avenue and Lemon Street	4/divided	12,500	30,600	Yes
Lemon Street and Main Street	4/divided	21,800	30,600	Yes
South of Main Street	4/divided	15,100	30,600	Yes
I Avenue between				
Bear Valley Road and Eucalyptus Street	4/divided	28,200	30,600	Yes
Eucalyptus Street and Lemon Street	4/divided	19,400	30,600	Yes
Lemon Street and Main Street	4/divided	22,400	30,600	Yes
South of Main Street	4/divided	27,500	30,600	Yes
North of Ranchero Road	4/divided	19,400	30,600	Yes
Arrowhead Lake Road				
North of Ranchero Road	4/undivided	19,500	24,480	Yes

SR 138				
East of Summit Valley Road	6/divided	66,700	46,100	No
Poplar Avenue				
East of Hwy 395	4/divided	17,800	30,600	Yes
Mesa Linda Avenue				
South of Main Street	4/divided	28,600	30,600	Yes
Cottonwood Avenue				
South of Eucalyptus Street	4/undivided	17,400	24,480	Yes
South of Main Street	2/undivided	14,200	14,500	Yes
7th Avenue between				
South of Eucalyptus Street	4/divided	20,400	30,600	Yes
South of Main Street	4/divided	19,800	30,600	Yes
Mesquite Street and Ranchero Road	4/divided	27,600	30,600	Yes
3rd Avenue				
South of Eucalyptus Street	4/divided	14,400	30,600	Yes
Peach Avenue				
South of Eucalyptus Street	4/undivided	21,500	24,480	Yes
North of Main Street	4/undivided	10,300	24,480	Yes
South of Main Street	4/undivided	16,500	24,480	Yes
North of Ranchero Road	4/undivided	4,100	24,480	Yes
Fuente Avenue				
South of Main Street	4/undivided	6,400	24,480	Yes
Oak Hill Road between				
I-15 SB Ramp and I-15 NB Ramp	4/divided	26,600	30,600	Yes
Rock Springs Road				
At Mojave River	4/divided	28,500	30,600	Yes
Smoketree Road				
West of Hwy 395	4/divided	13,300	30,600	Yes
Hwy 395 and Amargosa Road	6/divided	31,800	46,100	Yes
Mojave Street				
Mariposa Road and Maple Avenue	6/divided	41,100	46,100	Yes
Lemon Street				
At Mojave River	6/divided	40,000	46,100	Yes
Snowline Road				
Baldy Mesa Road and Verbena Road	4/divided	8,900	30,600	Yes
Verbena Road				
North of Ranchero Road	4/divided	10,800	30,600	Yes
Ranchero Road				
Baldy Mesa Road and Verbena Road	6/divided	13,900	46,100	Yes
Verbena Road and Caliente Road	6/divided	31,700	46,100	Yes
7th Avenue and Santa Fe Avenue East	6/divided	70,500	46,100	No

7th Avenue				
Mesquite Street and Ranchero Road	4/divided	22,000	30,600	Yes
Santa Fe Avenue East				
South of Lime Street	4/divided	25,600	30,600	Yes
Ranchero Road and Summit Valley Road	6/divided	70,400	46,100	No
Rancho Las Flores Parkway				
North of Hwy 138	6/divided	57,400	46,100	No
Maple Avenue and Santa Fe Avenue East	6/divided	54,900	46,100	No
South of Summit Valley Road	6/divided	31,600	46,100	Yes
Summit Valley Road				
Maple Avenue and Santa Fe Avenue east	4/divided	39,500	30,600	No
East of Arrowhead Lake Road	4/divided	30,700	30,600	No
Maple Avenue				
Summit Valley Road and Rancho Las Flores Parkway	4/divided	31,200	30,600	No
Hwy 173				
East of Rancho Las Flores Parkway	4/divided	24,600	30,600	Yes
Arrowhead Lake Road				
Mesa Drive and Summit Valley Road	6/divided	30,400	46,100	Yes



Legend

1,234 Future ADT, (LOS D or better)

1,234 Future ADT, (LOS E or worse)

Not to Scale

September 2009

Figure 4-3

Kimley-Horn and Associates, Inc.

Future Daily Traffic Volumes
Current General Plan

Table 4-3 Summary of Intersection Operations, Current General Plan

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
1	Summit Valley Rd at Hwy 138	S	344.5	F	53.9	D
5	I-15 SB Ramp at Oak Hill Rd	S	17.8	B	16.8	B
6	I-15 NB Ramp at Mariposa Ave	S	5.7	A	79.0	E
9	Caliente at Ranchero Rd	S	96.9	F	187.9	F
10	I-15 SB Ramp at Ranchero Rd	S	38.9	D	74.6	E
11	I-15 NB Ramp at Ranchero Rd	S	18.2	B	148.4	F
12	Mariposa at Ranchero Rd	S	41.3	D	55.4	E
13	Escondido Ave at Ranchero Rd	S	14.4	B	23.2	C
14	Maple Ave at Ranchero Rd	S	24.5	C	24.5	C
15	I Ave at Ranchero Rd	S	33.9	C	30.1	C
16	Arrowhead Lake Rd at Ranchero Rd	S	4.3	A	4.7	A
17	Caliente at Joshua St	S	19.9	B	39.7	D
18	Mariposa at Joshua St	S	25.3	C	56.1	E
19	Escondido Ave at Muscatel	S	17.2	B	31.7	C
20	Arrowhead Lake Rd at Main St/Rock Springs Rd	S	27.5	C	39.0	D
21	Baldy Mesa Dr at Phelan Rd	S	16.1	B	18.5	B
22	Hwy 395 at Phelan Rd	S	72.2	E	215.4	F
23	Maple Ave at Eucalyptus Rd	S	17.3	B	20.7	C
24	Mesa Linda at Main St.	S	9.9	A	11.1	B
25	Cataba Rd at Main St.	S	16.5	B	13.6	B
26	I-15 SB Ramp at Main St.	S	22.0	C	87.0	F
27	Escondido Ave at Main St	S	41.0	D	68.5	E
28	Maple Ave at Main St	S	30.3	C	66.1	E
29	I Ave at Bear Valley Rd	S	10.9	B	34.2	C
30	3rd Ave at Main St	S	69.5	E	230.8	F
31	C Ave at Main St	S	28.3	C	104.7	F
32	E Ave at Main St	S	21.8	C	48.2	D
33	I Ave at Main St	S	22.9	C	70.3	E
34	Baldy Mesa Dr at Smoke Tree	S	8.9	A	12.9	B
35	Hwy 395 at Smoke Tree	S	9.5	A	31.5	C
36	Mariposa at Mojave	S	29.5	C	86.9	F
37	Escondido Ave at Live Oak	S	10.2	B	16.7	B
38	I-15 SB Ramp at Mojave	S	41.6	D	129.5	F
39	I-15 NB Ramp at Mojave	S	17.8	B	99.7	F
40	Maple Ave at Mojave	S	17.8	B	27.2	C
41	Hesperia Rd at Bear Valley Rd	S	42.3	D	86.7	F

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
42	E Ave at Mauna Loa/Lemon	S	18.7	B	26.6	C
43	I Ave at Lemon	S	8.6	A	10.2	B
44	I-15 SB Ramp at Eucalyptus St	S	29.1	C	38.2	D
45	I-15 NB Ramp at Eucalyptus St	S	23.6	C	25.2	C
46	Mariposa at Eucalyptus St	S	28.1	C	43.3	D
47	Hesperia Rd at Eucalyptus St	S	22.5	C	39.2	D
48	E Ave at I Ave	S	7.8	A	7.8	A
49	I Ave at Eucalyptus St	S	31.4	C	27.5	C
54	Santa Fe East at Ranchero Rd	S	82.5	F	109.7	F
55	E Ave at Sultana St	S	25.6	C	40.1	D
56	I Ave at Sultana St	S	22.6	C	51.1	D
57	Hwy 395 at Joshua St	S	30.6	C	95.4	F
58	I-15 NB Ramp at Main St	S	48.4	D	147.5	F
59	I-15 SB Ramp at Muscatel (Future)	S	21.7	C	52.4	D
60	I-15 NB Ramp at Muscatel (Future)	S	23.9	C	88.5	F
70	Hwy 395 at Poplar	S	12.5	B	37.2	D
73	Maple Ave at Muscatel	S	8.2	A	12.0	B
74	Main St at Cottonwood	S	18.6	B	48.9	D
75	Main St at 7th Ave	S	27.5	C	32.6	C
76	Main St at Peach Ave	S	22.0	C	40.1	D
77	I Ave at Danbury Ave	S	10.7	B	12.4	B
78	Danbury Ave at Ranchero Rd	S	28.1	C	40.4	D



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

April 2008

Kimley-Horn and Associates, Inc.

Figure 4-4

AM Peak Hour Intersection Level of Service
Current General Plan



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

April 2008

Kimley-Horn and Associates, Inc.

Figure 4-5

PM Peak Hour Intersection Level of Service
Current General Plan

4.3.2 High Intensity Buildout Scenario with new Corridors

As shown in **Table 4-4**, under the High Intensity (with new Corridors) alternative, 69 out of the 118 roadway segments are projected to operate at LOS D or better. **Figure 4-5** depicts the roadway segment LOS throughout the City for the High Intensity Scenario.

The intersection LOS for the High Intensity Buildout (with new Corridors) alternative was analyzed using the intersection lane geometry from the High Intensity Buildout (no new Corridors) alternative. As shown in **Table 4-5**, 19 of the study intersections are projected to operate at LOS E or F during the AM peak hour period and 35 study intersections are projected to operate at LOS E or F during the PM peak hour period.

Figure 4-6 and Figure 4-7 depict the intersection LOS for the High Intensity Build scenario (with no new Corridors). SYNCHRO analysis worksheets are provided in **Appendix B**.

Table 4-4 Future Daily Traffic Volumes, High Intensity Buildout (with new Corridors)

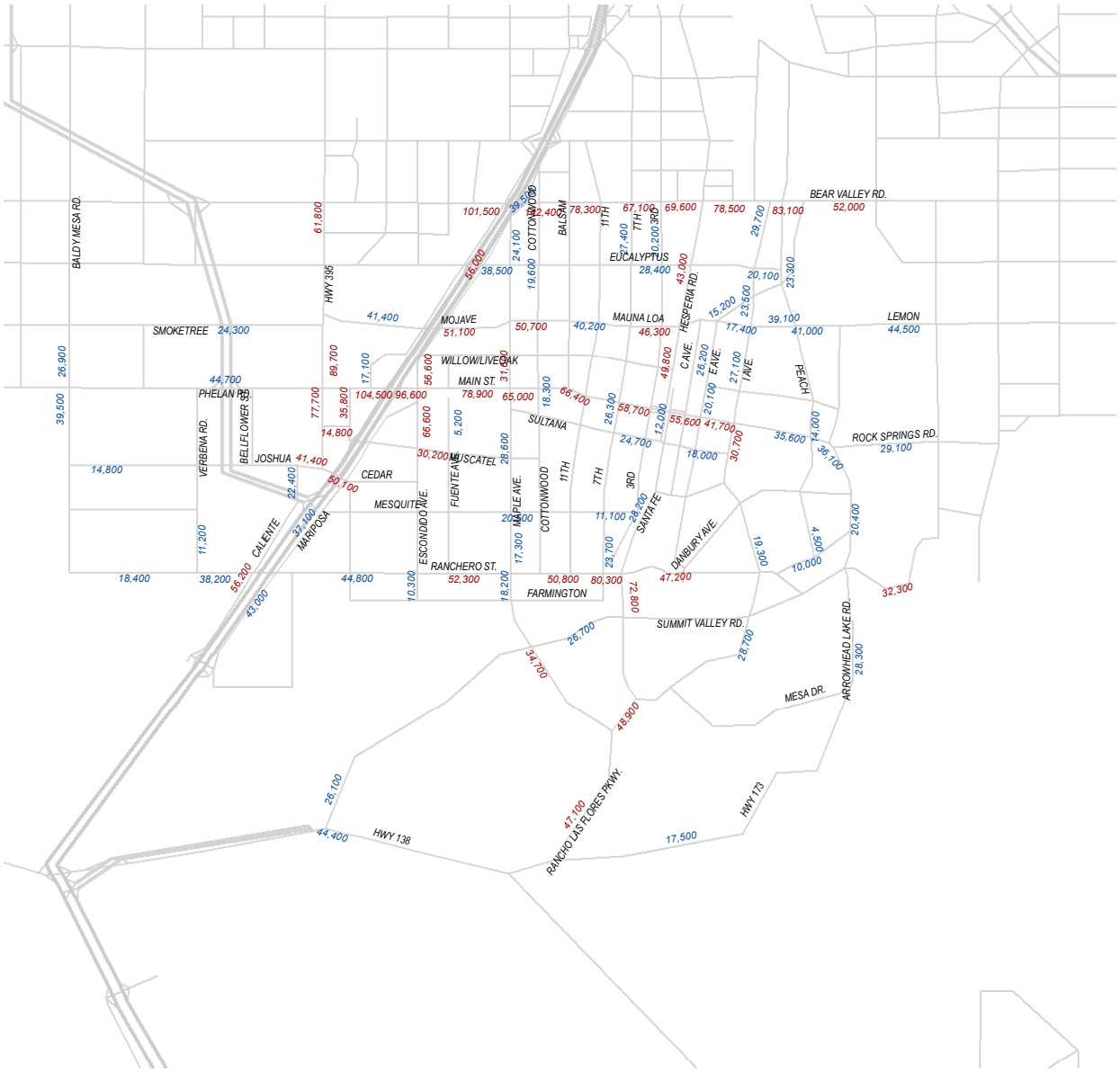
Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Caliente Road				
South of Ranchero Rd	2/undivided	56,200	14,500	No
South of Joshua Street	4/divided	22,400	30,600	Yes
North of Oak Hill Road	2/undivided	33,800	14,500	No
Escondido Avenue				
South of Ranchero Rd	4/divided	10,300	30,600	Yes
South of Main Street	4/divided	66,600	30,600	No
Summit Valley Road				
North of SR 138	4/divided	26,100	30,600	Yes
Arrowhead Lake Road				
South of Ranchero Road	6/divided	17,400	46,100	Yes
Ranchero Road between				
Santa Fe Avenue and "I" Avenue	6/divided	47,200	46,100	No
"I" Avenue and Peach Avenue	2/undivided	10,000	14,500	Yes
Mariposa Road and Escondido Avenue	6/divided	44,800	46,100	Yes
Maple Avenue and Escondido Avenue	6/divided	52,300	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	45,000	46,100	Yes
Cottonwood Avenue and 7th Avenue	6/divided	45,300	46,100	Yes
Joshua Street between				
NB 15 ramp and Mariposa Road	4/divided	50,100	30,600	No
Caliente and US 395	4/divided	41,400	30,600	No
US 395 and I-15 SB Ramp	4/divided	50,800	30,600	No
Muscatel Street between				
Escondido Avenue and Fuente Avenue	4/undivided	30,200	24,480	No
Mesquite Street				
East of Maple Avenue	4/undivided	19,300	24,480	Yes
East of 7th Avenue	4/undivided	11,100	24,480	Yes
Baldy Mesa Road				
South of Phelan Road	6/divided	39,500	46,100	Yes
North of Phelan Road	6/divided	26,900	46,100	Yes
Phelan Road between				
Baldy Mesa Road and US 395	6/divided	44,700	46,100	Yes

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Main Street between				
Cataba Rd and SB 15 ramp	6/divided	104,500	46,100	No
NB 15 ramp and Mariposa Road	6/divided	96,600	46,100	No
Mariposa Road and Maple Avenue	6/divided	78,900	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	65,000	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	66,400	46,100	No
7th Avenue and Hesperia Road	4/divided	58,700	30,600	No
"C" Avenue and "E" Avenue	4/divided	55,600	30,600	No
"E" Avenue and "I" Avenue	4/divided	41,700	30,600	No
"I" Avenue and Peach Avenue	6/divided	35,600	46,100	Yes
Peach Avenue and Rock Springs Road	6/divided	36,100	46,100	Yes
Sultana Street between				
7th Avenue and Hesperia Road	4/divided	27,400	30,600	Yes
"E" Avenue and "I" Avenue	4/divided	18,000	30,600	Yes
Mauna Loa Street between				
Maple Avenue and Cottonwood Avenue	6/divided	50,700	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	40,200	46,100	Yes
7th Avenue and 3rd Avenue	6/divided	46,300	46,100	No
Lemon Street between				
"E" Avenue and "I" Avenue	6/divided	37,100	46,100	Yes
"I" Avenue and Peach Avenue	6/divided	39,100	46,100	Yes
East of Peach Avenue	6/divided	41,000	46,100	Yes
Eucalyptus Avenue between				
Mariposa Road and Maple Avenue	6/divided	38,500	46,100	Yes
3rd Avenue and 7th Avenue	4/divided	28,400	30,600	Yes
"I" Avenue and Peach Avenue	4/divided	20,100	30,600	Yes
Bear Valley Road between				
Amargosa Road and SB 15 ramp	6/divided	101,500	46,100	No
NB 15 ramp and Mariposa Road	6/divided	142,400	46,100	No
Mariposa Road and 11th Avenue	6/divided	78,300	46,100	No
3rd Avenue and 7th Avenue	6/divided	67,100	46,100	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
West of Ridgecrest Road	6/divided	78,500	46,100	No
I Avenue and Peach Avenue	6/divided	83,100	46,100	No
West of 2nd Avenue	6/divided	69,600	46,100	No
At Mojave River	6/divided	52,000	46,100	No
Hwy 395 between				
South of Phelan Road	6/divided	77,700	46,100	No
North of Phelan Road	6/divided	89,700	46,100	No
South of Bear Valley Road	6/divided	61,800	46,100	No
Cataba Road between				
North of Main Street	4/divided	17,100	30,600	Yes
Mariposa Road between				
North of Main Street	6/divided	56,600	46,100	No
South of Eucalyptus Street	6/divided	56,000	46,100	No
South of Bear Valley Road	6/divided	39,500	46,100	Yes
Joshua Street and Ranchero Road	6/divided	37,100	46,100	Yes
Ranchero Road and Oak Hill Rd	6/divided	43,000	46,100	Yes
Oak Hill Road and I-15 NB Ramp	6/divided	33,700	46,100	Yes
South of Main Street	6/divided	60,200	46,100	No
Maple Avenue between				
North of Ranchero Road	4/divided	17,300	30,600	Yes
Muscatel Street and Sultana Street	4/divided	28,600	30,600	Yes
Main Street and Willow Street	4/divided	31,600	30,600	No
Eucalyptus Street and Mariposa Road	4/undivided	24,100	24,480	Yes
South of Eucalyptus Street	4/divided	31,400	30,600	No
South of Ranchero Road	4/divided	18,200	30,600	Yes
Hesperia Road between				
Eucalyptus and Lemon Street	4/divided	43,000	30,600	No
Lemon Street and Main Street	4/divided	49,800	30,600	No
Santa Fe Avenue East				
South of Main Street	4/divided	12,000	30,600	Yes
E Avenue between				
"I" Avenue and Lemon Street	4/divided	15,200	30,600	Yes
Lemon Street and Main Street	4/divided	26,200	30,600	Yes
South of Main Street	4/divided	20,100	30,600	Yes
I Avenue between				
Bear Valley Road and Eucalyptus Street	4/divided	29,700	30,600	Yes
Eucalyptus Street and Lemon Street	4/divided	23,500	30,600	Yes
Lemon Street and Main Street	4/divided	27,100	30,600	Yes
South of Main Street	4/divided	30,700	30,600	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
North of Ranchero Road	4/divided	20,500	30,600	Yes
Arrowhead Lake Road				
North of Ranchero Road	4/undivided	20,400	24,480	Yes
SR 138 between				
East of Summit Valley Road	6/divided	44,400	46,100	Yes
Poplar Avenue				
East of Hwy 395	4/divided	18,300	30,600	Yes
Mesa Linda Avenue				
South of Main Street	4/divided	35,800	30,600	No
Cottonwood Avenue				
South of Eucalyptus Street	4/undivided	19,600	24,480	Yes
South of Main Street	2/undivided	14,800	14,500	No
7th Avenue between				
South of Eucalyptus Street	4/divided	24,700	30,600	Yes
South of Main Street	4/divided	26,300	30,600	Yes
Mesquite Street and Ranchero Road	4/divided	29,700	30,600	Yes
3rd Avenue				
South of Eucalyptus Street	4/divided	20,200	30,600	Yes
Peach Avenue				
South of Eucalyptus Street	4/undivided	23,300	24,480	Yes
North of Main Street	4/undivided	14,000	24,480	Yes
South of Main Street	4/undivided	18,600	24,480	Yes
North of Ranchero Road	4/undivided	4,500	24,480	Yes
Fuente Avenue				
South of Main Street	4/undivided	5,200	24,480	Yes
Oak Hill Road between				
I-15 SB Ramp and I-15 NB Ramp	4/divided	36,300	30,600	No
Rock Springs Road				
At Mojave River	4/divided	29,100	30,600	Yes
Smoketree Road				
West of Hwy 395	4/divided	24,300	30,600	Yes
Hwy 395 and Amargosa Road	6/divided	41,400	46,100	Yes
Mojave Street				
Mariposa Road and Maple Avenue	6/divided	51,100	46,100	No
Lemon Street				
At Mojave River	6/divided	44,500	46,100	Yes
Snowline Road				
Baldy Mesa Road and Verbena Road	4/divided	14,800	30,600	Yes
Verbena Road				
North of Ranchero Road	4/divided	11,200	30,600	Yes

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Ranchero Road				
Baldy Mesa Road and Verbena Road	6/divided	18,400	46,100	Yes
Verbena Road and Caliente Road	6/divided	38,200	46,100	Yes
7th Avenue and Santa Fe Avenue East	6/divided	80,300	46,100	No
7th Avenue				
Mesquite Street and Ranchero Road	4/divided	23,700	30,600	Yes
Santa Fe Avenue East				
South of Lime Street	4/divided	28,200	30,600	Yes
Ranchero Road and Summit Valley Road	6/divided	72,800	46,100	No
Rancho Las Flores Parkway				
North of Hwy 138	6/divided	47,100	46,100	No
Maple Avenue and Santa Fe Avenue East	6/divided	48,900	46,100	No
South of Summit Valley Road	6/divided	28,700	46,100	Yes
Summit Valley Road				
Maple Avenue and Santa Fe Avenue east	4/divided	26,700	30,600	Yes
East of Arrowhead Lake Road	4/divided	32,300	30,600	No
Maple Avenue				
Summit Valley Road and Rancho Las Flores Parkway	4/divided	34,700	30,600	No
Hwy 173				
East of Rancho Las Flores Parkway	4/divided	17,500	30,600	Yes
Arrowhead Lake Road				
Mesa Drive and Summit Valley Road	6/divided	28,300	46,100	Yes



Legend	
1,234	Future ADT, (LOS D or better)
1,234	Future ADT, (LOS E or worse)

Not to Scale

April 2008

Figure 4-6

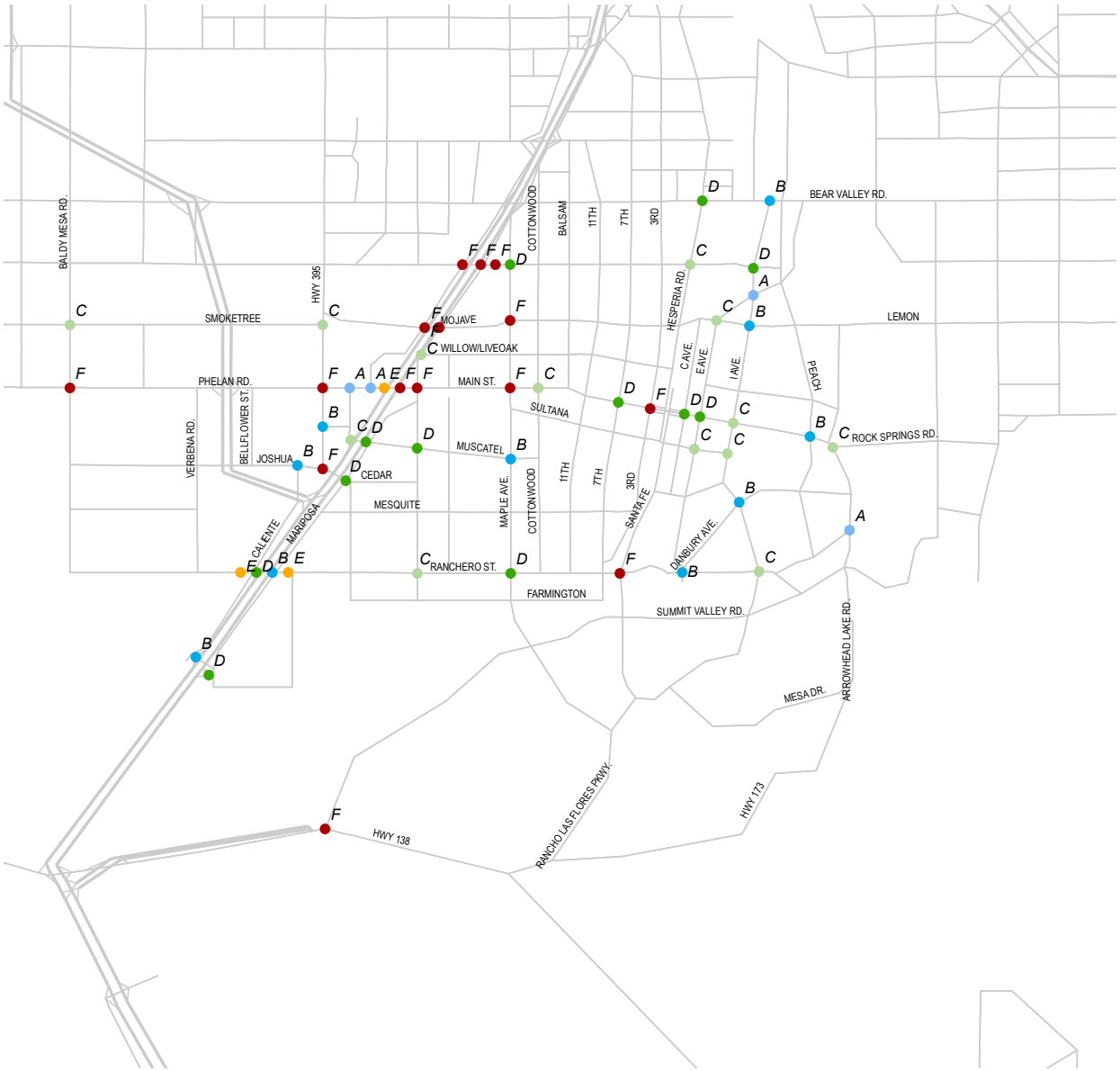
Kimley-Horn and Associates, Inc.

Future Daily Traffic Volumes
High Intensity Buildout (with new corridors)

Table 4-5 Summary of Intersection Operations, High Intensity Buildout (with new Corridors)

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
1	Summit Valley Rd at Hwy 138	S	191.7	F	99.5	F
5	I-15 SB Ramp at Oak Hill Rd	S	17.2	B	24.0	C
6	I-15 NB Ramp at Mariposa Ave	S	39.2	D	16.7	B
9	Caliente at Ranchero Rd	S	58.9	E	150.3	F
10	I-15 SB Ramp at Ranchero Rd	S	37.5	D	84.4	F
11	I-15 NB Ramp at Ranchero Rd	S	16.7	B	270.5	F
12	Mariposa at Ranchero Rd	S	76.5	E	124.2	F
13	Escondido Ave at Ranchero Rd	S	22.5	C	28.4	C
14	Maple Ave at Ranchero Rd	S	40.4	D	28.1	C
15	I Ave at Ranchero Rd	S	34.9	C	41.3	D
16	Arrowhead Lake Rd at Ranchero Rd	S	4.6	A	5.9	A
17	Caliente at Joshua St	S	14.8	B	119.3	F
18	Mariposa at Joshua St	S	39.5	D	96.7	F
19	Escondido Ave at Muscatel	S	40.8	D	39.5	D
20	Arrowhead Lake Rd at Main St/Rock Springs Rd	S	27.7	C	30.5	C
21	Baldy Mesa Dr at Phelan Rd	S	168.2	F	103.3	F
22	Hwy 395 at Phelan Rd	S	157.7	F	344.0	F
23	Maple Ave at Eucalyptus Rd	S	43.6	D	77.4	E
24	Mesa Linda at Main St.	S	4.4	A	5.3	A
25	Cataba Rd at Main St.	S	10.0	A	40.8	D
26	I-15 SB Ramp at Main St.	S	55.9	E	111.3	F
27	Escondido Ave at Main St	S	155.3	F	175.5	F
28	Maple Ave at Main St	S	80.4	F	166.5	F
29	I Ave at Bear Valley Rd	S	11.1	B	59.2	E
30	3rd Ave at Main St	S	173.8	F	431.4	F
31	C Ave at Main St	S	35.7	D	221.6	F
32	E Ave at Main St	S	37.3	D	97.2	F
33	I Ave at Main St	S	25.0	C	106.4	F
34	Baldy Mesa Dr at Smoke Tree	S	21.5	C	16.4	B
35	Hwy 395 at Smoke Tree	S	20.8	C	130.0	F
36	Mariposa at Mojave	S	218.9	F	256.1	F
37	Escondido Ave at Live Oak	S	33.1	C	50.9	D
38	I-15 SB Ramp at Mojave	S	143.0	F	232.7	F
39	I-15 NB Ramp at Mojave	S	140.8	F	209.7	F
40	Maple Ave at Mojave	S	92.5	F	81.2	F

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
41	Hesperia Rd at Bear Valley Rd	S	46.8	D	114.7	F
42	E Ave at Mauna Loa/Lemon	S	24.1	C	39.6	D
43	I Ave at Lemon	S	13.6	B	25.2	C
44	I-15 SB Ramp at Eucalyptus St	S	125.5	F	134.9	F
45	I-15 NB Ramp at Eucalyptus St	S	85.5	F	129.0	F
46	Mariposa at Eucalyptus St	S	275.7	F	222.0	F
47	Hesperia Rd at Eucalyptus St	S	29.0	C	60.0	E
48	E Ave at I Ave	S	7.6	A	10.0	A
49	I Ave at Eucalyptus St	S	47.4	D	42.0	D
54	Santa Fe East at Ranchero Rd	S	119.2	F	134.0	F
55	E Ave at Sultana St	S	28.1	C	52.7	D
56	I Ave at Sultana St	S	28.2	C	42.7	D
57	Hwy 395 at Joshua St	S	150.8	F	80.4	F
58	I-15 NB Ramp at Main St	S	135.9	F	175.7	F
59	I-15 SB Ramp at Muscatel (Future)	S	26.0	C	133.2	F
60	I-15 NB Ramp at Muscatel (Future)	S	48.1	D	257.4	F
70	Hwy 395 at Poplar	S	14.7	B	31.6	C
73	Maple Ave at Muscatel	S	19.8	B	46.2	D
74	Main St at Cottonwood	S	27.9	C	138.5	F
75	Main St at 7th Ave	S	40.6	D	92.9	F
76	Main St at Peach Ave	S	19.0	B	45.0	D
77	I Ave at Danbury Ave	S	15.2	B	18.7	B
78	Danbury Ave at Ranchero Rd	S	11.0	B	49.3	D



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

September 2009

Figure 4-7

AM Peak Hour Intersection Level of Service
High Intensity Buildout (with new corridors)



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

September 2009

Kimley-Horn and Associates, Inc.

Figure 4-8

PM Peak Hour Intersection Level of Service
High Intensity Buildout (with new corridors)

4.3.3 High Intensity Buildout Scenario without New Corridors

As shown in **Table 4-6**, under the High Intensity (no new Corridors) alternative, 54 out of the 118 roadway segments are projected to operate at LOS D or better. **Figure 4-9** depicts the roadway segment LOS throughout the City for the High Intensity Scenario.

The intersection LOS for the High Intensity Buildout (with new Corridors) alternative was analyzed using the intersection lane geometry from the High Intensity Buildout (with no new Corridors) alternative. As shown in **Table 4-7**, 19 of the study intersections are projected to operate at LOS E or F during the AM peak hour period and 31 study intersections are projected to operate at LOS E or F during the PM peak hour period.

Figure 4-10 and Figure 4-11 depict the intersection LOS for the High Intensity Build scenario (with no new Corridors). SYNCHRO analysis worksheets are provided in **Appendix B**.

Table 4-6 Future Daily Traffic Volumes, High Intensity Buildout (no new Corridors)

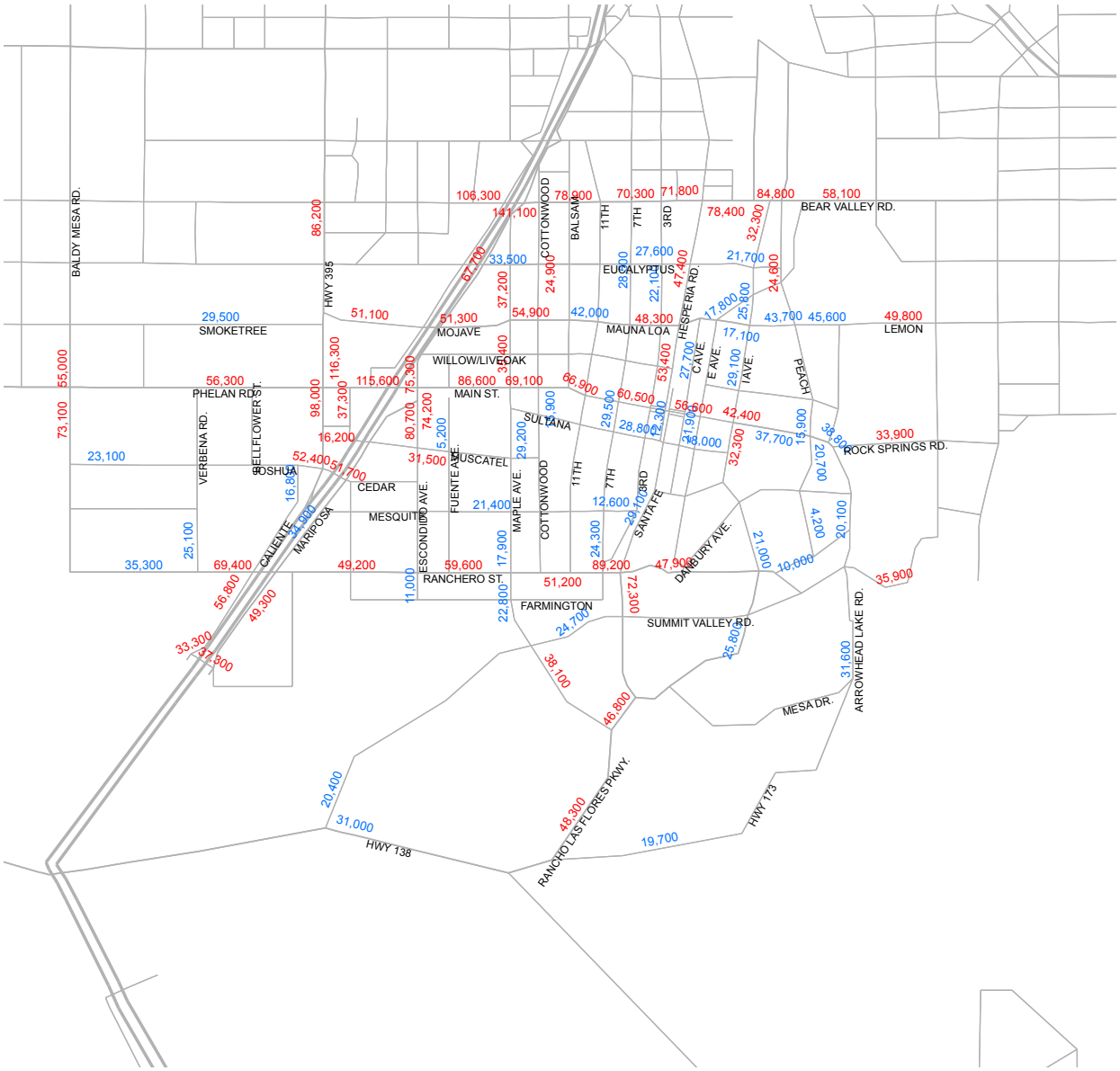
Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Caliente Road				
South of Ranchero Rd	2/undivided	56,800	14,500	No
South of Joshua Street	4/divided	16,800	30,600	Yes
North of Oak Hill Road	2/undivided	33,300	14,500	No
Escondido Avenue				
South of Ranchero Rd	4/divided	11,000	30,600	Yes
South of Main Street	4/divided	80,700	30,600	No
Summit Valley Road				
North of SR 138	4/divided	20,400	30,600	Yes
Arrowhead Lake Road				
South of Ranchero Road	6/divided	17,100	46,100	Yes
Ranchero Road between				
Santa Fe Avenue and "I" Avenue	6/divided	47,900	46,100	No
"I" Avenue and Peach Avenue	2/undivided	10,000	14,500	Yes
Mariposa Road and Escondido Avenue	6/divided	49,200	46,100	No
Maple Avenue and Escondido Avenue	6/divided	59,600	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	49,700	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	51,200	46,100	No
Joshua Street between				
NB 15 ramp and Mariposa Road	4/divided	51,700	30,600	No
Caliente and US 395	4/divided	47,500	30,600	No
US 395 and I-15 SB Ramp	4/divided	52,400	30,600	No
Muscatel Street between				
Escondido Avenue and Fuente Avenue	4/undivided	31,500	24,480	No
Mesquite Street				
East of Maple Avenue	4/undivided	21,000	24,480	Yes
East of 7th Avenue	4/undivided	12,600	24,480	Yes
Baldy Mesa Road				
South of Phelan Road	6/divided	73,100	46,100	No
North of Phelan Road	6/divided	55,000	46,100	No
Phelan Road between				
Baldy Mesa Road and US 395	6/divided	56,300	46,100	No
Main Street between				

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
Cataba Rd and SB 15 ramp	6/divided	115,600	46,100	No
NB 15 ramp and Mariposa Road	6/divided	87,800	46,100	No
Mariposa Road and Maple Avenue	6/divided	86,600	46,100	No
Maple Avenue and Cottonwood Avenue	6/divided	69,100	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	66,900	46,100	No
7th Avenue and Hesperia Road	4/divided	60,500	30,600	No
"C" Avenue and "E" Avenue	4/divided	56,600	30,600	No
"E" Avenue and "I" Avenue	4/divided	42,400	30,600	No
"I" Avenue and Peach Avenue	6/divided	37,700	46,100	Yes
Peach Avenue and Rock Springs Road	6/divided	38,800	46,100	Yes
Sultana Street between				
7th Avenue and Hesperia Road	4/divided	28,500	30,600	Yes
"E" Avenue and "I" Avenue	4/divided	18,000	30,600	Yes
Mauna Loa Street between				
Maple Avenue and Cottonwood Avenue	6/divided	54,900	46,100	No
Cottonwood Avenue and 7th Avenue	6/divided	42,000	46,100	Yes
7th Avenue and 3rd Avenue	6/divided	48,300	46,100	No
Lemon Street between				
"E" Avenue and "I" Avenue	6/divided	40,700	46,100	Yes
"I" Avenue and Peach Avenue	6/divided	43,700	46,100	Yes
East of Peach Avenue	6/divided	45,600	46,100	Yes
Eucalyptus Avenue between				
Mariposa Road and Maple Avenue	6/divided	33,500	46,100	Yes
3rd Avenue and 7th Avenue	4/divided	27,600	30,600	Yes
"I" Avenue and Peach Avenue	4/divided	21,700	30,600	Yes
Bear Valley Road between				
Amargosa Road and SB 15 ramp	6/divided	106,300	46,100	No
NB 15 ramp and Mariposa Road	6/divided	141,100	46,100	No
Mariposa Road and 11th Avenue	6/divided	78,900	46,100	No
3rd Avenue and 7th Avenue	6/divided	70,300	46,100	No
West of Ridgecrest Road	6/divided	78,400	46,100	No
I Avenue and Peach Avenue	6/divided	84,800	46,100	No
West of 2nd Avenue	6/divided	71,800	46,100	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
At Mojave River	6/divided	58,100	46,100	No
Hwy 395 between				
South of Phelan Road	6/divided	98,000	46,100	No
North of Phelan Road	6/divided	116,300	46,100	No
South of Bear Valley Road	6/divided	86,200	46,100	No
Cataba Road between				
North of Main Street	4/divided	23,200	30,600	Yes
Mariposa Road between				
North of Main Street	6/divided	75,300	46,100	No
South of Eucalyptus Street	6/divided	67,700	46,100	No
South of Bear Valley Road	6/divided	59,300	46,100	No
Joshua Street and Ranchero Road	6/divided	34,900	46,100	Yes
Ranchero Road and Oak Hill Rd	6/divided	49,300	46,100	No
Oak Hill Road and I-15 NB Ramp	6/divided	29,200	46,100	Yes
South of Main Street	6/divided	74,200	46,100	No
Maple Avenue between				
North of Ranchero Road	4/divided	17,900	30,600	Yes
Muscatel Street and Sultana Street	4/divided	29,200	30,600	Yes
Main Street and Willow Street	4/divided	35,400	30,600	No
Eucalyptus Street and Mariposa Road	4/undivided	30,500	24,480	No
South of Eucalyptus Street	4/divided	37,200	30,600	No
South of Ranchero Road	4/divided	22,800	30,600	Yes
Hesperia Road between				
Eucalyptus and Lemon Street	4/divided	47,400	30,600	No
Lemon Street and Main Street	4/divided	53,400	30,600	No
Santa Fe Avenue East				
South of Main Street	4/divided	12,300	30,600	Yes
E Avenue between				
"I" Avenue and Lemon Street	4/divided	17,800	30,600	Yes
Lemon Street and Main Street	4/divided	27,700	30,600	Yes
South of Main Street	4/divided	21,900	30,600	Yes
I Avenue between				
Bear Valley Road and Eucalyptus Street	4/divided	32,300	30,600	No
Eucalyptus Street and Lemon Street	4/divided	25,800	30,600	Yes
Lemon Street and Main Street	4/divided	29,100	30,600	Yes
South of Main Street	4/divided	32,300	30,600	No
North of Ranchero Road	4/divided	21,400	30,600	Yes
Arrowhead Lake Road				
North of Ranchero Road	4/undivided	20,100	24,480	Yes

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
SR 138 between				
East of Summit Valley Road	6/divided	31,000	46,100	Yes
Poplar Avenue				
East of Hwy 395	4/divided	15,900	30,600	Yes
Mesa Linda Avenue				
South of Main Street	4/divided	37,300	30,600	No
Cottonwood Avenue				
South of Eucalyptus Street	4/undivided	24,900	24,480	No
South of Main Street	2/undivided	16,200	14,500	No
7th Avenue between				
South of Eucalyptus Street	4/divided	28,800	30,600	Yes
South of Main Street	4/divided	29,500	30,600	Yes
Mesquite Street and Ranchero Road	4/divided	30,300	30,600	Yes
3rd Avenue				
South of Eucalyptus Street	4/divided	22,100	30,600	Yes
Peach Avenue				
South of Eucalyptus Street	4/undivided	24,600	24,480	No
North of Main Street	4/undivided	15,900	24,480	Yes
South of Main Street	4/undivided	20,700	24,480	Yes
North of Ranchero Road	4/undivided	4,200	24,480	Yes
Fuente Avenue				
South of Main Street	4/undivided	5,200	24,480	Yes
Oak Hill Road between				
I-15 SB Ramp and I-15 NB Ramp	4/divided	37,300	30,600	No
Rock Springs Road				
At Mojave River	4/divided	33,900	30,600	No
Smoketree Road				
West of Hwy 395	4/divided	29,500	30,600	Yes
Mojave Street				
Hwy 395 and Amargosa Road	6/divided	51,100	46,100	No
Mariposa Road and Maple Avenue	6/divided	51,300	46,100	No
Lemon Street				
At Mojave River	6/divided	49,800	46,100	No
Snowline Road				
Baldy Mesa Road and Verbena Road	4/divided	23,100	30,600	Yes
Verbena Road				
North of Ranchero Road	4/divided	25,100	30,600	Yes
Ranchero Road				
Baldy Mesa Road and Verbena Road	6/divided	35,300	46,100	Yes
Verbena Road and Caliente Road	6/divided	69,400	46,100	No
7th Avenue and Santa Fe Avenue	6/divided	89,200	46,100	No

Roadway Segment	No. of Lanes/ Median Type	Future ADT	LOS D Roadway Capacity	LOS D or better
East				
7th Avenue				
Mesquite Street and Ranchero Road	4/divided	24,300	30,600	Yes
Santa Fe Avenue East				
South of Lime Street	4/divided	29,100	30,600	Yes
Ranchero Road and Summit Valley Road	6/divided	72,300	46,100	No
Rancho Las Flores Parkway				
North of Hwy 138	6/divided	48,300	46,100	No
Maple Avenue and Santa Fe Avenue East	6/divided	46,800	46,100	No
South of Summit Valley Road	6/divided	25,800	46,100	Yes
Summit Valley Road				
Maple Avenue and Santa Fe Avenue east	4/divided	24,700	30,600	Yes
East of Arrowhead Lake Road	4/divided	35,900	30,600	No
Maple Avenue				
Summit Valley Road and Rancho Las Flores Parkway	4/divided	38,100	30,600	No
Hwy 173				
East of Rancho Las Flores Parkway	4/divided	19,700	30,600	Yes
Arrowhead Lake Road				
Mesa Drive and Summit Valley Road	6/divided	31,600	46,100	Yes



Legend

1,234 *Future ADT, (LOS D or better)*

1,234 *Future ADT, (LOS E or worse)*

Not to Scale

September 2009

Figure 4-9

Kimley-Horn and Associates, Inc.

Future Daily Traffic Volumes
High Intensity Buildout (no new corridors)

Table 4-7 Summary of Intersection Operations, High Intensity Buildout (no new Corridors)

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
1	Summit Valley Rd at Hwy 138	S	29.2	C	261.2	F
5	I-15 SB Ramp at Oak Hill Rd	S	17.0	B	23.4	C
6	I-15 NB Ramp at Mariposa Ave	S	29.9	C	14.0	B
9	Caliente at Ranchero Rd	S	67.2	E	164.7	F
10	I-15 SB Ramp at Ranchero Rd	S	70.8	E	102.0	F
11	I-15 NB Ramp at Ranchero Rd	S	22.0	C	90.3	F
12	Mariposa at Ranchero Rd	S	85.2	F	140.9	F
13	Escondido Ave at Ranchero Rd	S	23.0	C	40.7	D
14	Maple Ave at Ranchero Rd	S	53.0	D	31.5	C
15	I Ave at Ranchero Rd	S	32.8	C	46.3	D
16	Arrowhead Lake Rd at Ranchero Rd	S	4.9	A	5.5	A
17	Caliente at Joshua St	S	12.3	B	36.8	D
18	Mariposa at Joshua St	S	42.7	D	77.3	E
19	Escondido Ave at Muscatel	S	32.5	C	43.6	D
20	Arrowhead Lake Rd at Main St/Rock Springs Rd	S	42.6	D	39.0	D
21	Baldy Mesa Dr at Phelan Rd	S	197.1	F	132.6	F
22	Hwy 395 at Phelan Rd	S	259.7	F	454.1	F
23	Maple Ave at Eucalyptus Rd	S	58.4	E	53.0	D
24	Mesa Linda at Main St.	S	3.8	A	6.4	A
25	Cataba Rd at Main St.	S	117.0	F	104.7	F
26	I-15 SB Ramp at Main St.	S	54.9	D	123.2	F
27	Escondido Ave at Main St	S	115.4	F	183.1	F
28	Maple Ave at Main St	S	119.7	F	197.9	F
29	I Ave at Bear Valley Rd	S	11.9	B	56.8	E
30	3rd Ave at Main St	S	188.3	F	444.2	F
31	C Ave at Main St	S	41.6	D	227.3	F
32	E Ave at Main St	S	38.7	D	101.8	F
33	I Ave at Main St	S	25.5	C	120.7	F
34	Baldy Mesa Dr at Smoke Tree	S	32.9	C	45.5	D
35	Hwy 395 at Smoke Tree	S	80.6	F	296.7	F
36	Mariposa at Mojave	S	193.8	F	262.1	F
37	Escondido Ave at Live Oak	S	76.9	E	48.5	D
38	I-15 SB Ramp at Mojave	S	62.0	E	160.2	F
39	I-15 NB Ramp at Mojave	S	108.2	F	183.9	F
40	Maple Ave at Mojave	S	62.6	E	77.2	E

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
41	Hesperia Rd at Bear Valley Rd	S	53.6	D	121.6	F
42	E Ave at Mauna Loa/Lemon	S	27.4	C	49.1	D
43	I Ave at Lemon	S	13.9	B	27.5	C
44	I-15 SB Ramp at Eucalyptus St	S	42.2	D	23.2	C
45	I-15 NB Ramp at Eucalyptus St	S	22.9	C	46.8	D
46	Mariposa at Eucalyptus St	S	212.5	F	134.4	F
47	Hesperia Rd at Eucalyptus St	S	36.9	D	66.8	E
48	E Ave at I Ave	S	8.3	A	11.4	B
49	I Ave at Eucalyptus St	S	50.8	D	53.8	D
54	Santa Fe East at Ranchero Rd	S	143.8	F	168.0	F
55	E Ave at Sultana St	S	29.3	C	54.7	D
56	I Ave at Sultana St	S	29.3	C	46.4	D
57	Hwy 395 at Joshua St	S	55.8	E	188.3	F
58	I-15 NB Ramp at Main St	S	41.6	D	47.7	D
59	I-15 SB Ramp at Muscatel (Future)	S	25.3	C	42.3	D
60	I-15 NB Ramp at Muscatel (Future)	S	19.1	B	51.2	D
70	Hwy 395 at Poplar	S	11.2	B	78.5	E
73	Maple Ave at Muscatel	S	19.7	B	42.7	D
74	Main St at Cottonwood	S	34.5	C	170.3	F
75	Main St at 7th Ave	S	43.0	D	93.0	F
76	Main St at Peach Ave	S	22.6	C	54.1	D
77	I Ave at Danbury Ave	S	17.5	B	18.3	B
78	Danbury Ave at Ranchero Rd	S	36.2	D	56.3	E



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

September 2009

Kimley-Horn and Associates, Inc.

Figure 4-10

AM Peak Hour Intersection Level of Service
High Intensity Buildout (no new corridors)



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

September 2009

Kimley-Horn and Associates, Inc.

Figure 4-11

PM Peak Hour Intersection Level of Service
High Intensity Buildout (no new corridors)

4.4 Findings

Key findings from the analysis of alternatives can be summarized as follows:

- In the Current General Plan alternative, forecast peak hour levels of service are generally acceptable throughout the City except for interchange areas along I-15 and a few other locations.
- In the High Intensity Buildout scenario, severe congestion is forecast throughout the I-15 and Main Street corridors that have fairly intense commercial development in this scenario. Physical improvements could not provide sufficient capacity to achieve acceptable LOS in these areas. The intensity of land use should be scaled back to be more compatible with the carrying capacity of the roadway system.
- The potential new alignment of US-395 would substantially reduce future traffic on the two continuous north-south arterials west of I-15 – the resulting ADT would be 20,000 – 25,000 lower on the six-lane arterial in the current 395 alignment, and over 30,000 lower on Baldy Mesa Road. If a realigned 395 is not built, those roadways can be expected to experience severe congestion in the future.
- The Southeast Beltway would carry approximately 70,000 ADT between I-15 and Summit Valley Road. For adequate accessibility into southern Hesperia, the future corridor through this area should be planned to accommodate that volume of traffic.

5. EVALUATION OF PREFERRED SCENARIO

The results of the transportation alternatives analysis were used by the City's General Plan consultant and City staff (together with information from other components of the General Plan analysis) to develop a Preferred Land Use scenario. The City traffic model was then used to forecast future traffic with full development of the Preferred Land Use Strategy. The results of that analysis are presented in this chapter, and form the technical basis for the recommended transportation plan and policies presented in Chapter 6 of this report

5.1 Preferred Land Use Plan

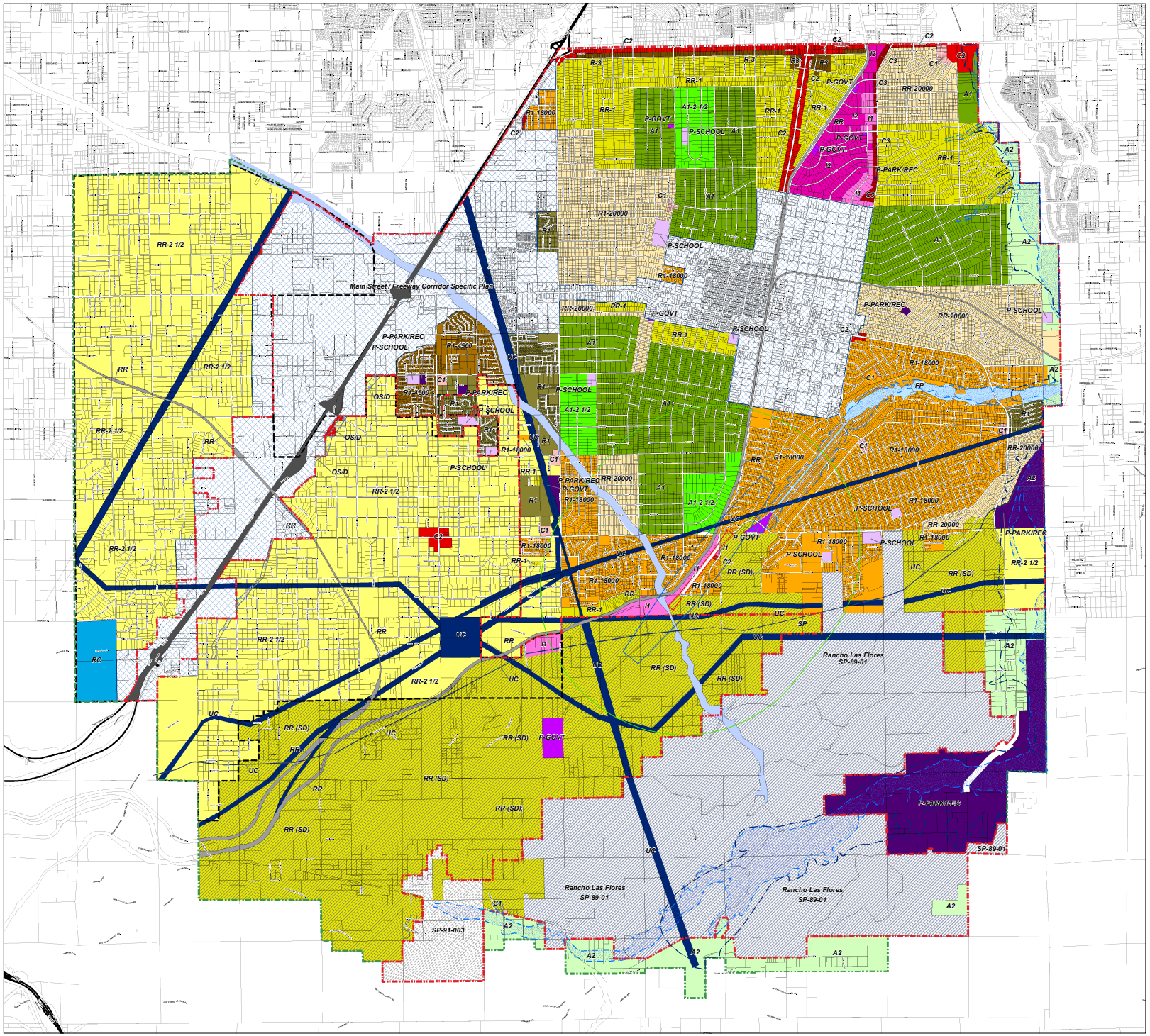
Land use patterns associated with the Preferred Alternative are shown in **Figure 5-1**. Citywide development assumptions for the Preferred Alternative are summarized in **Table 5-1** and compared with existing development and the other two alternatives. The future development assumptions by TAZ are provided in **Appendix C**.

Table 5-1 Summary of Land Use Alternatives

	Population	Households			Employment				School
	TotPop	SDU	MDU	TotalDU	Retail	Service	Other	Total	Enrollment
2003									
CITY & SPHERE	82,550	22,869	2,329	25,198	3,040	6,012	5,277	14,330	17,776
CITY	79,296	21,634	2,329	23,963	2,994	5,786	5,003	13,783	17,029
SPHERE	3,254	1,235	-	1,235	46	227	274	547	746
GENERAL PLAN BUILDOUT									
CITY & SPHERE	318,592	79,004	10,139	89,143	30,481	26,905	24,644	82,030	62,011
CITY	242,005	56,915	10,139	67,054	27,761	20,957	18,606	67,324	46,193
SPHERE	76,587	22,089	-	22,089	2,720	5,948	6,038	14,706	15,818
HIGH INTENSITY BUILDOUT LAND USE									
CITY & SPHERE	257,008	58,747	26,759	85,505	47,873	9,101	91,206	148,181	70,951
CITY	202,687	43,755	24,909	68,663	44,269	8,090	88,147	140,506	57,544
SPHERE	54,321	14,992	1,850	16,842	3,604	1,011	3,059	7,675	13,407
PREFERRED SCENARIO LAND USE									
CITY & SPHERE	253,158	57,165	25,280	82,444	31,063	16,177	28,552	75,792	67,780
CITY	199,815	42,657	23,093	65,750	27,949	15,190	24,332	67,470	54,422
SPHERE	53,343	14,508	2,187	16,695	3,114	987	4,221	8,322	13,358

Compared to the High Intensity Buildout scenario, the Preferred Scenario has 1% less total population, 4% fewer total dwelling units, 50% less in total employment, and a 4% decrease in school enrollment.

Figure 5-1 Preferred Scenario Land Use Map



Legend

Agricultural
- A2 (0.0 - 0.2 du/ac)
- A1-2 1/2 (0.21 - 0.4 du/ac)
- A1 (0.41 - 1.0 du/ac)

Rural Residential
- RR-2 1/2 (0.0 - 0.4 du/ac)
- RR (SD) (0.0 - 0.4 du/ac)
- RR-1 (0.41 - 1.0 du/ac)
- RR-20000 (1.1 - 2.0 du/ac)

Residential
- R1-18000 (2.1 - 2.4 du/ac)
- R1 (2.5 - 4.5 du/ac)
- R1-4500 (4.6 - 8.0 du/ac)
- R3 (8.1 - 15.0 du/ac)

Commercial
- C1 - Neighborhood Commercial (0.0 - 0.5 FAR)
- C2 - General Commericial (0.0 - 1.0 FAR)
- C3 - Service Commercial (0.0 - 0.5 FAR)

Industrial
- I1 - Limited Manufacturing (0.0 - 1.0 FAR)
- I2 - General Manufacturing (0.0 - 1.0 FAR)

Public
- P-SCHOOL - Public School (0.0 - 1.0 FAR)
- P-GOVT - Government Facility (0.0 - 1.0 FAR)
- P-PARK/REC - Park & Recreation (0.0 - 1.0 FAR)

Specific Plan
- Summit Valley Ranch Specific Plan SP-91-003
- Rancho Las Flores Specific Plan SP-89-01
- Main Street / Freeway Corridor Specific Plan

Other
- Rec-Com - Recreational Commercial
- RC - Resource Conservation
- RRC - Railroad Corridor
- UC - Utility Corridor
- TC - Transportation Corridor
- AQ - Aqueduct

Overlay
- AS - Airport Safety Zone
- AAT - Airport Approach and Transistional Zone
- AN - Airport Notice Area
- Dam Innundation
- FP - 100-Year Flood Plain Overlay
- OS / D - Open Space Drainage

- City Boundary
- Sphere of Influence
- Oak Hills Community Plan

DISCLAIMER:
This map is a public resource of general information. The feature data provided on this map represents the most accurate mapping and parcel information available at the most recent date of revision. In the event of a conflict between information on this map and adopted City Resolutions or Ordinances, the City's Resolutions or Ordinances shall govern.

General Plan Land Use *(Proposed)*

0 0.25 0.5 1 1.5 Miles

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Printing Date: Monday, July 13, 2009
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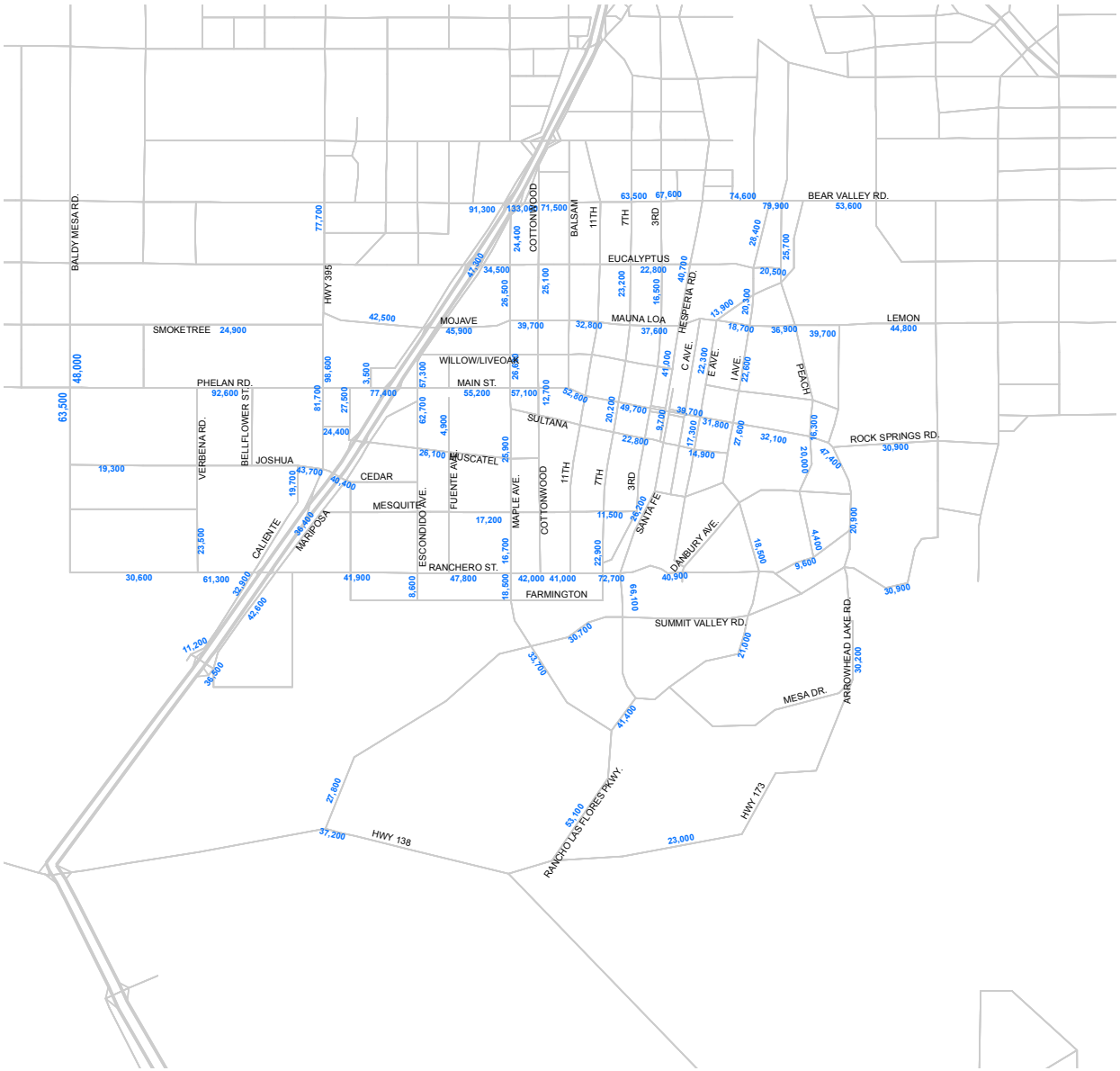
GIS Hogle-Ireland, Inc.

5.2 Future Traffic Conditions with Preferred Scenario

The forecast average daily traffic volumes for the Preferred Scenario are shown in **Figure 5-2**. For the Preferred Scenario, the daily segment capacity values are based on typical street cross-sections (whereas many of the future intersections will have additional turn lanes) and a 10% peak hour (whereas the peak hour can be expected to drop to about 8% in the future); therefore a daily segment LOS analysis was not performed for this scenario since it would produce results inconsistent with the intersection analysis.

Morning and afternoon peak hour LOS were calculated for the study intersections throughout the City. Where the lane geometry used for the Current General Plan alternative resulted in peak hour LOS F, the LOS was analyzed with additional turn lanes to endeavor to achieve peak hour LOS D or better (at 395/Phelan Road, it has been assumed that a grade separation would be constructed in the absence of a realigned 395). The forecasted peak hour LOS for the study intersections is summarized in **Table 5-2**. The traffic forecast indicates that 13 of the study intersections are projected to operate at LOS E or F during the AM peak hour period and 21 study intersections are projected to operate at LOS E or F during the PM peak hour period. The intersections with LOS E or F occur around freeway interchanges, along the Main Street corridor, or in the area west of I-15.

Figure 5-3 and **Figure 5-4** depict the intersection LOS for the Preferred scenario. The recommended future lane configurations are presented in **Appendix D**. SYNCHRO analysis worksheets are provided in **Appendix B**.



Legend	
1,234	Future ADT

Not to Scale

September 2009

Figure 5-2

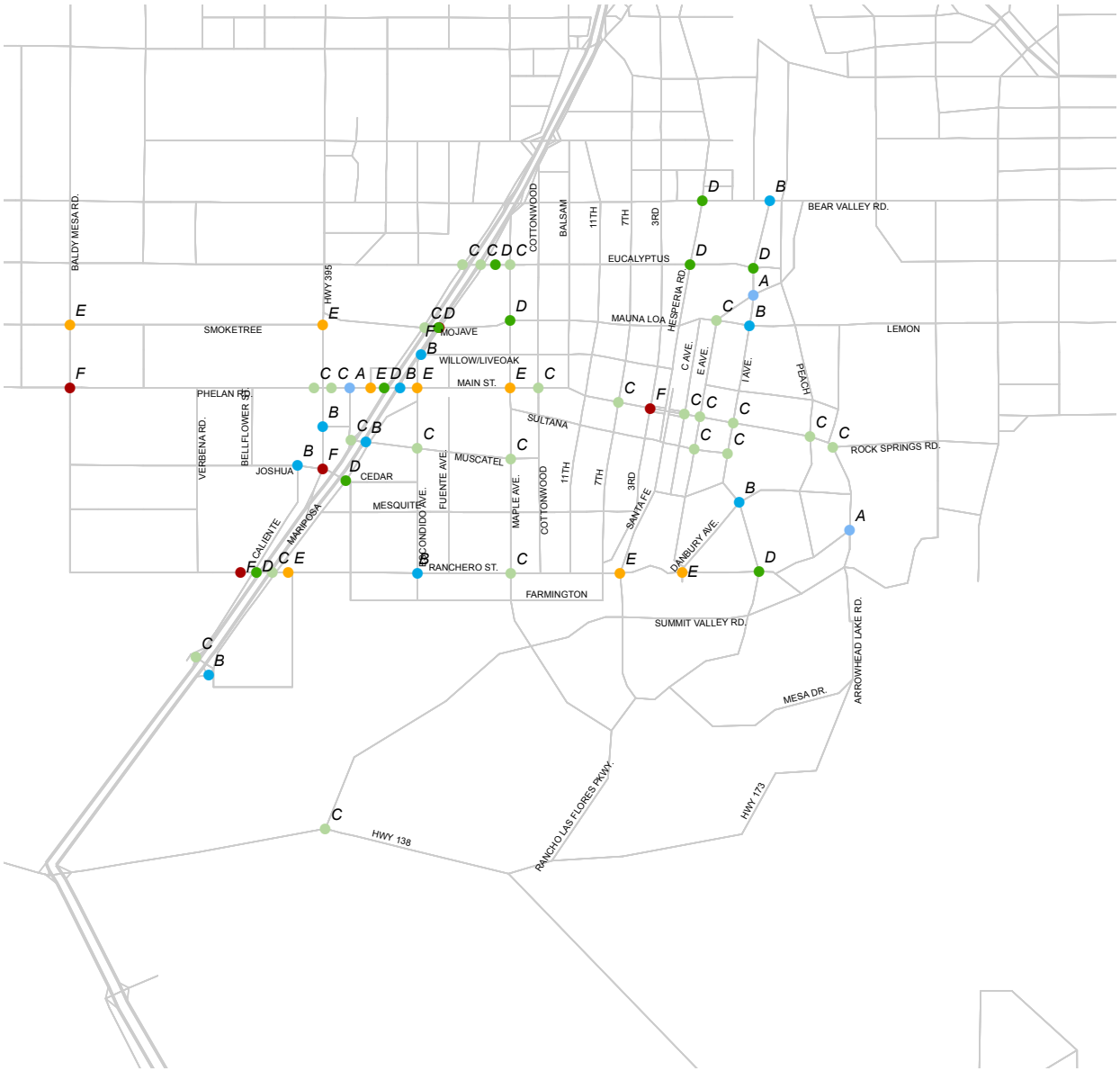
Kimley-Horn and Associates, Inc.

Future Roadway Average Daily Traffic (ADT)
Preferred Scenario

Table 5-2 Summary of Intersection Operations, Preferred Scenario

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
1	Summit Valley Rd at Hwy 138	S	23.8	C	0.1	A
5	I-15 SB Ramp at Oak Hill Rd	S	28.1	C	16.7	B
6	I-15 NB Ramp at Mariposa Ave	S	12.8	B	52.8	D
9	Caliente at Ranchero Rd	S	87.1	F	156.8	F
10	I-15 SB Ramp at Ranchero Rd	S	37.5	D	37.2	D
11	I-15 NB Ramp at Ranchero Rd	S	23.6	C	79.4	E
12	Mariposa at Ranchero Rd	S	66.3	E	80.0	E
13	Escondido Ave at Ranchero Rd	S	13.7	B	17.8	B
14	Maple Ave at Ranchero Rd	S	31.8	C	30.4	C
15	I Ave at Ranchero Rd	S	37.6	D	35.2	D
16	Arrowhead Lake Rd at Ranchero Rd	S	4.8	A	4.8	A
17	Caliente at Joshua St	S	12.0	B	38.5	D
18	Mariposa at Joshua St	S	53.7	D	39.7	D
19	Escondido Ave at Muscatel	S	28.4	C	33.2	C
20	Arrowhead Lake Rd at Main St/Rock Springs Rd	S	34.7	C	41.5	D
21	Baldy Mesa Dr at Phelan Rd	S	109.8	F	66.8	E
23	Maple Ave at Eucalyptus Rd	S	32.9	C	27.4	C
24	Mesa Linda at Main St.	S	5.0	A	10.8	B
25	Cataba Rd at Main St.	S	79.7	E	49.8	D
26	I-15 SB Ramp at Main St.	S	35.6	D	42.4	D
27	Escondido Ave at Main St	S	77.7	E	79.6	E
28	Maple Ave at Main St	S	66.2	E	67.9	E
29	I Ave at Bear Valley Rd	S	11.9	B	66.0	E
30	3rd Ave at Main St	S	199.5	F	349.2	F
31	C Ave at Main St	S	31.8	C	167.4	F
32	E Ave at Main St	S	26.2	C	73.2	E
33	I Ave at Main St	S	24.2	C	74.8	E
34	Baldy Mesa Dr at Smoke Tree	S	58.1	E	36.2	D
35	Hwy 395 at Smoke Tree	S	66.1	E	151.5	F
36	Mariposa at Mojave	S	109.0	F	87.5	F
37	Escondido Ave at Live Oak	S	15.7	B	15.7	B
38	I-15 SB Ramp at Mojave	S	28.8	C	63.9	E
39	I-15 NB Ramp at Mojave	S	46.6	D	56.3	E
40	Maple Ave at Mojave	S	43.8	D	36.6	D
41	Hesperia Rd at Bear Valley Rd	S	50.1	D	83.6	F
42	E Ave at Mauna Loa/Lemon	S	30.3	C	53.8	D

Int. #	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (s)	LOS	Delay (s)	LOS
43	I Ave at Lemon	S	16.1	B	18.5	B
44	I-15 SB Ramp at Eucalyptus St	S	30.2	C	34.5	C
45	I-15 NB Ramp at Eucalyptus St	S	34.4	C	50.7	D
46	Mariposa at Eucalyptus St	S	36.0	D	51.7	D
47	Hesperia Rd at Eucalyptus St	S	36.8	D	43.9	D
48	E Ave at I Ave	S	7.2	A	8.3	A
49	I Ave at Eucalyptus St	S	45.0	D	34.8	C
54	Santa Fe East at Ranchero Rd	S	63.7	E	77.4	E
55	E Ave at Sultana St	S	25.2	C	40.2	D
56	I Ave at Sultana St	S	30.6	C	42.8	D
57	Hwy 395 at Joshua St	S	107.7	F	138.2	F
58	I-15 NB Ramp at Main St	S	17.0	B	29.2	C
59	I-15 SB Ramp at Muscatel (Future)	S	25.5	C	31.5	C
60	I-15 NB Ramp at Muscatel (Future)	S	16.1	B	48.1	D
70	Hwy 395 at Poplar	S	13.1	B	49.1	D
73	Maple Ave at Muscatel	S	25.0	C	20.3	C
74	Main St at Cottonwood	S	24.7	C	57.8	E
75	Main St at 7th Ave	S	32.5	C	63.2	E
76	Main St at Peach Ave	S	21.4	C	59.8	E
77	I Ave at Danbury Ave	S	16.7	B	15.9	B
78	Danbury Ave at Ranchero Rd	S	56.1	E	36.0	D
79	Hwy 395 SB Ramp and Phelan Rd	S	24.1	C	49.9	D
80	Hwy 395 NB Ramp and Phelan Rd	S	25.7	C	31.8	C



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

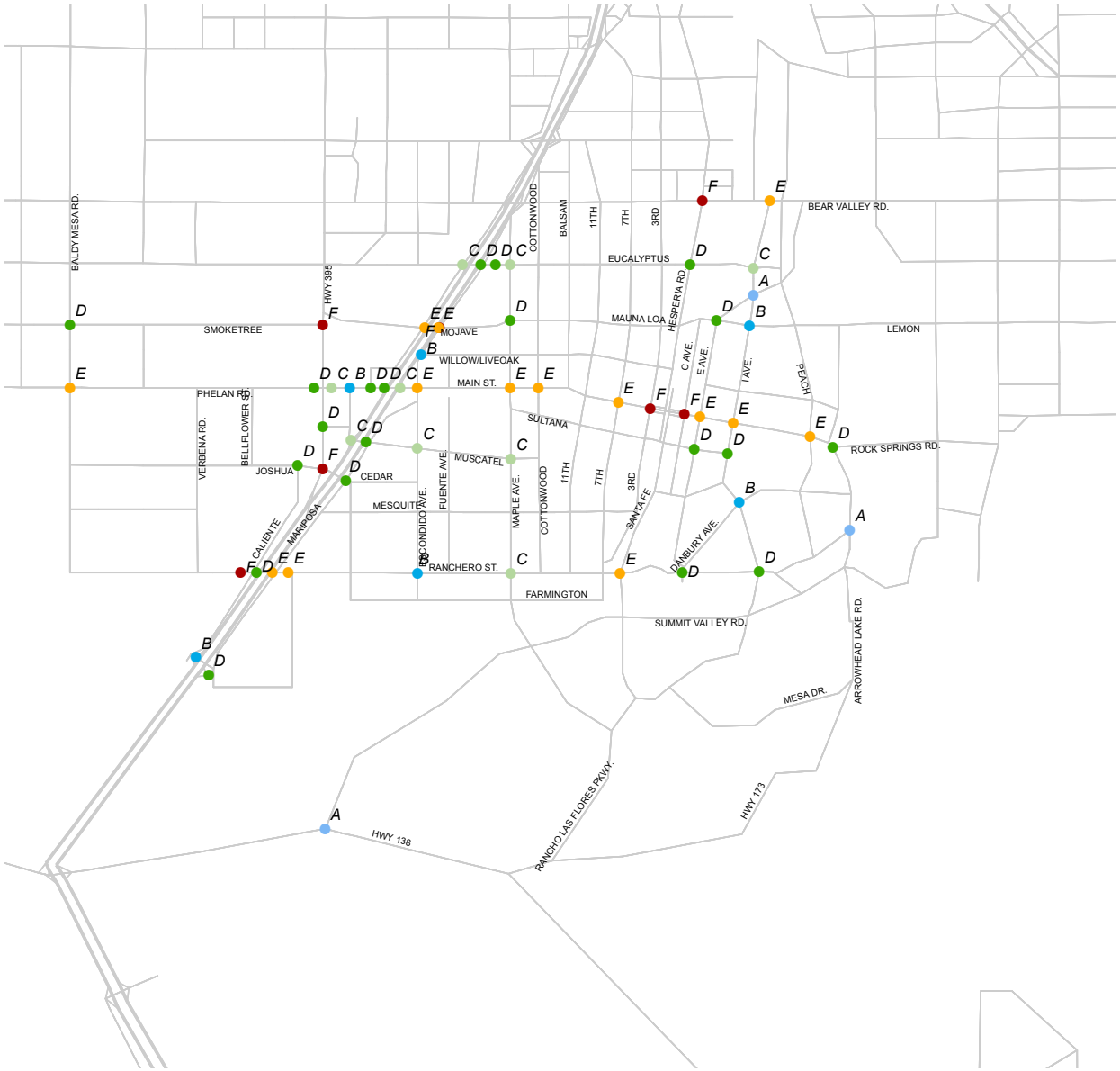
Not to Scale

September 2009

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Figure 5-3

AM Peak Hour Intersection Level of Service
Preferred Scenario



Legend

- Signalized, Level of Service A
- Signalized, Level of Service B
- Signalized, Level of Service C
- Signalized, Level of Service D
- Signalized, Level of Service E
- Signalized, Level of Service F

Not to Scale

September 2009

Kimley-Horn and Associates, Inc.

Figure 5-4

PM Peak Hour Intersection Level of Service
Preferred Scenario

6. RECOMMENDED CIRCULATION PLAN

The Recommended Circulation Plan provides strategies and approaches for addressing future transportation issues and opportunities. It envisions a system that serves future circulation needs for people and goods using multiple modes of travel. Potential approaches and strategies for implementing the Recommended Plan are discussed in the following sections.

6.1 Roadway Plan

The plan for Hesperia's future street system envisions that it will serve multiple roles and functions:

- Provide convenient property access to residences and businesses;
- Move traffic efficiently – facilitating convenient intra-city travel and providing access to regional transportation facilities in a manner that minimizes traffic congestion and delay;
- Accommodate multiple travel modes on the surface (autos, trucks, transit, bicycles, and pedestrians) as well as underground utilities;
- Provide a safe environment for circulation; and
- Contribute to the aesthetics of the city with attractive landscaping, signing, and gateways.

Recommended Approaches/Strategies:

- Plan arterial street lane capacity in relation to projected buildout traffic volumes. **Figure 6-1** shows the street network plan and recommended number of lanes.
- Develop a plan for widening key intersections to enhance capacity with additional turn lanes at locations where the capacity provided by the typical cross-section is projected to result in congestion. **Figure 6-2** shows the locations of enhanced intersections, where additional turn lanes (with right-of-way in excess of the typical street cross-section) will be required. **Appendix D** includes a table of estimated future buildout lane geometry.
- Develop an implementation plan that will monitor traffic conditions and program construction of roadway improvements in a timely manner to maintain efficient traffic flows and minimize congestion and delay.
- Develop conceptual designs for future freeway interchanges, railroad grade separations, and river crossings to demonstrate feasibility and protect these infrastructure improvement opportunities against development encroachment.
- Incorporate these key roadway facilities (interchanges, grade separations, and river crossings) into the City's Development Impact Fee (DIF) program or another funding plan to provide a mechanism for their funding.
- Implement a program of traffic signal synchronization so traffic using the principal arterial streets can experience continuous traffic flow.
- Plan local streets and collector streets in alignments that do not encourage cut-through traffic.

- Develop a strategy for implementing intelligent transportation technologies to facilitate traffic flow and disseminate traveler information.

6.2 Goods Movement

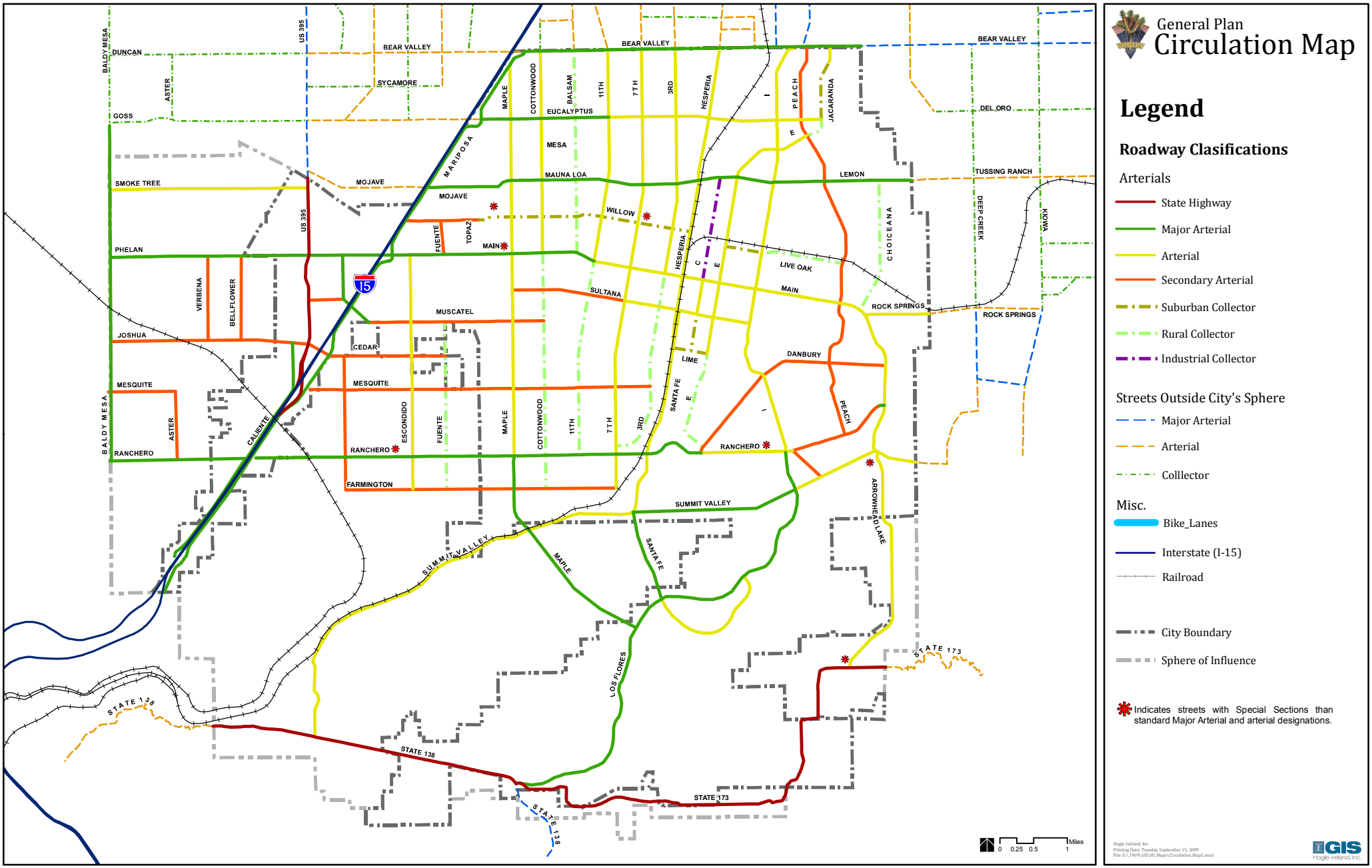
The movement of goods through Hesperia poses a challenging dichotomy for promoting economic development and maintaining the quality of life. On the positive side, the growth of industrial and transportation-related businesses helps the City's economy, and the level of commerce is enhanced by the availability of consumer goods. On the negative side, the BNSF rail line is a major circulation barrier through the heart of Hesperia, and truck traffic is often associated with its undesirable attributes – noise and air pollutants.

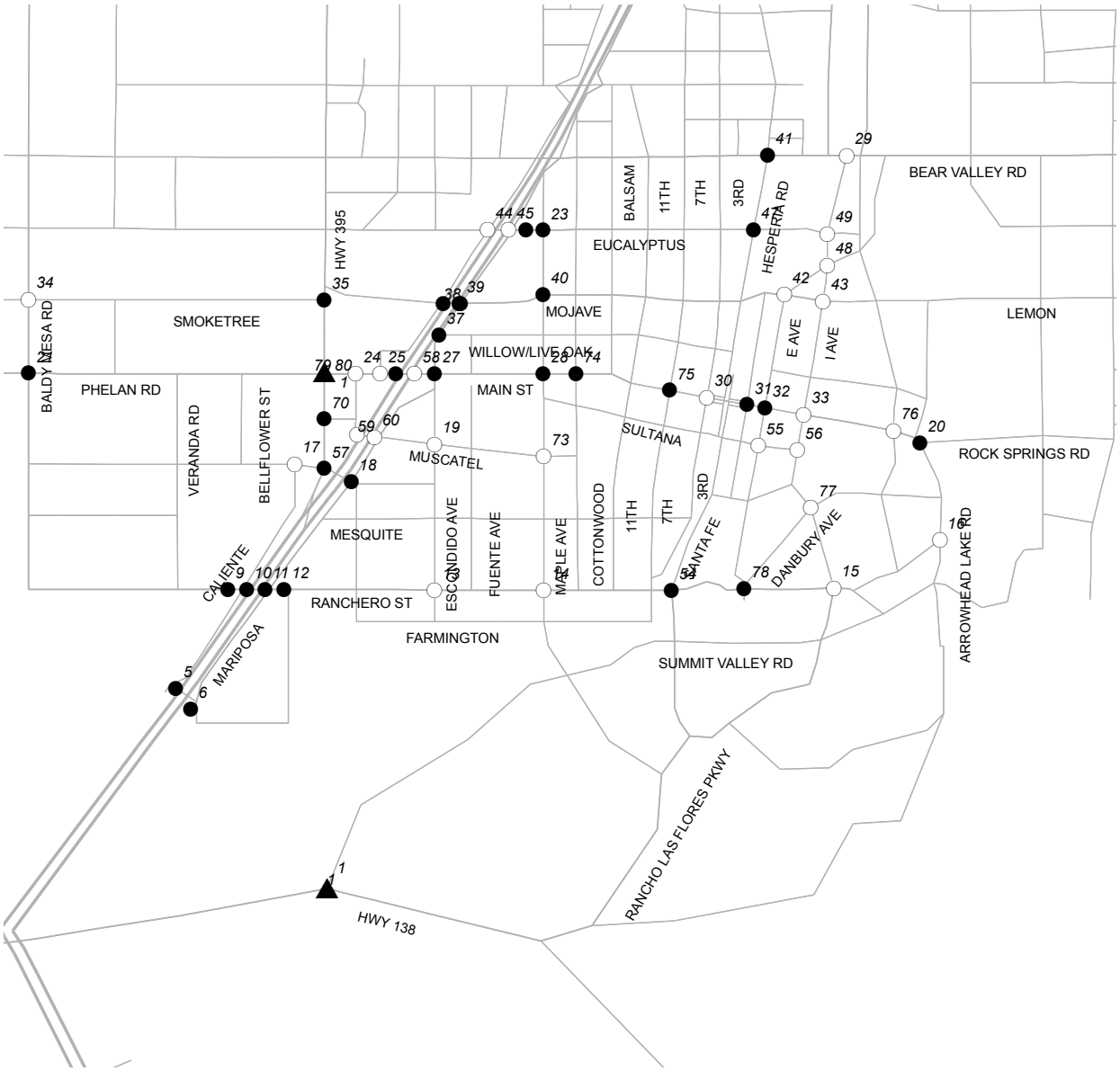
Overall, the benefits of economic activity far outweigh the negative aspects. Industrial and warehousing land uses (those that generate greater volumes of trucking activity) should be congregated in industrial areas of the City. Also, the barrier to circulation caused by the BNSF freight rail line can be mitigated by constructing additional grade-separated rail crossings at the locations identified in the roadway plan.

Recommended Approaches/Strategies:

- Develop land use strategies to focus heavier truck-generating uses in industrial areas.
- Identify streets where higher volumes and percentages of truck traffic are expected, and design arterial streets in those areas with design standards to facilitate the efficient movement of trucks.
- Support regional efforts to secure funding for the grade separation program.
- Develop a priority and funding plan for building the additional grade separations identified in the roadway plan.

Figure 6-1 Recommended Street Network Plan





Legend

- ● Enhanced Study Intersections
- ○ Study Intersections
- ▲ Grade Separated Intersections

Not to Scale

JULY 2009

Figure 6-2

Kimley-Horn and Associates, Inc.

Location of Enhanced Intersections

6.3 Transit

Public transportation can be a component of a balanced transportation system for the City, though public transit services are outside the City's purview. Public transportation provides an essential primary mode of transportation for those without access to automobiles, and an alternative mode of travel for motorists, which can help reduce traffic and congestion on the City's street network.

The City plays a role in the use of transit through land planning efforts to have developments designed in a manner that provides convenient access to bus stops, and comfortable waiting areas at the bus stops. Also the City can provide Victor Valley Transit with input and information that can help them to provide service in the areas that best meet the needs of Hesperia's citizens.

Recommended Approaches/Strategies:

- Encourage the expansion of local bus service to provide essential mobility for residents and employees in Hesperia.
- Support the expansion of express bus services from the Victor Valley to the San Bernardino Valley.

6.4 Non-motorized Transportation

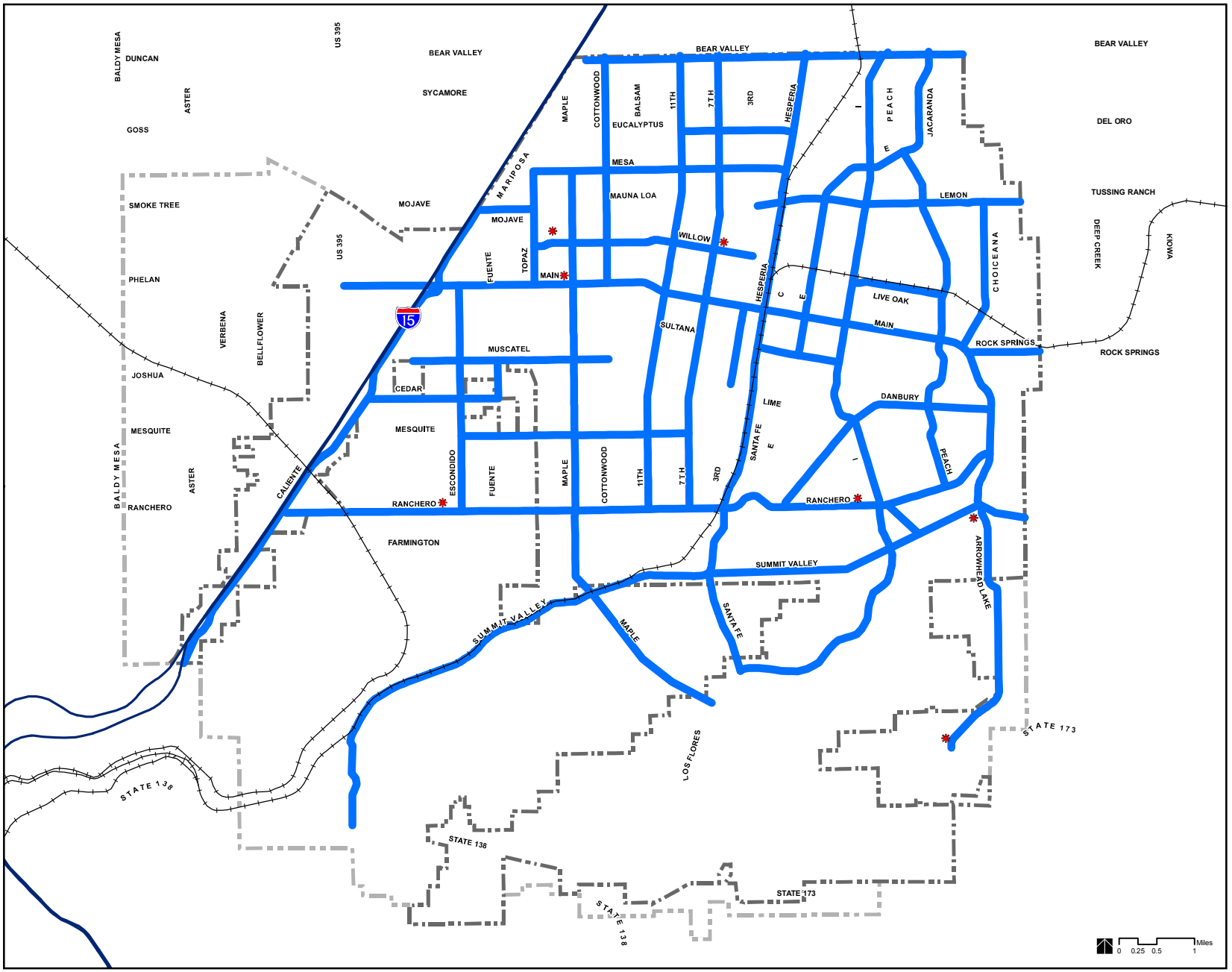
Hesperia wants walking and bicycle trips to be convenient, enjoyable, and safe for those who can travel that way, since this provides travelers with more options and promotes a healthy lifestyle. Areas developed with a mix of land use types can be planned to include walkways and bicycle facilities that facilitate non-motorized travel for short trips.

Recommended Approaches/Strategies:

- Incorporate sidewalks within street rights-of-way unless rendered inappropriate by other walkways or the character of the surrounding area.
- Plan pedestrian connections between adjacent development areas to help eliminate very short automobile trips.
- Plan convenient pedestrian connections in parts of the City planned for mixed use development.
- Plan off-street multi-use paths for bicycles and pedestrians where right-of-way is available.
- Plan bike lanes (Class II) on streets with sufficient pavement width that do not carry high volumes of traffic if possible.

A map of the City's planned bike system is shown in **Figure 6-3**.

Figure 6-3 Bikeway System Plan



General Plan
Circulation Map

Legend

Roadway Clasifications

Arterials

- State Highway
- Major Arterial
- Arterial
- Secondary Arterial
- Suburban Collector
- Rural Collector
- Industrial Collector

Streets Outside City's Sphere

- Major Arterial
- Arterial
- Colllector

Misc.

- Bike_Lanes
- Interstate (I-15)
- Railroad
- City Boundary
- Sphere of Influence

Indicates streets with Special Sections than standard Major Arterial and arterial designations.

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GIS Hogle-Ireland, Inc.

6.5 Regional Transportation

The highways that currently provide regional access for Hesperia – I-15, US-395, and SR-138 – will be woefully inadequate to serve the future regional transportation needs of the Victor Valley, which is projected to exceed 1.2 million population when the local land use plans are built out. These roadways will need additional future capacity – I-15 will need to be widened, a new highway alignment will be needed for US-395 in addition to a six-lane arterial on the present alignment, and SR-138 will need to be developed as a major six-lane highway between I-15 and Summit Valley Road. Without these improvements, regional traffic will spill over onto the City's system of arterial streets, creating substantial congestion an inhibiting efficient circulation for Hesperia residents, employees, and customers. To maximize the City's potential and achieve the vision for efficient circulation in Hesperia, the City should become a proactive player in the process to identify and develop specific solutions to these corridor improvement needs through cooperative regional and subregional planning efforts.

Recommended Approaches/Strategies:

- Encourage Caltrans to complete the studies necessary to identify preferred new alignments and implement right-of-way preservation for US-395 and SR-138.
- Support, and participate in, the conduct of these studies.
- Support the conduct of engineering and environmental studies for a preferred program of improvements to I-15 through Cajon Pass and the Victor Valley.

APPENDICES

Appendix A

- **Traffic Count Worksheets**

Appendix B

- **Synchro Analysis Worksheets**

Appendix B-1

- **Existing Conditions**

Appendix B-2

- **General Plan Buildout**

Appendix B-3

- **High Intensity Buildout (with new corridors)**

Appendix B-4

- **High Intensity Buildout (no new corridors)**

Appendix B-5

- **Preferred Scenario**

Appendix C

- **Future Development Assumptions by TAZ**

Appendix D

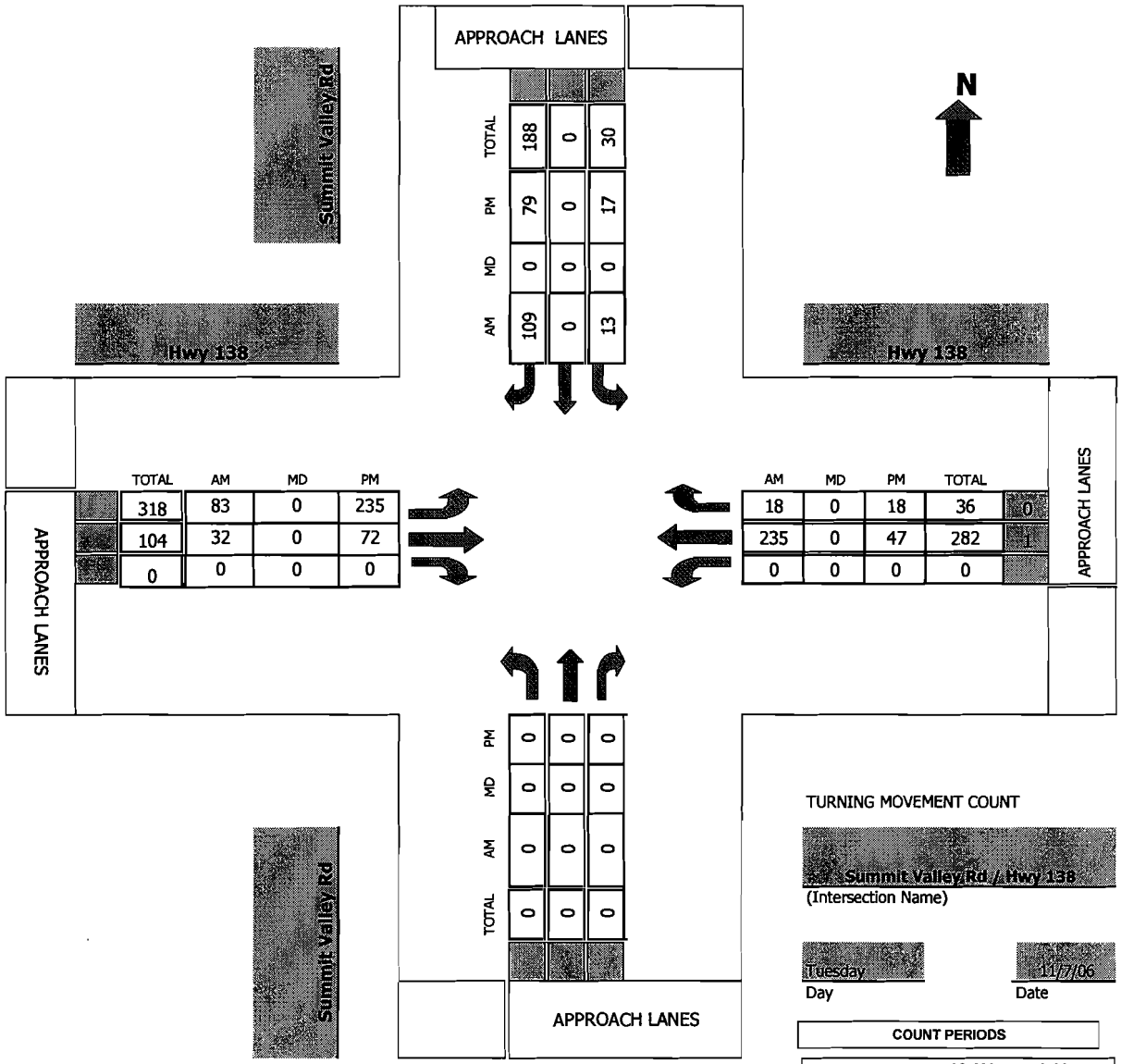
- **Recommended Intersection Lane Geometries Summary**

Appendix A

- **Traffic Count Worksheets**

TMC Summary of Summit Valley Rd/Hwy 138

Project #: 06-3448-001



TURNING MOVEMENT COUNT

Summit Valley Rd / Hwy 138
(Intersection Name)

Tuesday — Day

11/7/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Summit Valley Rd DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Hwy 138 DAY: TUESDAY PROJECT# 06-3448-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				0	1	0	0	1			1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM				4		30	20	8			45	10	117
7:15 AM				5		25	15	6			50	6	107
7:30 AM				6		21	25	8			66	8	134
7:45 AM				3		20	22	6			65	0	116
8:00 AM				2		35	21	8			50	4	120
8:15 AM				2		33	15	10			54	6	120
8:30 AM				4		30	16	6			54	3	113
8:45 AM				2		25	10	5			40	2	84
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 0	NR 0	SL 28	ST 0	SR 219	EL 144	ET 57	ER 0	WL 0	WT 424	WR 39	TOTAL 911

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	0	0	13	0	109	83	32	0	0	235	18	490
PEAK HR. FACTOR:		0.000			0.824			0.871			0.855		0.914

CONTROL: 1-way stop s/b

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Summit Valley Rd DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Hwy 138 DAY: TUESDAY PROJECT# 06-3448-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				0	1	0	0	1			1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM				2		18	50	11			7	2	90
4:15 PM				4		15	66	16			8	6	115
4:30 PM				5		18	65	15			11	4	118
4:45 PM				3		21	50	21			15	5	115
5:00 PM				5		25	54	20			13	3	120
5:15 PM				6		20	40	15			10	4	95
5:30 PM				7		15	45	15			8	3	93
5:45 PM				5		11	45	11			6	2	80
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	0	0	0	37	0	143	415	124	0	0	78	29	826

PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	0	0	0	17	0	79	235	72	0	0	47	18	468
PEAK HR. FACTOR:		0.000			0.800			0.936			0.813		0.975

CONTROL: 1-way stop s/b

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-006

Location: I-15 SB Ramps & Oak Hill Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
LANES:					0.5	0.5	1		1	0	0	1	
7:00	CARS				6	0	3		4	14	125	10	
	2-axle				2						2	1	
	3-axle												
	4-axle												
	5-axle +								1				
7:15	CARS				3	0	4		22	22	146	6	
	2-axle										5		
	3-axle											1	
	4-axle												
	5-axle +											1	
7:30	CARS				1	0	1		11	11	85	5	
	2-axle									1	2	1	
	3-axle												
	4-axle												
	5-axle +												
7:45	CARS				3	0	4		10	10	78	11	
	2-axle				1						3	1	
	3-axle									1	1		
	4-axle												
	5-axle +				1					1			
8:00	CARS				3	0	1		10	12	87	15	
	2-axle										1	1	
	3-axle												
	4-axle												
	5-axle +										1	1	
8:15	CARS				1	1	6		8	10	74	9	
	2-axle								1				
	3-axle												
	4-axle												
	5-axle +											1	
8:30	CARS				1	0	5		10	12	56	10	
	2-axle				1				1		1		
	3-axle												
	4-axle												
	5-axle +										1	2	
8:45	CARS				7	0	3		9	6	58	10	
	2-axle										2		
	3-axle											1	
	4-axle												
	5-axle +												

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	0	0	0	25	1	27	0	84	97	709	76	0
2-axle	0	0	0	4	0	0	0	2	1	16	4	0
3-axle	0	0	0	0	0	0	0	0	1	1	2	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	1	0	0	0	1	1	2	5	0
TOTALS	0	0	0	30	1	27	0	87	100	728	87	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	0	0	17	0	12	0	48	60	447	37	0
PEAK HR. FACTOR:		0.000			0.659			0.614			0.761	

CONTROL: 1-Way Stop s

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-006

Location: I-15 SB Ramps & Oak Hill Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
LANES:					0.5	0.5	1		1	0	0	1	
16:00	CARS				7	0	8		6	5	50	24	
	2-axle				1				2	1	2	1	
	3-axle												
	4-axle												
	5-axle +				1						3		
16:15	CARS				3	1	5		4	4	34	21	
	2-axle										3	2	
	3-axle										2		
	4-axle												
	5-axle +										1		
16:30	CARS				9	1	4		9	5	47	18	
	2-axle						1		2		2	1	
	3-axle												
	4-axle												
	5-axle +				1						1		
16:45	CARS				8	0	5		6	7	53	21	
	2-axle				1				1		1	1	
	3-axle										2		
	4-axle												
	5-axle +												
17:00	CARS				7	0	7		5	6	51	20	
	2-axle				1				1		1		
	3-axle												
	4-axle												
	5-axle +												
17:15	CARS				8	0	11		8	5	49	18	
	2-axle										2		
	3-axle												
	4-axle												
	5-axle +										1		
17:30	CARS				4	1	5		7	3	31	21	
	2-axle				2				1		2		
	3-axle												
	4-axle												
	5-axle +				1					1	1		
17:45	CARS				7	0	9		10	3	37	19	
	2-axle								1	1	2	1	
	3-axle												
	4-axle												
	5-axle +				1		1						

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	0	0	0	53	3	54	0	55	38	352	162	0
2-axle	0	0	0	5	0	1	0	8	2	15	6	0
3-axle	0	0	0	0	0	0	0	0	0	4	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	4	0	1	0	0	1	7	0	0
TOTALS	0	0	0	62	3	56	0	63	41	378	168	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1630 PM

PEAK VOLUMES =	0	0	0	35	1	28	0	32	23	210	79	0
PEAK HR. FACTOR:		0.000			0.842			0.859			0.926	

CONTROL: 1-Way Stop s

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-007

Location: I-15 NB Ramps & Mariposa Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1			1	0	0	1	0			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	1	27			24	3	32		22			
	2-axle		1			2	3	1		1			
	3-axle												
	4-axle												
	5-axle +						1						
7:15	CARS	1	21			13	8	28		4			
	2-axle		2			1				1			
	3-axle							1					
	4-axle												
	5-axle +							1					
7:30	CARS	6	16			21	2	22		7			
	2-axle	2	2			2		2		3			
	3-axle												
	4-axle												
	5-axle +												
7:45	CARS	18	19			14	6	21		8			
	2-axle	1	1			2		1		1			
	3-axle												
	4-axle												
	5-axle +					1							
8:00	CARS	3	16			15	4	36		8			
	2-axle		2					3					
	3-axle												
	4-axle		1										
	5-axle +												
8:15	CARS	1	22			16	4	30		5			
	2-axle		1			1	1	1					
	3-axle									1			
	4-axle												
	5-axle +							1					
8:30	CARS	8	16			11	4	29		7			
	2-axle	2	1			1		1		1			
	3-axle							1					
	4-axle									1			
	5-axle +		1					1		1			
8:45	CARS	4	14			15	5	25		6			
	2-axle							1		2			
	3-axle		1							1			
	4-axle												
	5-axle +							1					

MOVEMENT TOTALS

CARS	42	151	0	0	129	36	223	0	67	0	0	0
2-axle	5	10	0	0	9	4	10	0	9	0	0	0
3-axle	0	1	0	0	0	0	2	0	2	0	0	0
4-axle	0	1	0	0	0	0	0	0	1	0	0	0
5-axle +	0	1	0	0	1	1	4	0	1	0	0	0
TOTALS	47	164	0	0	139	41	239	0	80	0	0	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	29	89	0	0	80	23	109	0	47	0	0	0
PEAK HR. FACTOR:		0.756			0.780			0.696			0.000	

CONTROL: 1-Way Stop E

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-007

Location: I-15 NB Ramps & Mariposa Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

		LANES:	0	1			1	0	0	1	0			
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		6	25			12	2	158		15			
	2-axle			2			4		5		1			
	3-axle													
	4-axle													
	5-axle +			2					1		1			
16:15	CARS		2	13			11	0	97		11			
	2-axle						2		4		2			
	3-axle								1					
	4-axle													
	5-axle +			1					1					
16:30	CARS		7	32			21	3	118		26			
	2-axle		2	2			1		2					
	3-axle								2					
	4-axle													
	5-axle +			1										
16:45	CARS		8	34			8	3	122		27			
	2-axle						4		5		1			
	3-axle			2					1					
	4-axle													
	5-axle +													
17:00	CARS		4	25			13	4	157		10			
	2-axle			3					1		1			
	3-axle													
	4-axle													
	5-axle +			1										
17:15	CARS		5	23			14	1	128		16			
	2-axle			3					3					
	3-axle													
	4-axle													
	5-axle +													
17:30	CARS		5	29			19	2	142		16			
	2-axle			1			2	1	4		1			
	3-axle													
	4-axle													
	5-axle +						1							
17:45	CARS		2	20			9	4	107		9			
	2-axle													
	3-axle													
	4-axle													
	5-axle +						1				2			

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	39	201	0	0	107	19	1029	0	130	0	0	0
2-axle	2	11	0	0	13	1	24	0	6	0	0	0
3-axle	0	2	0	0	0	0	4	0	0	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	5	0	0	2	0	2	0	3	0	0	0
TOTALS	41	219	0	0	122	20	1059	0	139	0	0	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

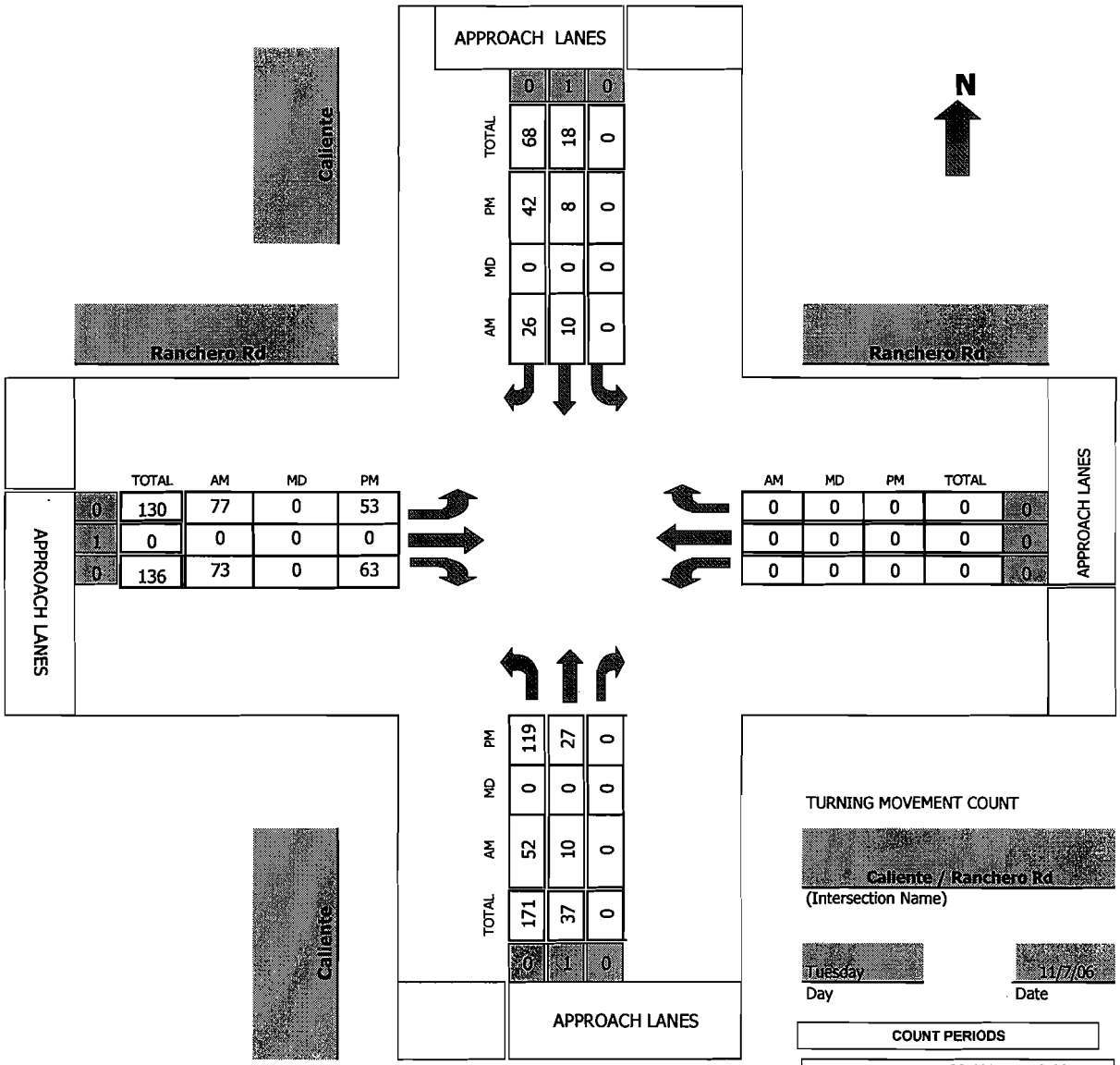
PM Peak Hr Begins at: 1645 PM

PEAK VOLUMES =	22	121	0	0	61	11	563	0	72	0	0	0
PEAK HR. FACTOR:		0.813			0.720			0.939			0.000	

CONTROL: 1-Way Stop E

TMC Summary of Caliente/Ranchero Rd

Project #: 06-3448-002



TURNING MOVEMENT COUNT

Caliente / Ranchero Rd
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Caliente DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0				
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	6	3			3	8	10		16				46
7:15 AM	8	1			4	6	22		12				53
7:30 AM	12	2			1	7	30		15				67
7:45 AM	17	3			2	8	15		24				69
8:00 AM	15	4			3	5	10		22				59
8:15 AM	15	3			4	2	6		12				42
8:30 AM	8	6			3	3	10		27				57
8:45 AM	11	3			2	5	10		12				43
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 92	NT 25	NR 0	SL 0	ST 22	SR 44	EL 113	ET 0	ER 140	WL 0	WT 0	WR 0	TOTAL 436

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	52	10	0	0	10	26	77	0	73	0	0	0	248
PEAK HR. FACTOR:		0.775			0.900			0.833			0.000		0.899

CONTROL: 1-Way Stop E

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Caliente DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0				
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	27	5			4	13	15		21				85
4:15 PM	31	7			2	11	14		16				81
4:30 PM	33	9			0	6	16		9				73
4:45 PM	28	6			2	12	8		17				73
5:00 PM	23	5			4	20	14		12				78
5:15 PM	25	5			6	15	8		10				69
5:30 PM	22	5			2	10	5		13				57
5:45 PM	36	3			3	13	5		11				71
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 225	NT 45	NR 0	SL 0	ST 23	SR 100	EL 85	ET 0	ER 109	WL 0	WT 0	WR 0	TOTAL 587

PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	119	27	0	0	8	42	53	0	63	0	0	0	312
PEAK HR. FACTOR:		0.869			0.735			0.806			0.000		0.918

CONTROL: 1-Way Stop E

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-005

Location: Mariposa Rd. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1	0	0	1	0	0	0	0	0	1	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS		8	29	19	16					98		29
	2-axle			1	1						3		
	3-axle												
	4-axle			1									
	5-axle +			1									1
7:15	CARS		11	35	18	13					132		34
	2-axle		1	2							1		1
	3-axle										1		
	4-axle				1								
	5-axle +												
7:30	CARS		9	38	16	10					88		29
	2-axle			1	2						7		
	3-axle			1							1		
	4-axle										1		
	5-axle +			1	1								
7:45	CARS		8	24	19	14					92		30
	2-axle		2										
	3-axle										1		3
	4-axle					1							
	5-axle +					1					2		1
8:00	CARS		8	21	16	12					77		19
	2-axle				1						1		
	3-axle			1	1						1		
	4-axle												1
	5-axle +				1								1
8:15	CARS		6	26	12	11					78		27
	2-axle			4	1	1					2		2
	3-axle			1									1
	4-axle			2							1		
	5-axle +												
8:30	CARS		9	26	11	6					60		23
	2-axle			2		1					5		
	3-axle										1		1
	4-axle												
	5-axle +				1						2		1
8:45	CARS		8	18	11	6					71		22
	2-axle		1	2									
	3-axle			1									
	4-axle										2		
	5-axle +		1										1

MOVEMENT TOTALS

CARS	0	67	217	122	88	0	0	0	0	696	0	213
2-axle	0	4	12	5	2	0	0	0	0	19	0	3
3-axle	0	0	4	1	0	0	0	0	0	5	0	5
4-axle	0	0	3	1	1	0	0	0	0	4	0	1
5-axle +	0	1	2	3	1	0	0	0	0	4	0	5
TOTALS	0	72	238	132	92	0	0	0	0	728	0	227
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	39	134	77	55	0	0	0	0	427	0	128
PEAK HR. FACTOR:		0.865			0.917			0.000			0.821	

CONTROL: 3-Way Stop N , S & W

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-005

Location: Mariposa Rd. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1	0	0	1	0	0	0	0	0	1	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		6	78	20	8					21		12
	2-axle			3	2						1		2
	3-axle			3									1
	4-axle		1		1								
	5-axle +												1
16:15	CARS		12	131	19	11					45		13
	2-axle			1	1	2					3		2
	3-axle			2									
	4-axle										1		
	5-axle +												
16:30	CARS		9	125	20	10					25		22
	2-axle			2	2	1							2
	3-axle					1							
	4-axle												1
	5-axle +			1									1
16:45	CARS		5	129	19	9					36		13
	2-axle			4	1						1		
	3-axle			2									
	4-axle												
	5-axle +			1							1		1
17:00	CARS		7	133	26	14					42		21
	2-axle			3							3		
	3-axle												1
	4-axle										1		
	5-axle +		1	1									
17:15	CARS		12	122	17	8					43		13
	2-axle			1							1		
	3-axle		1	1									1
	4-axle			1									
	5-axle +												
17:30	CARS		7	138	28	13					36		9
	2-axle			3	1								
	3-axle			1									
	4-axle				1								
	5-axle +												
17:45	CARS		4	159	16	9					20		12
	2-axle												
	3-axle			1	1								
	4-axle												
	5-axle +			1									

MOVEMENT TOTALS

CARS	0	62	1015	165	82	0	0	0	0	268	0	115
2-axle	0	0	17	7	3	0	0	0	0	9	0	6
3-axle	0	1	10	1	1	0	0	0	0	0	0	3
4-axle	0	1	1	2	0	0	0	0	0	2	0	1
5-axle +	0	1	4	0	0	0	0	0	0	1	0	3
TOTALS	0	65	1047	175	86	0	0	0	0	280	0	128
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1615 PM

PEAK VOLUMES =	0	34	535	88	48	0	0	0	0	158	0	77
PEAK HR. FACTOR:		0.974			0.850			0.000			0.864	

CONTROL: 3-Way Stop N , S & W

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-009

Location: Escondido Ave. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1	0	0	1	0	1	1	0	1	1	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	4	2	3	0	0	3	4	38	3	2	122	5
	2-axle											3	
	3-axle									1			
	4-axle												
	5-axle +	1										1	
7:15	CARS	4	3	9	1	1	4	8	33	3	3	124	1
	2-axle								4	2			
	3-axle												
	4-axle												
	5-axle +								1			1	
7:30	CARS	7	1	7	0	2	4	1	47	5	6	100	2
	2-axle	1		1					1			4	
	3-axle	1							1				
	4-axle												
	5-axle +											1	
7:45	CARS	2	0	4	1	0	1	0	38	4	3	81	0
	2-axle	1		1					1			2	
	3-axle											1	
	4-axle												
	5-axle +												
8:00	CARS	8	0	9	2	0	0	5	32	3	2	77	0
	2-axle		1	1					2			4	
	3-axle								2			1	
	4-axle												
	5-axle +								1			2	
8:15	CARS	0	0	3	0	0	3	2	29	3	4	74	2
	2-axle								4	1	1	4	
	3-axle												
	4-axle												
	5-axle +										1	1	
8:30	CARS	2	0	4	0	0	1	0	27	2	1	68	1
	2-axle										1		1
	3-axle												
	4-axle												
	5-axle +								2				
8:45	CARS	6	3	2	0	1	0	0	28	3	0	60	0
	2-axle								2	1		3	
	3-axle												
	4-axle												
	5-axle +												

MOVEMENT TOTALS

CARS	33	9	41	4	4	16	20	272	26	21	706	11
2-axle	2	1	3	0	0	0	0	14	4	2	20	1
3-axle	1	0	0	0	0	0	0	3	1	0	2	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	1	0	0	0	0	0	0	4	0	1	6	0
TOTALS	37	10	44	4	4	16	20	293	31	24	734	12
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	21	6	25	2	3	12	13	164	18	14	440	8
PEAK HR. FACTOR:		0.722			0.708			0.886			0.868	

CONTROL: 2-Way Stop N & S

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-009

Location: Escondido Ave. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

		LANES:	0	1	0	0	1	0	1	1	0	1	1	0
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		5	2	5	0	0	1	3	130	7	8	64	3
	2-axle									1		1	4	
	3-axle												1	
	4-axle													
	5-axle +									2				
16:15	CARS		1	0	5	1	0	0	3	138	10	5	51	2
	2-axle									2	2		1	
	3-axle									1				
	4-axle													
	5-axle +													
16:30	CARS		2	0	2	0	0	0	0	151	7	8	52	5
	2-axle									1		1		1
	3-axle									4				
	4-axle													
	5-axle +									1	1		1	
16:45	CARS		1	1	9	0	0	0	2	126	1	3	53	0
	2-axle								1	1				
	3-axle													
	4-axle													
	5-axle +									1				
17:00	CARS		4	1	4	0	0	1	1	162	4	4	77	0
	2-axle				1					1			2	
	3-axle										1			
	4-axle													
	5-axle +									1			1	
17:15	CARS		0	0	2	2	1	1	2	122	5	5	64	1
	2-axle									3				
	3-axle												1	
	4-axle													
	5-axle +													
17:30	CARS		3	0	6	0	0	2	6	151	6	4	59	0
	2-axle									1				
	3-axle													
	4-axle													
	5-axle +								1					
17:45	CARS		1	1	3	0	0	0	4	150	2	7	54	0
	2-axle		1							1				
	3-axle									1				
	4-axle													
	5-axle +									1			1	

MOVEMENT TOTALS

CARS	17	5	36	3	1	5	21	1130	42	44	474	11
2-axle	1	0	1	0	0	0	1	11	2	2	7	1
3-axle	0	0	0	0	0	0	0	6	1	0	2	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	0	0	1	6	1	0	3	0
TOTALS	18	5	37	3	1	5	23	1153	46	46	486	12
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1700 PM

PEAK VOLUMES =	9	2	16	2	1	4	14	594	18	20	259	1
PEAK HR. FACTOR:		0.675			0.438			0.921			0.833	

CONTROL: 2-Way Stop N & S

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-012

Location: Maple Ave. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1	0	0	1	0	0	1	0	0	1	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	5	7	3	16	13	33	13	41	4	3	69	26
	2-axle		1		2	2		2			1		
	3-axle												
	4-axle												
	5-axle +								1			1	
7:15	CARS	9	5	1	11	6	36	15	49	2	0	49	10
	2-axle			1	2	2	1	1				1	1
	3-axle								1				
	4-axle												
	5-axle +				1							1	
7:30	CARS	8	8	1	15	3	30	14	53	4	3	44	19
	2-axle		4	2	1		2		1	1		1	
	3-axle						1						
	4-axle												
	5-axle +										1		
7:45	CARS	6	4	1	7	4	18	10	37	5	2	67	13
	2-axle								2			4	1
	3-axle				1							1	
	4-axle												
	5-axle +											3	
8:00	CARS	3	4	0	8	3	30	12	39	0	0	62	8
	2-axle						1	1				2	
	3-axle												
	4-axle												
	5-axle +				1			2				1	
8:15	CARS	3	2	0	3	0	18	9	27	0	0	55	7
	2-axle								1			2	
	3-axle												
	4-axle												
	5-axle +								2				1
8:30	CARS	3	6	1	2	3	15	13	37	0	0	46	6
	2-axle						1	1	2				
	3-axle												
	4-axle												
	5-axle +												
8:45	CARS	1	1	0	7	1	17	5	29	0	0	62	6
	2-axle				1				1				
	3-axle												
	4-axle												
	5-axle +												

MOVEMENT TOTALS

CARS	38	37	7	69	33	197	91	312	15	8	454	95
2-axle	0	5	3	6	4	5	5	7	1	1	10	2
3-axle	0	0	0	1	0	1	0	1	0	0	1	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	2	0	0	2	3	0	1	6	1
TOTALS	38	42	10	78	37	203	98	323	16	10	471	98
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	28	29	9	56	30	121	55	185	16	10	241	70
PEAK HR. FACTOR:		0.717			0.784			0.877			0.803	

CONTROL: 4-Way Stop

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-012

Location: Maple Ave. & Ranchero Rd. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	0	1	0	0	1	0	0	1	0	0	1	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS	3	2	2	13	8	17	17	95	6	1	49	7
	2-axle			2			1		1			3	
	3-axle												
	4-axle												
	5-axle +												
16:15	CARS	0	0	2	20	10	17	33	104	13	1	51	8
	2-axle							1	3			2	
	3-axle												
	4-axle												
	5-axle +					1			1				
16:30	CARS	2	4	2	7	4	15	17	108	10	1	43	12
	2-axle				1			1	2			2	
	3-axle								1				
	4-axle												
	5-axle +								1				
16:45	CARS	5	2	1	9	4	14	26	101	9	3	43	12
	2-axle								3			2	
	3-axle												
	4-axle												
	5-axle +											1	
17:00	CARS	3	1	2	18	3	18	30	111	13	0	65	10
	2-axle								3			2	
	3-axle												
	4-axle												
	5-axle +								1			1	
17:15	CARS	6	6	2	12	7	21	18	110	15	1	51	10
	2-axle								1				
	3-axle												
	4-axle												
	5-axle +												
17:30	CARS	1	4	2	8	3	12	32	87	12	1	50	4
	2-axle							1	2				
	3-axle									1			
	4-axle												
	5-axle +												
17:45	CARS	2	5	2	25	12	31	38	89	14	2	49	8
	2-axle												
	3-axle												
	4-axle												
	5-axle +											1	

MOVEMENT TOTALS

CARS	22	24	15	112	51	145	211	805	92	10	401	71
2-axle	0	0	2	1	0	1	3	15	0	0	11	0
3-axle	0	0	0	0	0	0	0	1	1	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	1	0	0	3	0	0	3	0
TOTALS	22	24	17	113	52	146	214	824	93	10	415	71
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

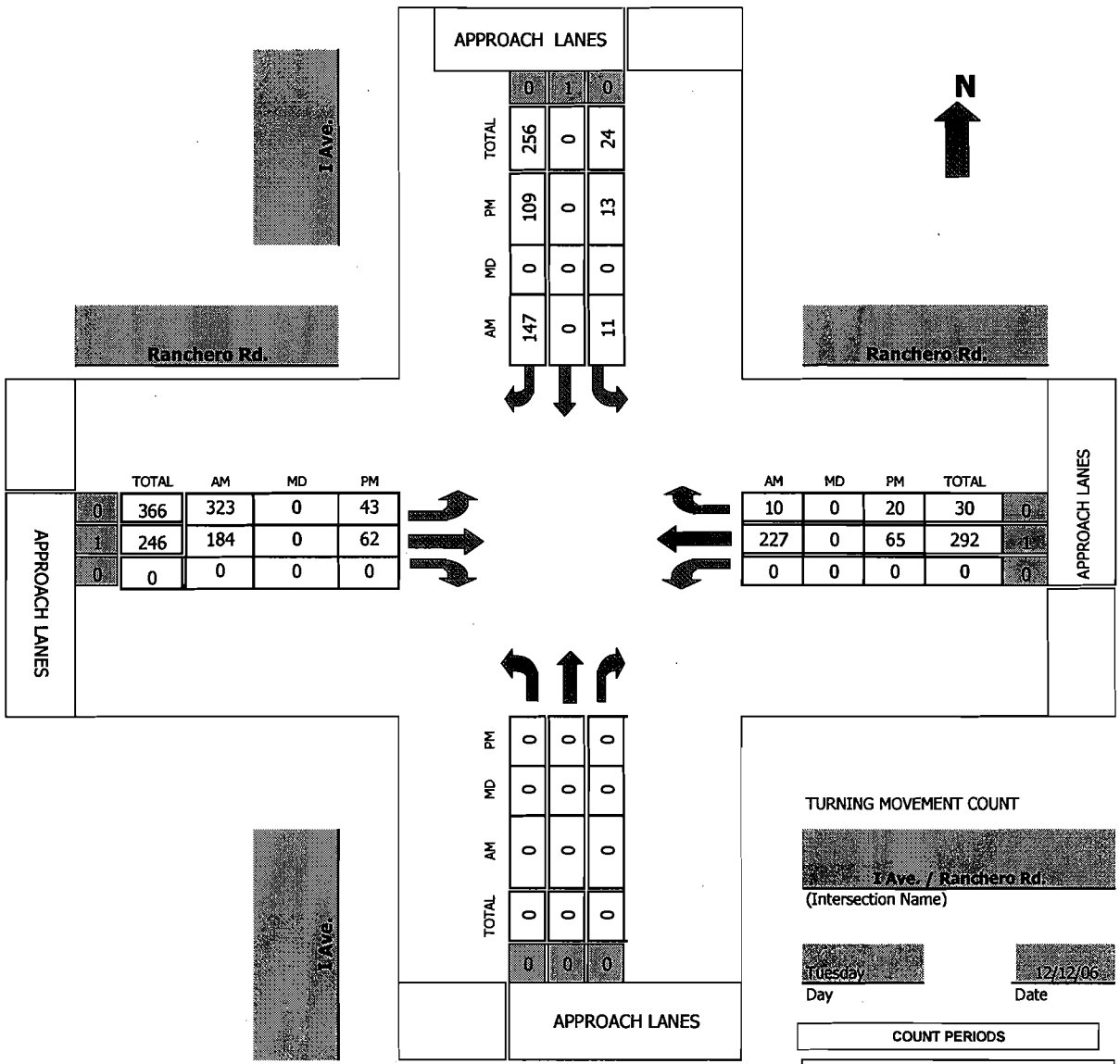
PM Peak Hr Begins at: 1700 PM

PEAK VOLUMES =	12	16	8	63	25	82	119	404	55	4	219	32
PEAK HR. FACTOR:		0.643			0.625			0.915			0.817	

CONTROL: 4-Way Stop

TMC Summary of I Ave./Ranchero Rd.

Project #: 06-3448-039



TURNING MOVEMENT COUNT

I Ave. / Ranchero Rd.
(Intersection Name)

Tuesday
Day

12/12/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave. DATE: 12/12/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd. DAY: TUESDAY PROJECT# 06-3448-039

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM				1		17	4	5			18	1	46
7:15 AM				0		33	17	8			27	2	87
7:30 AM				3		36	79	37			68	2	225
7:45 AM				1		27	94	46			84	4	256
8:00 AM				4		38	88	57			51	3	241
8:15 AM				3		46	62	44			24	1	180
8:30 AM				1		35	36	31			20	4	127
8:45 AM				4		31	18	25			17	4	99
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 0	NR 0	SL 17	ST 0	SR 263	EL 398	ET 253	ER 0	WL 0	WT 309	WR 21	TOTAL 1261

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	0	0	11	0	147	323	184	0	0	227	10	902
PEAK HR. FACTOR:		0.000			0.806			0.874			0.673		0.881

CONTROL: 1-Way Stop S

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave. DATE: 12/12/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd. DAY: TUESDAY PROJECT# 06-3448-039

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM				5		11	3	8			14	8	49
4:15 PM				7		25	6	14			21	10	83
4:30 PM				4		34	10	26			15	6	95
4:45 PM				2		22	8	10			17	2	61
5:00 PM				0		28	19	12			12	2	73
5:15 PM				3		24	16	11			10	5	69
5:30 PM				4		9	6	7			8	3	37
5:45 PM				3		4	12	5			5	7	36
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 0	NR 0	SL 28	ST 0	SR 157	EL 80	ET 93	ER 0	WL 0	WT 102	WR 43	TOTAL 503

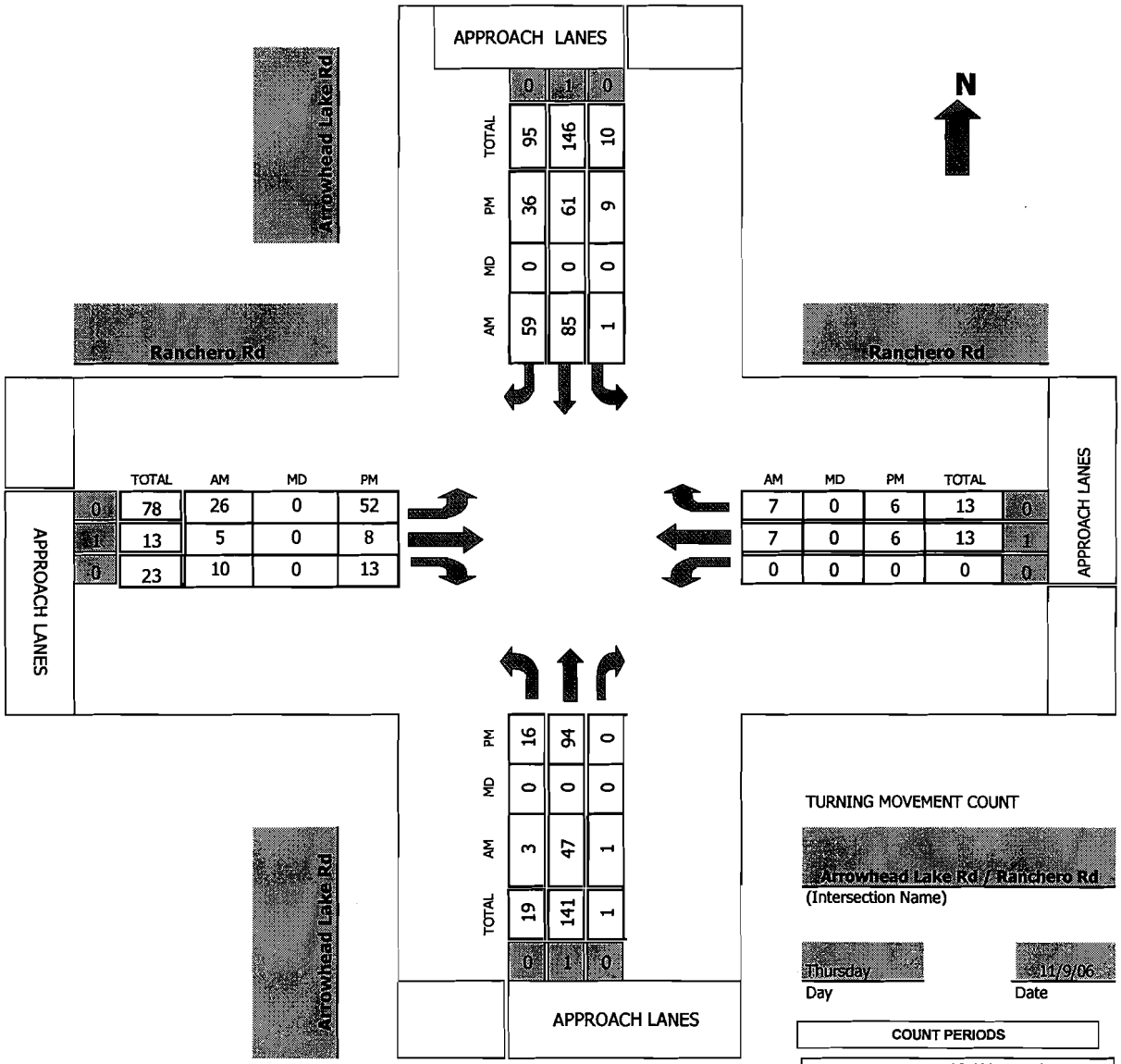
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	0	0	0	13	0	109	43	62	0	0	65	20	312
PEAK HR. FACTOR:		0.000			0.803			0.729			0.685		0.821

CONTROL: 1-Way Stop S

TMC Summary of Arrowhead Lake Rd/Ranchero Rd

Project #: 06-3448-004



TURNING MOVEMENT COUNT

Arrowhead Lake Rd / Ranchero Rd
(Intersection Name)

Thursday
Day

11/9/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	700 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Arrowhead Lake Rd DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: THURSDAY PROJECT# 06-3448-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	7	1	1	30	9	1	1	4		0	4	58
7:15 AM	0	13	0	0	20	11	5	2	2		1	1	55
7:30 AM	0	14	0	0	17	20	10	0	1		2	1	65
7:45 AM	3	13	0	0	18	19	10	2	3		4	1	73
8:00 AM	0	11	0	0	14	14	9	1	2		1	0	52
8:15 AM	1	10	1	2	11	7	6	0	3		0	3	44
8:30 AM	3	4	0	2	13	9	7	1	0		4	0	43
8:45 AM	0	6	0	1	10	9	5	0	1		1	0	33
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	7	78	2	6	133	98	53	7	16	0	13	10	423

AM Peak Hr Begins at: 700 AM

PEAK													
VOLUMES =	3	47	1	1	85	59	26	5	10	0	7	7	251
PEAK HR. FACTOR:		0.797			0.906			0.683			0.700		0.860

CONTROL: 2-Way Stop E & W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Arrowhead Lake Rd DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: THURSDAY PROJECT# 06-3448-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1	15		2	20	6	8	0	2		0	2	56
4:15 PM	6	10		4	20	9	11	3	3		2	2	70
4:30 PM	5	13		2	15	6	10	1	3		0	1	56
4:45 PM	1	34		1	12	13	14	4	1		2	1	83
5:00 PM	4	37		2	14	8	17	0	6		2	2	92
5:15 PM	2	25		3	18	8	5	0	2		0	2	65
5:30 PM	1	15		1	19	6	10	1	1		0	1	55
5:45 PM	0	12		0	10	10	8	2	1		0	1	44
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 20	NT 161	NR 0	SL 15	ST 128	SR 66	EL 83	ET 11	ER 19	WL 0	WT 6	WR 12	TOTAL 521

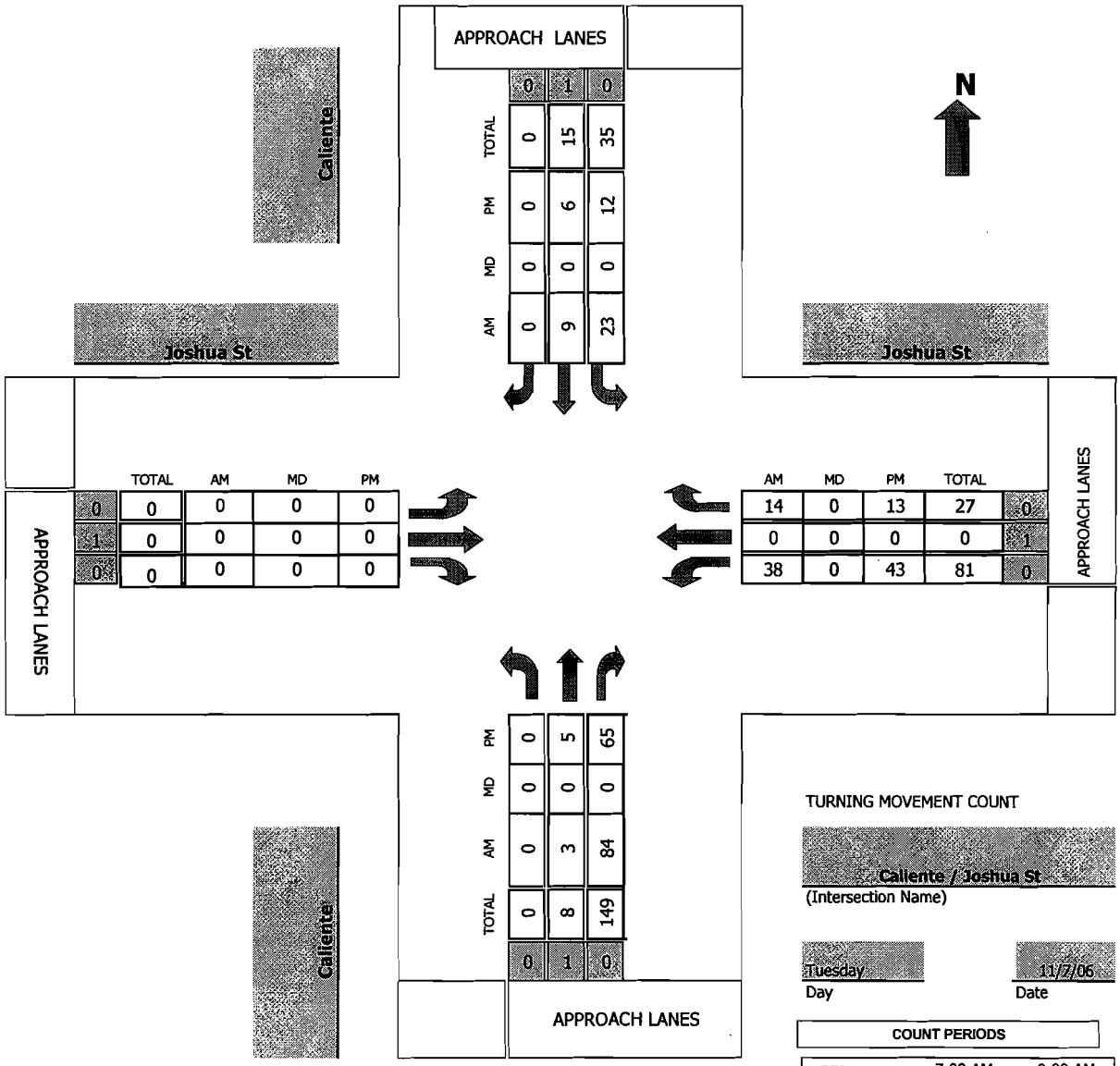
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	16	94	0	9	61	36	52	8	13	0	6	6	301
PEAK HR. FACTOR:		0.671			0.803			0.793			0.750		0.818

CONTROL: 2-Way Stop E & W

TMC Summary of Caliente/Joshua St

Project #: 06-3448-005



TURNING MOVEMENT COUNT

Caliente / Joshua St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Caliente DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Joshua St DAY: TUESDAY PROJECT# 06-3448-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0				0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		0	10	1	2					10		6	29
7:15 AM		1	25	5	3					11		3	48
7:30 AM		0	32	6	2					8		6	54
7:45 AM		0	15	9	1					12		2	39
8:00 AM		2	12	3	3					7		3	30
8:15 AM		0	9	5	3					4		1	22
8:30 AM		1	13	2	0					6		3	25
8:45 AM		1	11	4	1					7		3	27
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	0	5	127	35	15	0	0	0	0	65	0	27	274

AM Peak Hr Begins at: 715 AM

PEAK													
VOLUMES =	0	3	84	23	9	0	0	0	0	38	0	14	171
PEAK HR. FACTOR:		0.680			0.800			0.000			0.929		0.792

CONTROL: 1-Way Stop W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Caliente DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Joshua St DAY: TUESDAY PROJECT# 06-3448-005

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0				0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		2	19	4	3					12		3	43
4:15 PM		2	16	2	3					12		4	39
4:30 PM		0	19	2	0					13		2	36
4:45 PM		1	11	4	0					6		4	26
5:00 PM		3	10	6	1					11		6	37
5:15 PM		2	11	3	2					16		2	36
5:30 PM		2	7	3	0					10		4	26
5:45 PM		1	7	2	2					14		1	27
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 13	NR 100	SL 26	ST 11	SR 0	EL 0	ET 0	ER 0	WL 94	WT 0	WR 26	TOTAL 270

PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	0	5	65	12	6	0	0	0	0	43	0	13	144
PEAK HR. FACTOR:		0.833			0.643			0.000			0.875		0.837

CONTROL: 1-Way Stop W

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-004

Location: Mariposa Rd. & Joshua St. City: Hesperia Date: 03/08/06 Day: WEDNESDAY

		LANES:	0	1			1	0	0	1	0			
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS		20	8			9	11	16		7			
	2-axle						1				1			
	3-axle													
	4-axle													
	5-axle +													
7:15	CARS		24	11			8	12	11		3			
	2-axle			1				1	1					
	3-axle													
	4-axle													
	5-axle +													
7:30	CARS		22	8			10	16	9		7			
	2-axle		1								1			
	3-axle													
	4-axle													
	5-axle +													
7:45	CARS		24	7			6	11	8		8			
	2-axle			1			1							
	3-axle													
	4-axle													
	5-axle +										1			
8:00	CARS		16	5			4	5	7		6			
	2-axle					1								
	3-axle													
	4-axle													
	5-axle +													
8:15	CARS		19	7			6	5	8		5			
	2-axle		1					1						
	3-axle													
	4-axle													
	5-axle +						1							
8:30	CARS		17	8			10	4	6		6			
	2-axle			1							1			
	3-axle							1						
	4-axle													
	5-axle +													
8:45	CARS		14	6			7	5	6		4			
	2-axle													
	3-axle													
	4-axle													
	5-axle +													

MOVEMENT TOTALS

CARS	156	60	0	0	60	69	71	0	46	0	0	0
2-axle	2	3	0	1	2	2	1	0	3	0	0	0
3-axle	0	0	0	0	0	1	0	0	0	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	1	0	0	0	1	0	0	0
TOTALS	158	63	0	1	63	72	72	0	50	0	0	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	91	36	0	0	35	51	45	0	28	0	0	0
PEAK HR. FACTOR:		0.882			0.827			0.760			0.000	

CONTROL: 1-Way Stop E

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-004

Location: Mariposa Rd. & Joshua St. City: Hesperia Date: 03/08/06 Day: WEDNESDAY

		LANES:	0	1			1	0	0	1	0			
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		15	11			9	8	20		17			
	2-axle						1				1			
	3-axle								1					
	4-axle													
	5-axle +													
16:15	CARS		20	17			6	6	24		21			
	2-axle			2				1	1					
	3-axle													
	4-axle													
	5-axle +													
16:30	CARS		17	13			7	8	16		15			
	2-axle										1			
	3-axle													
	4-axle													
	5-axle +													
16:45	CARS		17	14			9	10	19		20			
	2-axle		1	1										
	3-axle													
	4-axle													
	5-axle +													
17:00	CARS		19	13			8	8	26		17			
	2-axle						2							
	3-axle													
	4-axle													
	5-axle +													
17:15	CARS		15	13			3	10	24		20			
	2-axle								1					
	3-axle													
	4-axle													
	5-axle +													
17:30	CARS		10	20			4	9	20		19			
	2-axle			1							1			
	3-axle													
	4-axle													
	5-axle +													
17:45	CARS		8	12			3	5	20		16			
	2-axle													
	3-axle													
	4-axle													
	5-axle +													

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	121	113	0	0	49	64	169	0	145	0	0	0
2-axle	1	4	0	0	3	1	2	0	3	0	0	0
3-axle	0	0	0	0	0	0	1	0	0	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	122	117	0	0	52	65	172	0	148	0	0	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

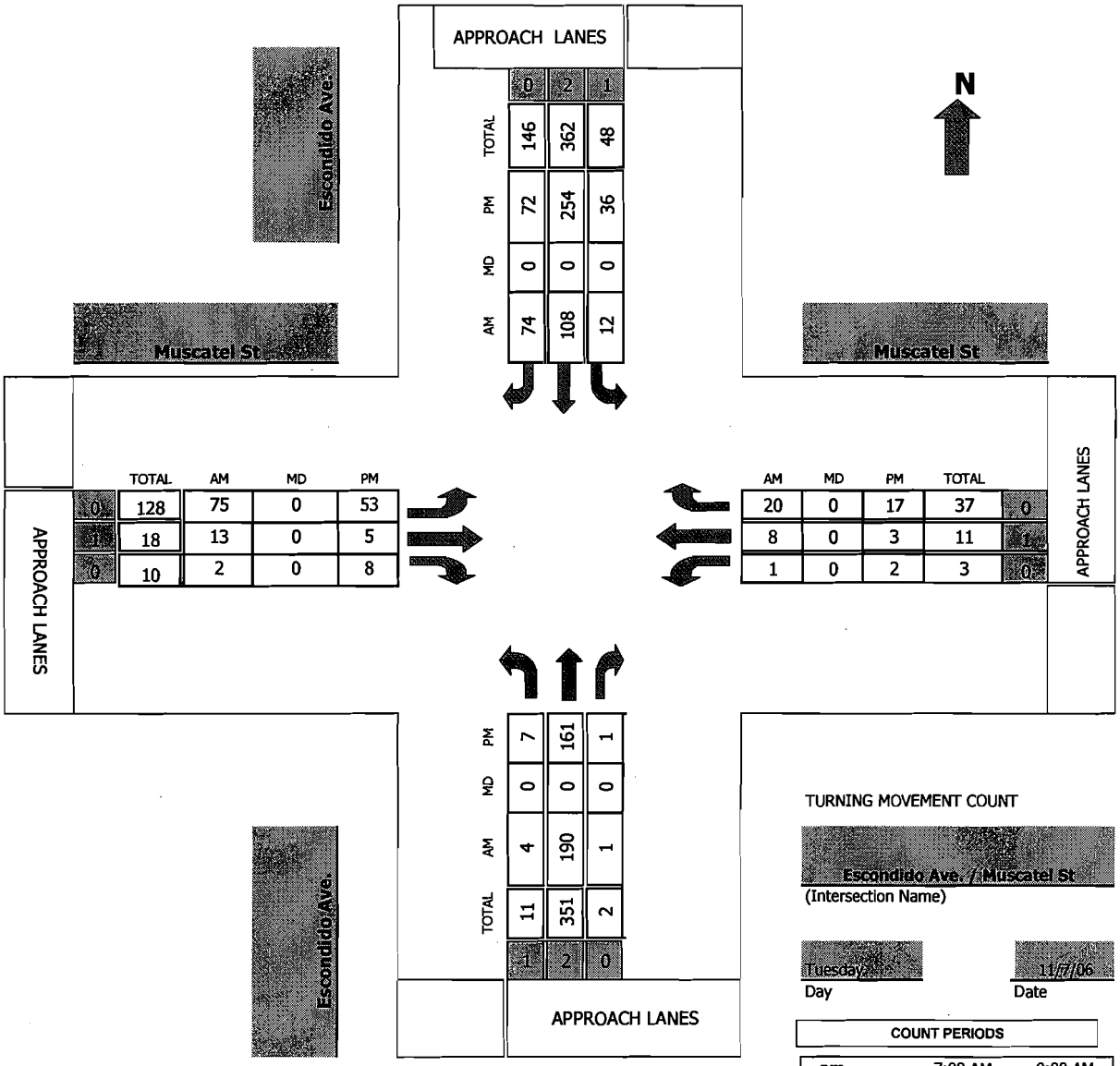
PM Peak Hr Begins at: 1615 PM

PEAK VOLUMES =	74	60	0	0	32	33	86	0	74	0	0	0
PEAK HR. FACTOR:		0.859			0.855			0.870			0.000	

CONTROL: 1-Way Stop E

TMC Summary of Escondido Ave./Muscatel St

Project #: 06-3448-006



TURNING MOVEMENT COUNT

Escondido Ave. / Muscatel St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Escondido Ave. DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Muscatel St DAY: TUESDAY PROJECT# 06-3448-006

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	52	0	2	18	9	6	0	0	0	1	2	90
7:15 AM	0	48	0	2	22	7	11	1	1	1	2	4	99
7:30 AM	1	44	0	3	17	16	13	2	0	0	2	2	100
7:45 AM	2	51	1	2	24	13	9	2	0	0	1	3	108
8:00 AM	1	36	0	1	25	21	12	2	0	0	2	1	101
8:15 AM	2	58	0	3	23	14	20	3	1	1	3	10	138
8:30 AM	1	48	1	4	28	19	22	5	0	0	3	7	138
8:45 AM	0	48	0	4	32	20	21	3	1	0	0	2	131
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	7	385	2	21	189	119	114	18	3	2	14	31	905

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	4	190	1	12	108	74	75	13	2	1	8	20	508
PEAK HR. FACTOR:		0.813			0.866			0.833			0.518		0.920

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Escondido Ave. DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Muscatel St DAY: TUESDAY PROJECT# 06-3448-006

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1	40	0	9	53	21	18	1	2	0	0	1	146
4:15 PM	2	41	0	5	50	18	15	0	5	0	2	5	143
4:30 PM	2	48	0	4	50	17	14	3	3	1	0	3	145
4:45 PM	2	37	0	14	69	18	18	0	3	0	1	8	170
5:00 PM	0	35	1	12	72	21	12	1	0	0	0	4	158
5:15 PM	3	41	0	6	63	16	9	1	2	1	2	2	146
5:30 PM	1	29	0	4	41	9	9	2	0	0	2	2	99
5:45 PM	1	22	1	4	44	7	6	0	0	0	0	2	87
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 12	NT 293	NR 2	SL 58	ST 442	SR 127	EL 101	ET 8	ER 15	WL 2	WT 7	WR 27	TOTAL 1094

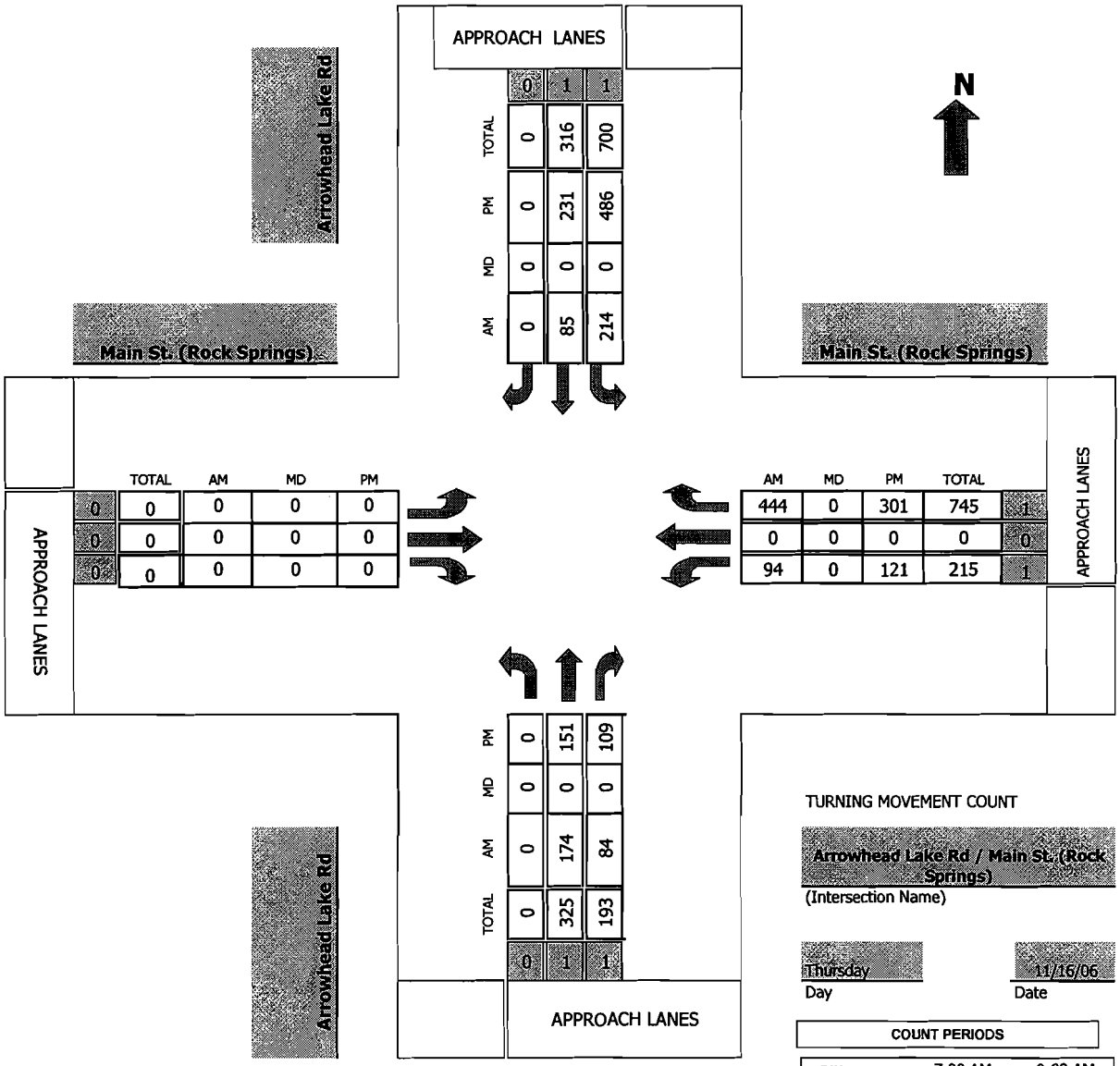
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	7	161	1	36	254	72	53	5	8	2	3	17	619
PEAK HR. FACTOR:		0.845			0.862			0.786			0.611		0.910

CONTROL: Signalized

TMC Summary of Arrowhead Lake Rd/Main St. (Rock Springs)

Project #: 06-3448-007



TURNING MOVEMENT COUNT

Arrowhead Lake Rd / Main St. (Rock Springs)
(Intersection Name)

Thursday — Day

11/16/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Arrowhead Lake Rd DATE: 11/16/2006 LOCATION: City of Hesperia

E-W STREET: Main St. (Rock Springs) DAY: THURSDAY PROJECT# 06-3448-007

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	1	1	0	0	0	0	1	0	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		33	11	34	18					22		99	217
7:15 AM		39	15	57	21					27		113	272
7:30 AM		45	17	64	24					34		116	300
7:45 AM		48	26	40	22					17		125	278
8:00 AM		42	26	53	18					16		90	245
8:15 AM		30	15	49	29					20		59	202
8:30 AM		47	12	66	24					21		77	247
8:45 AM		63	13	37	31					28		80	252
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 347	NR 135	SL 400	ST 187	SR 0	EL 0	ET 0	ER 0	WL 185	WT 0	WR 759	TOTAL 2013

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	0	174	84	214	85	0	0	0	0	94	0	444	1095
PEAK HR. FACTOR:		0.872			0.849			0.000			0.897		0.913

CONTROL: 1-way stop e/b

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Arrowhead Lake Rd DATE: 11/16/2006 LOCATION: City of Hesperia

E-W STREET: Main St. (Rock Springs) DAY: THURSDAY PROJECT# 06-3448-007

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	1	1	0	0	0	0	1	0	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		17	10	118	24					13		24	206
4:15 PM		31	21	123	39					27		88	329
4:30 PM		36	28	128	57					32		86	367
4:45 PM		49	35	107	50					32		66	339
5:00 PM		25	26	123	65					27		74	340
5:15 PM		41	20	128	59					30		75	353
5:30 PM		36	25	116	41					16		65	299
5:45 PM		35	18	111	39					24		62	289
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 270	NR 183	SL 954	ST 374	SR 0	EL 0	ET 0	ER 0	WL 201	WT 0	WR 540	TOTAL 2522

PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	0	151	109	486	231	0	0	0	0	121	0	301	1399
PEAK HR. FACTOR:		0.774			0.953			0.000			0.894		0.953

CONTROL: 1-way stop e/b

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3062-002Axl

Location: Baldy Mesa Rd. & Main St. City: Hesperia Date: 02/15/2006 Day: WEDNESDAY

	LANES:	1	1	1	1	1	1	1	1	1	1	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	7	21	16	42	4	28	20	131	12	7	75	27
	2-axle		1		1		5		3			1	
	3-axle							1	1			3	
	4-axle												
	5-axle +								3				
7:15	CARS	3	11	11	32	4	26	46	166	18	3	50	20
	2-axle			1	1		1	1	6	1	1	7	
	3-axle											1	
	4-axle												
	5-axle +								1				
7:30	CARS	2	21	17	29	1	37	41	137	4	2	93	31
	2-axle			2	1		3	2	8	1		9	2
	3-axle				1				1				
	4-axle												
	5-axle +								1				
7:45	CARS	13	42	19	68	16	52	69	134	2	2	96	61
	2-axle		1	1		3	7	3	8			6	3
	3-axle								2				1
	4-axle								1				
	5-axle +				1				1			3	
8:00	CARS	14	25	3	98	25	66	43	157	4	4	88	44
	2-axle	1					3		3		1	3	3
	3-axle								1				
	4-axle												
	5-axle +												
8:15	CARS	6	7	13	16	5	32	21	128	3	3	52	13
	2-axle	1			1				1		1	3	
	3-axle								1			1	
	4-axle												
	5-axle +								1				
8:30	CARS	7	3	12	19	2	30	26	122	9	6	69	11
	2-axle	2	1	1			1	2	4		1	7	2
	3-axle				1			1				1	
	4-axle												
	5-axle +								1			1	
8:45	CARS	6	4	15	14	1	24	31	131	8	4	66	11
	2-axle				2		4		2	1		4	
	3-axle				1		1		3			1	
	4-axle												
	5-axle +				1				1			1	

MOVEMENT TOTALS

CARS	58	134	106	318	58	295	297	1106	60	31	589	218
2-axle	4	3	5	6	3	24	8	35	3	4	40	10
3-axle	0	0	0	3	0	1	2	9	0	0	7	1
4-axle	0	0	0	0	0	0	0	1	0	0	0	0
5-axle +	0	0	0	2	0	0	0	9	0	0	5	0
TOTALS	62	137	111	329	61	320	307	1160	63	35	641	229
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	33	100	54	231	49	195	205	627	30	13	356	165
PEAK HR. FACTOR:		0.615			0.618			0.902			0.776	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3062-002Axl

Location: Baldy Mesa Rd. & Main St. City: Hesperia Date: 02/15/2006 Day: WEDNESDAY

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
LANES:		1	1	1	1	1	1	1	1	1	1	2	0
16:00	CARS	3	3	6	21	3	36	42	114	8	9	88	22
	2-axle				1		1	1	3		1	2	2
	3-axle						1	1	1				
	4-axle												
	5-axle +											1	1
16:15	CARS	5	4	4	23	6	39	51	137	11	10	92	27
	2-axle					1	1	2	5			2	1
	3-axle								2				
	4-axle												
	5-axle +								2			2	
16:30	CARS	1	3	9	20	5	32	39	115	12	11	138	29
	2-axle				2		2	1	6		1	7	
	3-axle								3				
	4-axle								1				
	5-axle +								1			1	
16:45	CARS	5	5	14	25	2	44	42	127	14	15	122	31
	2-axle	1		1			1	1	4			4	
	3-axle						1		1				2
	4-axle												
	5-axle +								1			1	
17:00	CARS	2	2	12	24	5	48	34	108	6	8	134	38
	2-axle	1						1	2			3	
	3-axle										1		
	4-axle												
	5-axle +												
17:15	CARS	2	4	8	23	3	49	36	117	8	12	175	43
	2-axle							1	6			7	
	3-axle											2	1
	4-axle												
	5-axle +											1	
17:30	CARS	3	6	9	14	7	53	32	153	7	14	188	30
	2-axle							1	6			3	
	3-axle				1			1				1	
	4-axle											1	
	5-axle +											1	
17:45	CARS	2	4	6	16	2	29	14	81	6	10	140	28
	2-axle												
	3-axle								1				
	4-axle												
	5-axle +												

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	23	31	68	166	33	330	290	952	72	89	1077	248
2-axle	2	0	1	3	1	5	8	32	0	2	28	3
3-axle	0	0	0	1	0	2	2	8	0	1	3	3
4-axle	0	0	0	0	0	0	0	1	0	0	1	0
5-axle +	0	0	0	0	0	0	0	4	0	0	7	1
TOTALS	25	31	69	170	34	337	300	997	72	92	1116	255
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1645 PM

PEAK VOLUMES =	14	17	44	87	17	196	149	525	35	50	643	145
PEAK HR. FACTOR:		0.721			0.974			0.886			0.869	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3062-001Axl

Location: SR-395 & Main St. City: Hesperia Date: 02/16/2006 Day: THURSDAY

	LANES:	1	2	0	1	2	0	1	2	1	1	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	10	198	2	42	395	19	47	194	110	1	88	40
	2-axle	2	9		3	5		4	6	3		6	
	3-axle		1		4	4	1	1	1			1	
	4-axle		1		1								
	5-axle +		10		2	13			1			1	
7:15	CARS	27	187	1	60	349	18	22	185	55	0	108	53
	2-axle	1	12		2	3			2			6	
	3-axle		1		1		1					1	
	4-axle												
	5-axle +		10	2		15			1	1			
7:30	CARS	32	151	2	54	223	30	24	207	53	6	87	45
	2-axle	1	6		3	9			4			4	3
	3-axle		1		4	2		1	1			1	
	4-axle											1	
	5-axle +		9			14	2			1			2
7:45	CARS	15	171	0	58	221	18	22	169	57	4	71	47
	2-axle	2	9	1	1	3		1	4			5	5
	3-axle		1		2	2	4		1				1
	4-axle												
	5-axle +	1	9		3	21	1		2		1	1	4
8:00	CARS	28	104	4	31	255	12	29	167	51	7	73	53
	2-axle	3	7			10	1		8	2		13	4
	3-axle	1	1		3	3	1	1	2			2	3
	4-axle		1										
	5-axle +	3	25		4	24			3				7
8:15	CARS	9	122	3	42	231	16	22	143	32	0	68	40
	2-axle	2	25	1	4	13	3		12	2	2	9	4
	3-axle	1				1		2	1				3
	4-axle		1			1							
	5-axle +		25		9	26	1		3	4		2	4
8:30	CARS	14	120	3	49	161	17	23	113	27	5	98	32
	2-axle	3	24	1	2	9			6			19	4
	3-axle		1		4	1	1		1			1	5
	4-axle		1										
	5-axle +	1	25	1	4	41			1				8
8:45	CARS	21	109	2	41	172	12	14	159	29	3	96	31
	2-axle	2	8		1	8			8	2		5	6
	3-axle				1	2	1						2
	4-axle												
	5-axle +		17	1	6	29				1	1		4

MOVEMENT TOTALS

CARS	156	1162	17	377	2007	142	203	1337	414	26	689	341
2-axle	16	100	3	16	60	4	5	50	9	2	67	26
3-axle	2	6	0	19	15	9	5	7	0	0	6	14
4-axle	0	4	0	1	1	0	0	0	0	0	1	0
5-axle +	5	130	4	28	183	4	0	11	7	2	4	29
TOTALS	179	1402	24	441	2266	159	213	1405	430	30	767	410
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	91	786	8	240	1279	94	122	778	280	12	381	200
PEAK HR. FACTOR:		0.918			0.825			0.804			0.882	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3062-001Axl

Location: SR-395 & Main St. City: Hesperia Date: 02/16/2006 Day: THURSDAY

	LANES:	1	2	0	1	2	0	1	2	1	1	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS	51	278	6	50	209	31	24	137	29	5	176	37
	2-axle	1	3		2	13			3	2		4	1
	3-axle		1		2	1			1			1	1
	4-axle												
	5-axle +		16		1	12				1	1	3	
16:15	CARS	46	303	3	46	231	28	28	128	20	4	169	35
	2-axle		7		2	5			6	2		6	1
	3-axle		1			1							
	4-axle												
	5-axle +		17	2		21				1		1	
16:30	CARS	47	336	4	27	199	18	33	137	31	5	188	52
	2-axle	1	5	1		8	1	1	5		2		1
	3-axle					3			1			2	
	4-axle												
	5-axle +		13	1	1	15			1			1	1
16:45	CARS	3	348	2	45	204	21	34	114	29	3	114	49
	2-axle	2	6		2	7			5	1		4	1
	3-axle		1			4			3				
	4-axle		1			1							
	5-axle +		17	1		18						1	3
17:00	CARS	84	382	10	33	215	15	21	128	20	1	192	71
	2-axle	1	7			9			8	4		5	1
	3-axle								1			1	
	4-axle		1			1							
	5-axle +		20			22			1	1		2	
17:15	CARS	66	315	6	31	168	15	15	119	19	2	184	60
	2-axle	3	2		1	4			7			5	1
	3-axle		2			3						1	1
	4-axle					2							
	5-axle +	1	18	1		30				1		4	
17:30	CARS	63	369	9	17	164	16	14	111	22	1	171	55
	2-axle	1	3	1	1	2			3			7	1
	3-axle	1	1			1			1				
	4-axle				1								
	5-axle +		6		2	12							
17:45	CARS	72	327	3	50	195	24	13	103	19	2	119	51
	2-axle	1	3		1	5			3	3		5	2
	3-axle					4							
	4-axle		1			3							
	5-axle +	1	20		1	30			1				1

MOVEMENT TOTALS

CARS	432	2658	43	299	1585	168	182	977	189	23	1313	410
2-axle	10	36	2	9	53	1	1	40	12	2	36	9
3-axle	1	6	0	2	17	0	0	7	0	0	5	2
4-axle	0	3	0	1	7	0	0	0	0	0	0	0
5-axle +	2	127	5	5	160	0	0	3	4	1	12	5
TOTALS	445	2830	50	316	1822	169	183	1027	205	26	1366	426
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

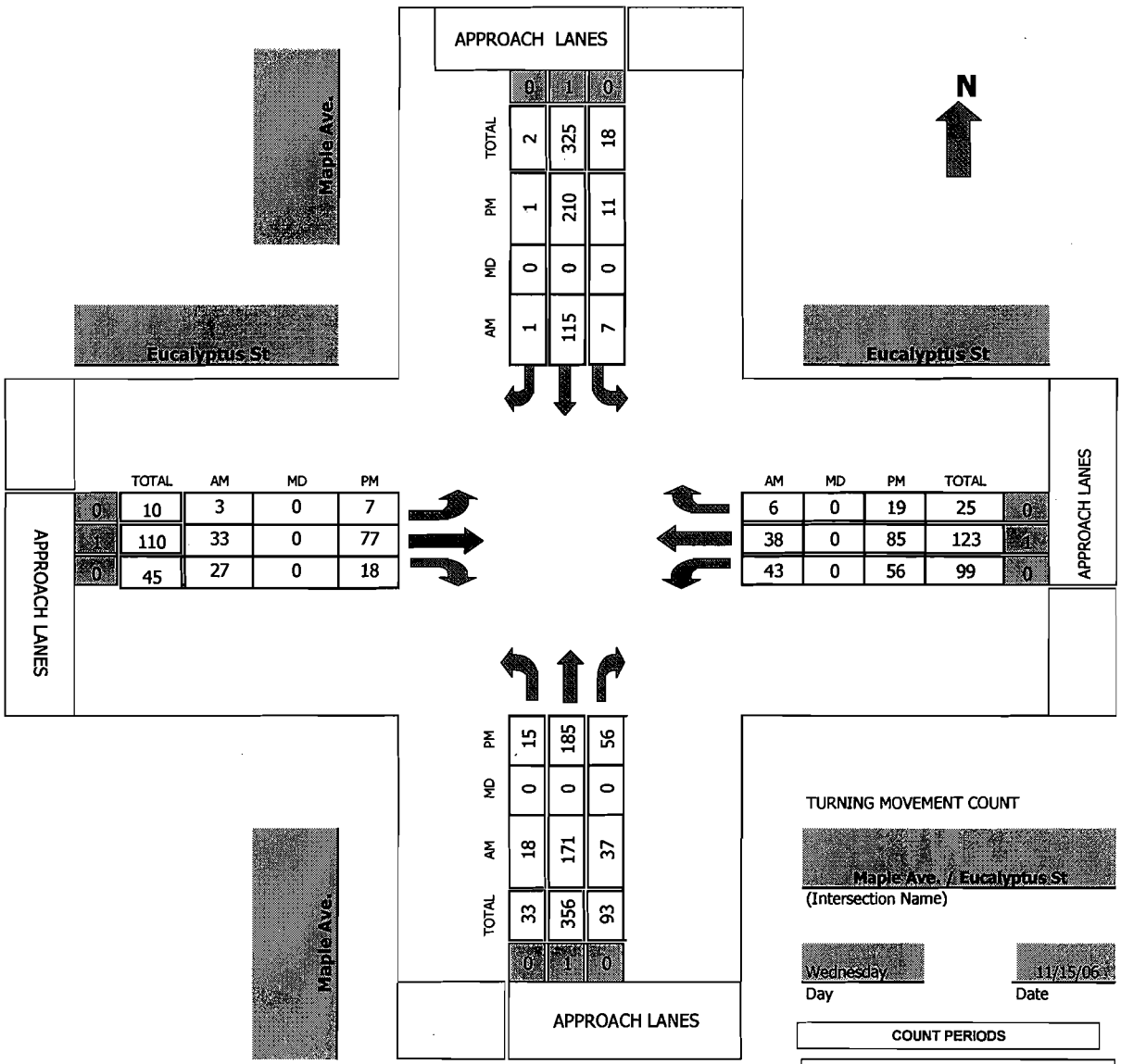
PM Peak Hr Begins at: 1615 PM

PEAK VOLUMES =	184	1465	24	156	964	83	117	538	109	15	686	215
PEAK HR. FACTOR:		0.828			0.900			0.914			0.839	

CONTROL: Signalized

TMC Summary of Maple Ave./Eucalyptus St

Project #: 06-3448-008



TURNING MOVEMENT COUNT

Maple Ave. / Eucalyptus St
(Intersection Name)

Wednesday
Day

11/15/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: WEDNESDAY PROJECT# 06-3448-008

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	3	38	10	1	15	0	0	1	1	4	8	2	83
7:15 AM	2	32	9	1	28	0	0	5	3	3	4	4	91
7:30 AM	4	45	12	3	34	0	1	10	7	8	8	1	133
7:45 AM	6	42	9	1	44	0	1	7	8	13	8	2	141
8:00 AM	5	48	10	2	16	0	0	11	7	12	14	2	127
8:15 AM	3	36	6	1	21	1	1	5	5	10	8	1	98
8:30 AM	5	25	9	0	16	0	1	8	2	9	9	3	87
8:45 AM	1	44	7	1	25	0	0	9	2	2	9	0	100
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	29	310	72	10	199	1	4	56	35	61	68	15	860
PEAK VOLUMES =	18	171	37	7	115	1	3	33	27	43	38	6	499
PEAK HR. FACTOR:		0.897			0.683			0.875			0.777		0.885

AM Peak Hr Begins at: 730 AM

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: WEDNESDAY PROJECT# 06-3448-008

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1	50	15	1	42	3	1	21	6	10	6	3	159
4:15 PM	6	45	16	5	51	1	3	25	8	20	22	3	205
4:30 PM	2	49	14	3	57	0	2	12	1	10	16	5	171
4:45 PM	3	44	13	1	52	0	2	24	2	13	22	6	182
5:00 PM	4	47	13	2	50	0	0	16	7	13	25	5	182
5:15 PM	0	51	17	5	43	0	0	16	5	12	22	3	174
5:30 PM	8	37	7	1	50	0	0	11	6	14	21	2	157
5:45 PM	5	40	4	2	48	3	0	11	5	12	18	0	148
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 29	NT 363	NR 99	SL 20	ST 393	SR 7	EL 8	ET 136	ER 40	WL 104	WT 152	WR 27	TOTAL 1378

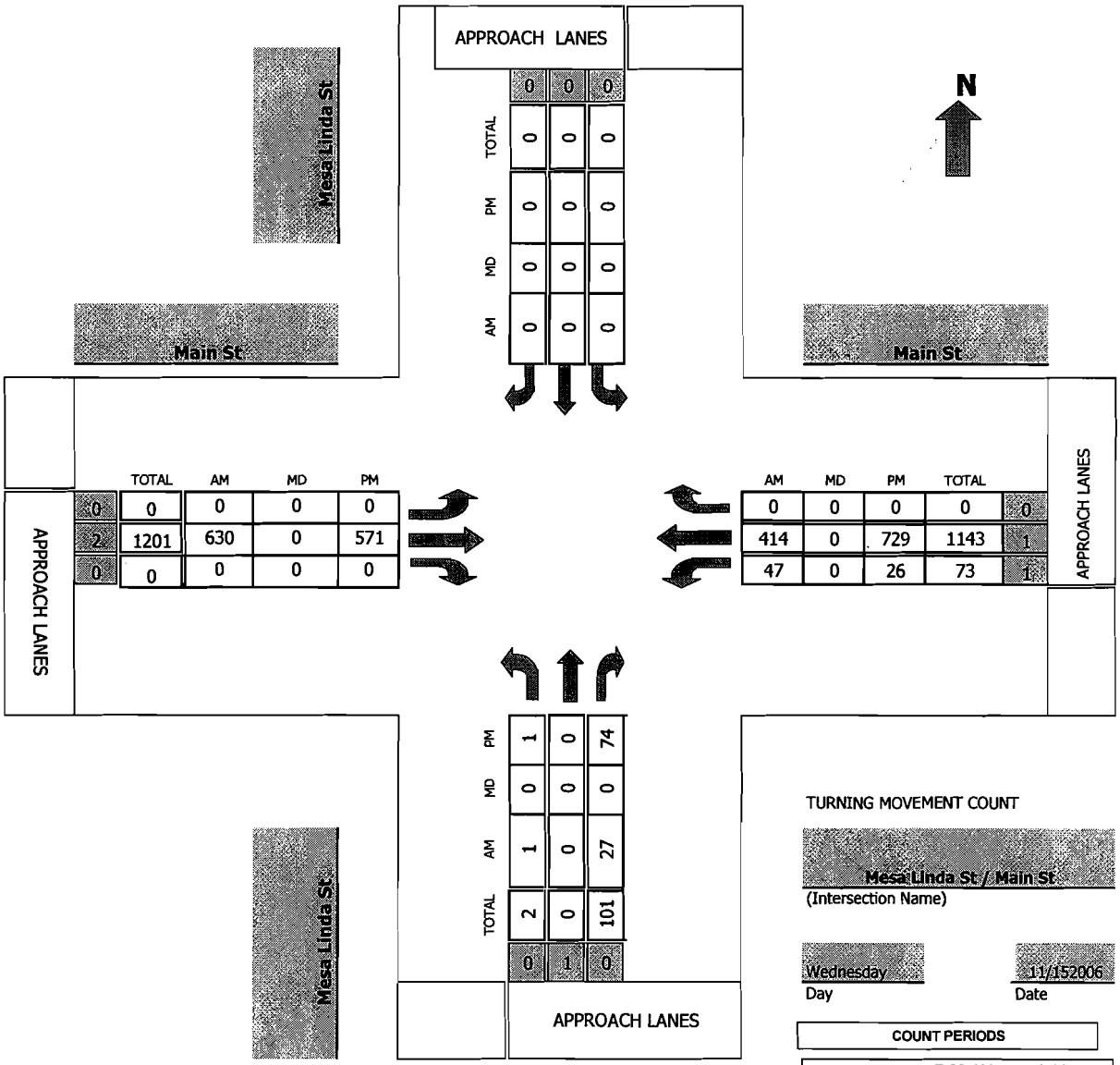
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	15	185	56	11	210	1	7	77	18	56	85	19	740
PEAK HR. FACTOR:		0.955			0.925			0.708			0.889		0.902

CONTROL: 4-Way Stop

TMC Summary of Mesa Linda St/Main St

Project #: 06-3448-009



TURNING MOVEMENT COUNT

Mesa Linda St / Main St
(Intersection Name)

Wednesday
Day

11/152006
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mesa Linda St DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: WEDNESDAY PROJECT# 06-3448-009

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	0	0	0	2	0	1	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0		9					130	0	12	80		231
7:15 AM	0		8					151	0	9	135		303
7:30 AM	0		7					164	0	14	95		280
7:45 AM	0		7					157	0	15	104		283
8:00 AM	1		5					158	0	9	80		253
8:15 AM	5		13					134	1	10	87		250
8:30 AM	9		13					106	1	14	93		236
8:45 AM	9		16					112	0	12	86		235
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	24	0	78	0	0	0	0	1112	2	95	760	0	2071

AM Peak Hr Begins at: 715 AM

PEAK													
VOLUMES =	1	0	27	0	0	0	0	630	0	47	414	0	1119
PEAK HR. FACTOR:		0.875			0.000			0.960			0.800		0.923

CONTROL: 1-Way Stop N

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mesa Linda St DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: WEDNESDAY PROJECT# 06-3448-009

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	0	0	0	2	0	1	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1		16					124	0	8	169		318
4:15 PM	0		22					135	0	6	158		321
4:30 PM	2		19					118	0	7	165		311
4:45 PM	0		12					152	0	8	162		334
5:00 PM	1		28					126	0	5	191		351
5:15 PM	0		16					143	0	6	192		357
5:30 PM	0		18					150	0	7	184		359
5:45 PM	0		22					123	1	7	142		295
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	4	0	153	0	0	0	0	1071	1	54	1363	0	2646

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	1	0	74	0	0	0	0	571	0	26	729	0	1401
PEAK HR. FACTOR:		0.647			0.000			0.939			0.953		0.976

CONTROL: 1-Way Stop N

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-001Axl

Location: Cataba Rd. & Main St. City: Hesperia Date: 02/08/2006 Day: WEDNESDAY

	LANES:	0	0	0	1	0	1	1	3	0	0	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS				9		4	16	107			83	2
	2-axle				1				6			8	
	3-axle								1			1	
	4-axle								1			1	
	5-axle +								5			2	
7:15	CARS				13		6	29	106			90	2
	2-axle				1				3			5	
	3-axle											1	
	4-axle								1			2	
	5-axle +								1				
7:30	CARS				10		15	20	120			91	4
	2-axle						1		4			6	
	3-axle								1			3	
	4-axle												
	5-axle +								1			5	
7:45	CARS				13		5	17	112			79	3
	2-axle								5			8	
	3-axle						1						
	4-axle								1				
	5-axle +							1	2			4	
8:00	CARS				10		11	24	105			72	1
	2-axle				2			1	4			4	
	3-axle								2				
	4-axle												
	5-axle +								4			4	
8:15	CARS				10		10	20	90			74	0
	2-axle						1		9			4	1
	3-axle								1				
	4-axle												
	5-axle +								5			5	
8:30	CARS				13		8	28	83			67	4
	2-axle				3		2	1	3			9	
	3-axle								2			1	
	4-axle												
	5-axle +							1	2			5	
8:45	CARS				7		4	12	94			59	4
	2-axle								7			11	
	3-axle								1			5	
	4-axle												
	5-axle +						1		5			3	

MOVEMENT TOTALS

CARS	0	0	0	85	0	63	166	817	0	0	615	20
2-axle	0	0	0	7	0	4	2	41	0	0	55	1
3-axle	0	0	0	0	0	1	0	8	0	0	11	0
4-axle	0	0	0	0	0	0	0	3	0	0	3	0
5-axle +	0	0	0	0	0	1	2	25	0	0	28	0
TOTALS	0	0	0	92	0	69	170	894	0	0	712	21
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	0	0	47	0	32	83	477	0	0	389	11
PEAK HR. FACTOR:		0.000			0.760			0.959			0.917	

CONTROL: Signalized

15 45 Start Time -15 MINUTES

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-001Axl

Location: Cataba Rd. & Main St. City: Hesperia Date: 02/08/2006 Day: WEDNESDAY

	LANES:	0	0	0	1	0	1	1	3	0	0	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS				16		27	13	73			131	7
	2-axle				2		2		7			5	
	3-axle				1			1					
	4-axle												
	5-axle +								2			2	1
16:15	CARS				8		14	22	85			134	6
	2-axle				1		2		3			3	
	3-axle											2	
	4-axle												
	5-axle +						1		3			1	
16:30	CARS				5		29	18	74			138	10
	2-axle							1	3			3	
	3-axle								1			2	
	4-axle												
	5-axle +						1		2			2	
16:45	CARS				13		26	20	80			132	11
	2-axle							1	1				1
	3-axle											1	
	4-axle												
	5-axle +											3	
17:00	CARS				15		27	17	96			151	5
	2-axle							3	3			4	
	3-axle								1			1	
	4-axle												
	5-axle +											2	
17:15	CARS				10		25	26	72			165	10
	2-axle				1		2	4	2				
	3-axle								1				
	4-axle												
	5-axle +							1	2			2	
17:30	CARS				10		30	32	68			131	12
	2-axle				1		1	1	3				
	3-axle								1				
	4-axle												
	5-axle +											2	
17:45	CARS				12		10	11	83			128	9
	2-axle							1	4			2	1
	3-axle								1			1	
	4-axle											1	
	5-axle +				1				2			1	1

MOVEMENT TOTALS

CARS	0	0	0	89	0	188	159	631	0	0	1110	70
2-axle	0	0	0	5	0	7	11	26	0	0	17	2
3-axle	0	0	0	1	0	0	1	5	0	0	7	0
4-axle	0	0	0	0	0	0	0	0	0	0	1	0
5-axle +	0	0	0	1	0	2	1	11	0	0	15	2
TOTALS	0	0	0	96	0	197	172	673	0	0	1150	74
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1645 PM

PEAK VOLUMES =	0	0	0	50	0	111	105	330	0	0	594	39
PEAK HR. FACTOR:		0.000			0.958			0.906			0.894	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-006Axl

Location: I-15 SB On/Off Ramp & Main St. City: Hesperia Date: 02/09/2006 Day: THURSDAY

	LANES:	0	0	0	2	0	1	0	3	0	0	3	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS				29		9		101	17		114	115
	2-axle				4		1		5	2		6	1
	3-axle											1	
	4-axle											1	
	5-axle +				2		1		2			5	3
7:15	CARS				42		13		114	21		116	192
	2-axle				5		1		6			4	
	3-axle				1		1					1	
	4-axle								3			2	
	5-axle +				2				2			4	4
7:30	CARS				61		14		117	13		122	137
	2-axle				5		1		2	2		6	2
	3-axle											1	
	4-axle												
	5-axle +				5				1			6	2
7:45	CARS				59		11		122	12		100	104
	2-axle				4		1		5			5	2
	3-axle								1	1		1	
	4-axle								1				
	5-axle +				2				1	3		7	3
8:00	CARS				48		12		110	11		93	117
	2-axle				2				7			6	2
	3-axle								3			1	1
	4-axle								1			1	
	5-axle +				3		2		4				
8:15	CARS				35		10		107	10		95	127
	2-axle				4		1		5	4		6	1
	3-axle						1		1			2	1
	4-axle												
	5-axle +				5				2	3		3	2
8:30	CARS				51		11		112	8		85	128
	2-axle				10		1		12	2		8	1
	3-axle								3	1			1
	4-axle												
	5-axle +				6		1		4			9	
8:45	CARS				52		11		105	9		67	102
	2-axle				6		2		5	1		9	2
	3-axle				2					1		5	
	4-axle												
	5-axle +				1				7	1		2	3

MOVEMENT TOTALS

CARS	0	0	0	377	0	91	0	888	101	0	792	1022
2-axle	0	0	0	40	0	8	0	47	11	0	50	11
3-axle	0	0	0	3	0	2	0	8	3	0	12	3
4-axle	0	0	0	0	0	0	0	5	0	0	4	0
5-axle +	0	0	0	26	0	4	0	23	7	0	36	17
TOTALS	0	0	0	446	0	105	0	971	122	0	894	1053
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	0	0	0	239	0	56	0	500	63	0	476	566
PEAK HR. FACTOR:		0.000			0.858			0.964			0.807	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-006Axl

Location: I-15 SB On/Off Ramp & Main St. City: Hesperia Date: 02/09/2006 Day: THURSDAY

		LANES:	0	0	2	0	1	0	3	0	0	3	1
			NL	NT	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS				65		12		98	18		151	99
	2-axle				4		1		6			5	1
	3-axle								2			2	
	4-axle												
	5-axle +						1		2			1	2
16:15	CARS				73		22		104	15		159	96
	2-axle				5				1			2	1
	3-axle				2								
	4-axle												
	5-axle +				3							3	4
16:30	CARS				77		29		105	18		181	111
	2-axle				4				2			2	1
	3-axle				1		1		1			2	1
	4-axle												
	5-axle +				4				1			1	2
16:45	CARS				86		20		110	17		203	119
	2-axle				6				1			1	
	3-axle									2		2	1
	4-axle												
	5-axle +				5				2			2	1
17:00	CARS				66		27		102	16		205	109
	2-axle				3				4	1		1	2
	3-axle				1		1			1			
	4-axle				1								
	5-axle +				3		3		2			1	
17:15	CARS				77		38		105	24		206	107
	2-axle				4				4			3	2
	3-axle				2				1				
	4-axle												
	5-axle +				4				3			2	2
17:30	CARS				83		47		95	21		187	114
	2-axle				3				6			2	1
	3-axle				3				1				
	4-axle				1								
	5-axle +				2				2	1		3	
17:45	CARS				58		24		88	17		179	103
	2-axle				5				5				3
	3-axle												
	4-axle				1							1	
	5-axle +				2				3			3	3

MOVEMENT TOTALS

CARS	0	0	0	585	0	219	0	807	146	0	1471	858
2-axle	0	0	0	34	0	1	0	29	1	0	16	11
3-axle	0	0	0	9	0	2	0	5	3	0	6	2
4-axle	0	0	0	3	0	0	0	0	0	0	1	0
5-axle +	0	0	0	23	0	4	0	15	1	0	16	14
TOTALS	0	0	0	654	0	226	0	856	151	0	1510	885
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1645 PM

PEAK VOLUMES =	0	0	0	350	0	136	0	438	83	0	818	458
PEAK HR. FACTOR:		0.000			0.874			0.951			0.970	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-014Axl

Location: Escondido Ave. & Main St. City: Hesperia Date: 02/09/2006 Day: THURSDAY

	LANES:	2	0	1	0	0	0	0	3	1	1	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	54		53					143	54	54	245	
	2-axle	1		4					15	8	2	6	
	3-axle	2		2					2			1	
	4-axle	1							1				
	5-axle +	1							5	1		1	
7:15	CARS	59		64					168	56	44	226	
	2-axle			3					12	4		4	
	3-axle	1		5							1		
	4-axle								1				
	5-axle +	3		1					2	3	1	4	
7:30	CARS	62		73					164	38	39	230	
	2-axle	2		5					4	4	2	2	
	3-axle			1					2	1	2		
	4-axle								4				
	5-axle +								5	3		3	
7:45	CARS	47		48					169	42	42	228	
	2-axle	2		6					8	4	1	3	
	3-axle								1		1	1	
	4-axle								2				
	5-axle +	2							3	1		5	
8:00	CARS	55		26					146	35	38	203	
	2-axle	1		2					8	3	3	3	
	3-axle	2		1					1		3	5	
	4-axle												
	5-axle +	1							6		2	8	
8:15	CARS	52		28					153	31	35	164	
	2-axle	1		5					5	1	4	2	
	3-axle	1		1					2		1	1	
	4-axle												
	5-axle +			1					6	2	3		
8:30	CARS	56		28					161	42	32	176	
	2-axle			4					5	5	1	6	
	3-axle								1	1	2	3	
	4-axle										1		
	5-axle +	3		2					6	1	1	4	
8:45	CARS	42		20					154	34	23	167	
	2-axle	2							4	5	1	8	
	3-axle	3		1					1		1	1	
	4-axle											1	
	5-axle +	2		1					5	2	2	7	

MOVEMENT TOTALS

CARS	427	0	340	0	0	0	0	1258	332	307	1639	0
2-axle	9	0	29	0	0	0	0	61	34	14	34	0
3-axle	9	0	11	0	0	0	0	10	2	11	12	0
4-axle	1	0	0	0	0	0	0	8	0	1	1	0
5-axle +	12	0	5	0	0	0	0	38	13	9	32	0
TOTALS	458	0	385	0	0	0	0	1375	381	342	1718	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	237	0	265	0	0	0	0	711	219	189	959	0
PEAK HR. FACTOR:		0.878			0.000			0.945			0.929	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-014Axl

Location: Escondido Ave. & Main St. City: Hesperia Date: 02/09/2006 Day: THURSDAY

		LANES:	2	0	1	0	0	0	0	3	1	1	2	0
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		56		67					277	28	46	248	
	2-axle		7		1					7			2	
	3-axle				1					2			2	
	4-axle													
	5-axle +		1							5	2		3	
16:15	CARS		39		63					283	56	55	275	
	2-axle		1		1					6		2	5	
	3-axle									5				
	4-axle													
	5-axle +									8			4	
16:30	CARS		63		62					294	87	45	249	
	2-axle		3		2					8	1	1	3	
	3-axle									1			3	
	4-axle		2											
	5-axle +									4			1	
16:45	CARS		46		60					299	59	48	286	
	2-axle		1							6		3	9	
	3-axle									2			1	
	4-axle												1	
	5-axle +									3			5	
17:00	CARS		42		55					293	82	57	255	
	2-axle		1		1					3	1		7	
	3-axle									1				
	4-axle									1				
	5-axle +									6			3	
17:15	CARS		44		61					295	60	52	274	
	2-axle		3		1					7		1	3	
	3-axle				1									
	4-axle		1											
	5-axle +									5			2	
17:30	CARS		51		63					288	74	52	296	
	2-axle		1		1					6			5	
	3-axle									2			1	
	4-axle													
	5-axle +									2			1	
17:45	CARS		47		65					292	82	57	290	
	2-axle		1		1					6		1	2	
	3-axle									2			2	
	4-axle													
	5-axle +									7			5	

MOVEMENT TOTALS

CARS	388	0	496	0	0	0	0	2321	528	412	2173	0
2-axle	18	0	8	0	0	0	0	49	2	8	36	0
3-axle	0	0	2	0	0	0	0	15	0	0	9	0
4-axle	3	0	0	0	0	0	0	1	0	0	1	0
5-axle +	1	0	0	0	0	0	0	40	2	0	24	0
TOTALS	410	0	506	0	0	0	0	2426	532	420	2243	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1700 PM

PEAK VOLUMES =	191	0	249	0	0	0	0	1216	299	220	1146	0
PEAK HR. FACTOR:		0.948			0.000			0.974			0.957	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-010

Location: Maple Ave. & Main St. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:	1	2	0	2	1	1	1	2	0	1	2	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	59	67	17	21	20	15	15	149	14	23	289	42
	2-axle	2	1	2	2	1	1		3	1	1	12	1
	3-axle			1					1			1	
	4-axle												
	5-axle +				1				2			2	
7:15	CARS	34	31	36	19	18	12	6	179	18	13	239	6
	2-axle	1	1	3	1	3		1	10		1	7	
	3-axle								1		1		
	4-axle									1			
	5-axle +				1			2	1		7		
7:30	CARS	40	29	23	20	15	11	10	200	9	8	212	15
	2-axle	1	1	1			1	1	13	1	1	9	1
	3-axle								2		1		
	4-axle			1									
	5-axle +						1		1			6	
7:45	CARS	17	25	23	16	25	17	15	251	14	9	213	14
	2-axle	2	1	3			1		10	1	3	5	
	3-axle								3		1		
	4-axle								2				
	5-axle +		1		1				4			4	
8:00	CARS	34	36	20	18	29	21	12	177	15	24	249	23
	2-axle	2		1	3				5			12	
	3-axle			1					3			6	
	4-axle												
	5-axle +											12	
8:15	CARS	26	29	13	31	17	14	13	168	7	13	230	2
	2-axle	2		2	5			1	7		1	8	
	3-axle						1		2			5	
	4-axle												
	5-axle +			1						3		7	
8:30	CARS	27	29	15	22	18	9	7	156	6	14	208	13
	2-axle	2	1	1	2	1		2	9	2	1	10	1
	3-axle	1		1		1			4		1	2	
	4-axle												
	5-axle +	1				1		1	4			6	
8:45	CARS	30	26	16	16	29	13	9	152	6	17	164	8
	2-axle	1			2				13			11	1
	3-axle								1	1		2	
	4-axle												
	5-axle +	2					1		3			4	

MOVEMENT TOTALS

CARS	267	272	163	163	171	112	87	1432	89	121	1804	123
2-axle	13	5	13	15	5	3	5	70	5	8	74	4
3-axle	1	0	3	0	1	1	0	17	1	4	16	0
4-axle	0	0	1	0	0	0	0	2	1	0	0	0
5-axle +	3	1	1	3	1	2	3	15	3	7	41	0
TOTALS	284	278	181	181	178	118	95	1536	99	140	1935	127
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	156	157	110	82	82	59	50	832	59	69	999	79
PEAK HR. FACTOR:		0.710			0.914			0.784			0.773	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-010

Location: Maple Ave. & Main St. City: Hesperia Date: 03/07/06 Day: TUESDAY

		LANES:	1	2	0	2	1	1	1	2	0	1	2	0
			NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS		30	27	23	35	36	21	38	290	22	24	254	23
	2-axle			1			1		2	4				3
	3-axle									3				
	4-axle													
	5-axle +									2		1	2	
16:15	CARS		31	25	20	22	51	22	32	296	17	31	236	13
	2-axle									7			6	
	3-axle									3			1	
	4-axle													
	5-axle +									2	2		2	
16:30	CARS		32	23	20	21	30	9	14	255	34	22	234	27
	2-axle			1		2	1			6			7	3
	3-axle									2			1	
	4-axle													
	5-axle +									4	1		3	
16:45	CARS		25	27	27	35	38	22	31	290	34	25	324	22
	2-axle					1	1			7			2	
	3-axle									2				
	4-axle												3	
	5-axle +							1		5	1			
17:00	CARS		20	25	24	35	64	29	17	313	27	22	306	28
	2-axle					1			2	4		1	6	
	3-axle												2	
	4-axle													
	5-axle +									2				
17:15	CARS		33	23	29	38	46	27	15	298	41	22	291	11
	2-axle					2						1	7	
	3-axle					1				1			1	
	4-axle													
	5-axle +									5				
17:30	CARS		26	16	15	32	37	16	18	340	40	20	298	11
	2-axle		1		1					1		2	5	
	3-axle									2			1	
	4-axle													
	5-axle +									6			1	
17:45	CARS		59	43	35	53	81	32	22	262	30	22	243	17
	2-axle									7			4	
	3-axle									3			1	
	4-axle												1	
	5-axle +									2				

MOVEMENT TOTALS

CARS	256	209	193	271	383	178	187	2344	245	188	2186	152
2-axle	1	2	1	6	3	0	4	36	0	4	37	6
3-axle	0	0	0	1	0	0	0	16	0	0	7	0
4-axle	0	0	0	0	0	0	0	0	0	0	4	0
5-axle +	0	0	0	0	0	1	0	28	4	1	8	0
TOTALS	257	211	194	278	386	179	191	2424	249	193	2242	158
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

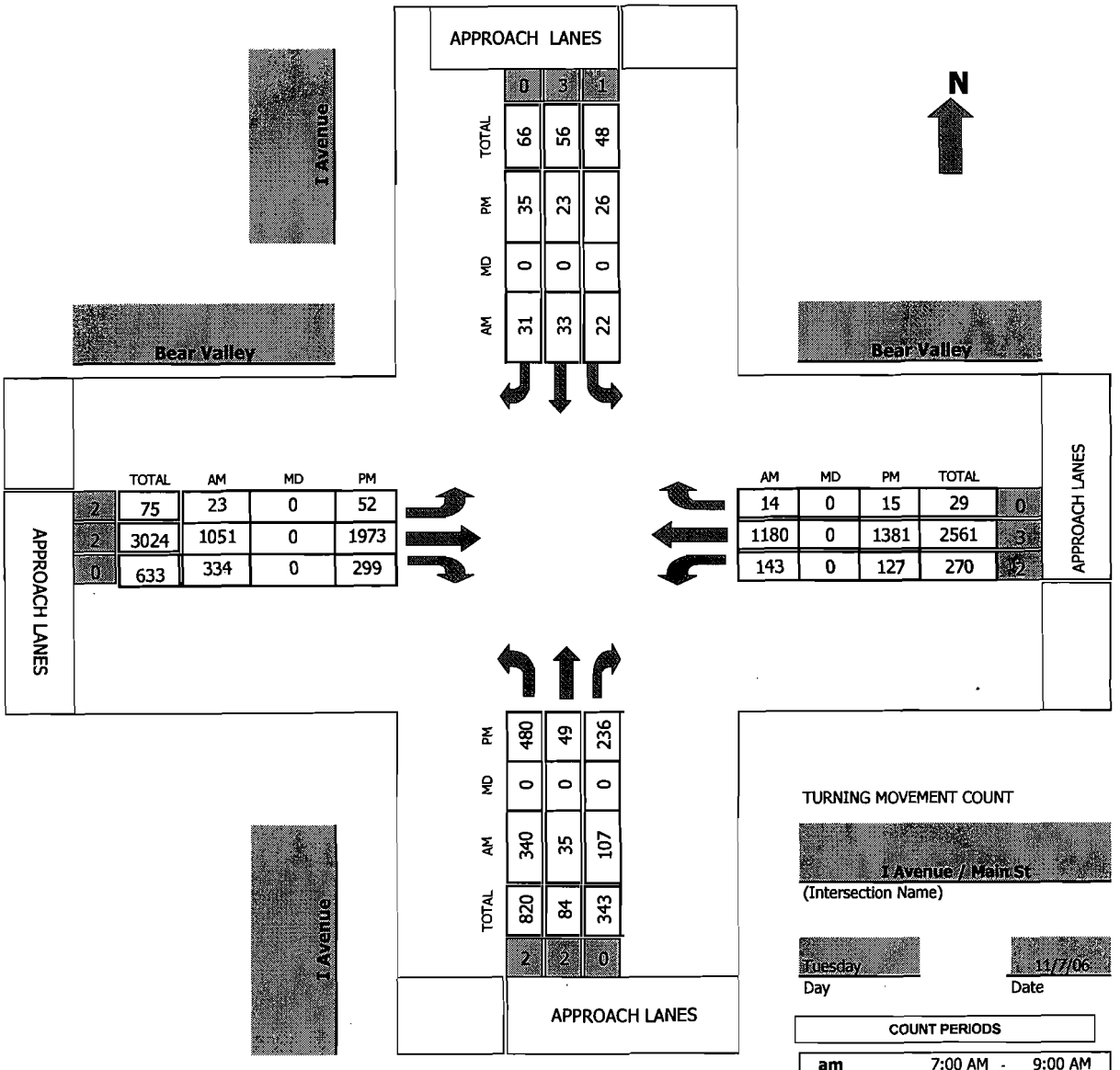
PM Peak Hr Begins at: 1645 PM

PEAK VOLUMES =	105	91	96	145	186	95	83	1276	143	93	1247	72
PEAK HR. FACTOR:		0.859			0.826			0.923			0.939	

CONTROL: Signalized

TMC Summary of I Avenue/Bear Valley

Project #: 06-3448-010



TURNING MOVEMENT COUNT

I Avenue / Main St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Avenue DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Bear Valley DAY: TUESDAY PROJECT# 06-3448-010

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1.5	0.5	1	0.5	0.5	1	1	3	1	2	3	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	70	3	15	5	2	10	2	189	77	28	255	1	657
7:15 AM	88	5	21	3	5	13	4	201	75	40	260	2	717
7:30 AM	89	7	25	5	6	15	5	221	60	50	301	4	788
7:45 AM	90	6	30	7	7	11	6	266	69	35	331	5	863
8:00 AM	88	8	22	6	8	7	8	250	90	33	305	3	828
8:15 AM	87	11	25	5	10	8	6	245	88	30	284	2	801
8:30 AM	75	10	30	4	8	5	3	290	87	45	260	4	821
8:45 AM	86	2	31	2	5	10	5	288	61	40	299	2	831
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 673	NT 52	NR 199	SL 37	ST 51	SR 79	EL 39	ET 1950	ER 607	WL 301	WT 2295	WR 23	TOTAL 6306

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	340	35	107	22	33	31	23	1051	334	143	1180	14	3313
PEAK HR. FACTOR:		0.956			0.860			0.926			0.901		0.960

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Avenue DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Bear Valley DAY: TUESDAY PROJECT# 06-3448-010

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1.5	0.5	1	0.5	0.5	1	1	3	1	2	3	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	102	16	78	5	10	8	11	405	66	31	356	4	1092
4:15 PM	112	15	60	6	8	6	15	441	68	25	360	3	1119
4:30 PM	120	8	65	8	6	8	16	430	75	22	355	3	1116
4:45 PM	125	10	55	5	5	11	10	488	78	40	354	4	1185
5:00 PM	130	16	56	7	7	10	11	504	80	35	340	5	1201
5:15 PM	105	15	60	6	5	6	15	551	66	30	332	3	1194
5:30 PM	88	11	68	5	4	5	7	456	65	25	305	1	1040
5:45 PM	90	9	51	2	6	3	9	504	58	20	342	2	1096
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 872	NT 100	NR 493	SL 44	ST 51	SR 57	EL 94	ET 3779	ER 556	WL 228	WT 2744	WR 25	TOTAL 9043

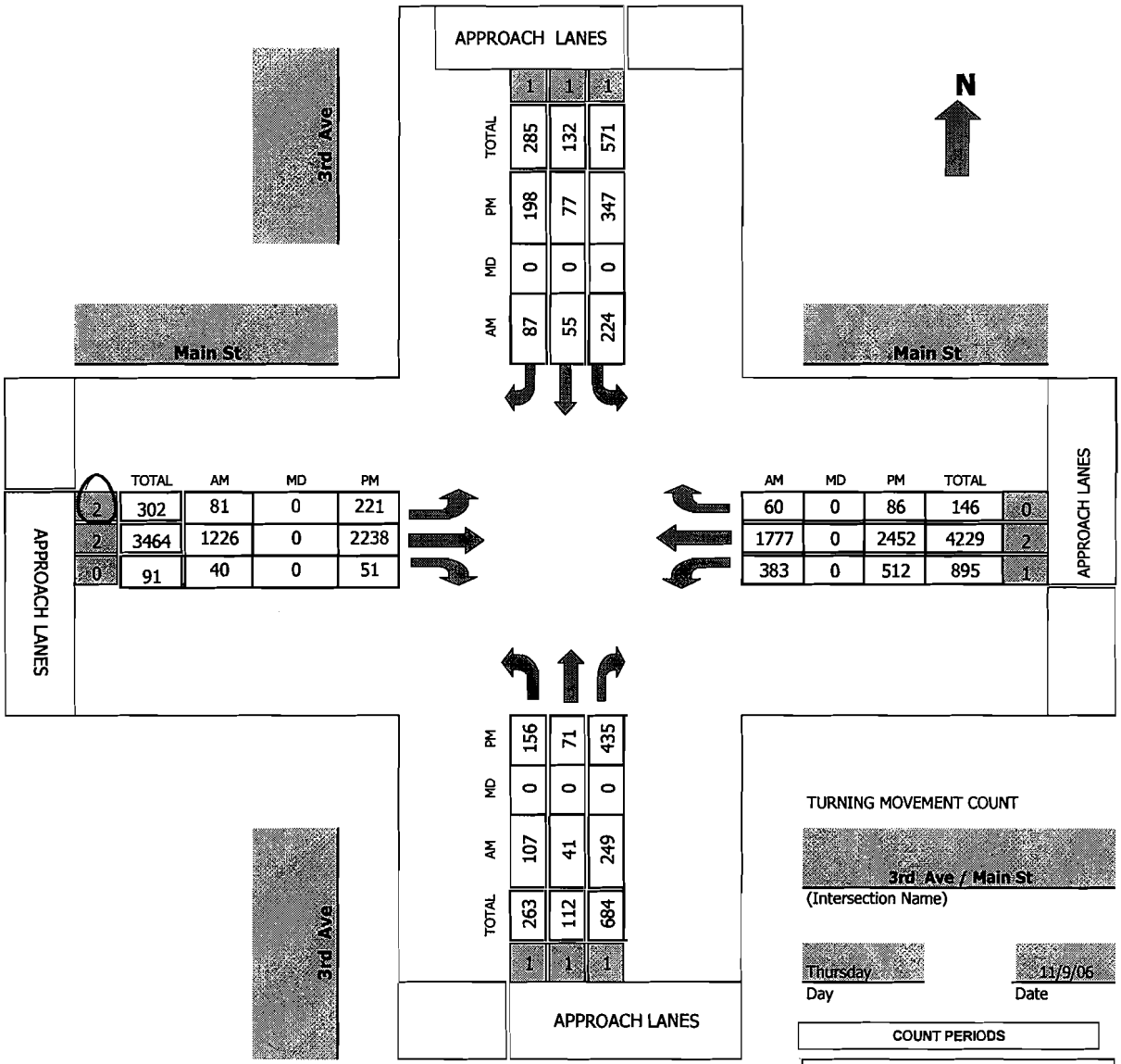
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	480	49	236	26	23	35	52	1973	299	127	1381	15	4696
PEAK HR. FACTOR:		0.947			0.875			0.919			0.957		0.978

CONTROL: Signalized

TMC Summary of 3rd Ave/Main St

Project #: 06-3448-011



TURNING MOVEMENT COUNT

3rd Ave / Main St
(Intersection Name)

Thursday
Day

11/9/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	700 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 3rd Ave DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: THURSDAY PROJECT# 06-3448-011

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	25	8	53	48	13	14	17	269	8	102	480	17	1054
7:15 AM	31	11	58	56	9	22	21	287	11	92	386	11	995
7:30 AM	29	9	61	48	16	24	18	301	9	83	407	14	1019
7:45 AM	22	13	77	72	17	27	25	369	12	106	504	18	1262
8:00 AM	28	13	69	50	13	21	24	264	14	75	377	12	960
8:15 AM	19	13	49	38	11	21	32	285	19	38	256	9	790
8:30 AM	15	17	52	50	9	17	26	256	17	56	310	12	837
8:45 AM	13	12	48	36	8	25	38	279	18	40	309	8	834
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 182	NT 96	NR 467	SL 398	ST 96	SR 171	EL 201	ET 2310	ER 108	WL 592	WT 3029	WR 101	TOTAL 7751

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	107	41	249	224	55	87	81	1226	40	383	1777	60	4330
PEAK HR. FACTOR:		0.886			0.789			0.829			0.884		0.858

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 3rd Ave DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: THURSDAY PROJECT# 06-3448-011

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	41	25	127	91	19	54	57	553	16	140	683	19	1825
4:15 PM	44	19	122	97	23	47	61	591	17	129	626	21	1797
4:30 PM	38	11	94	75	19	51	54	569	11	131	602	17	1672
4:45 PM	33	16	92	84	16	46	49	525	7	112	541	29	1550
5:00 PM	27	15	62	70	12	41	33	436	9	91	456	19	1271
5:15 PM	16	11	58	75	12	31	49	393	3	69	399	8	1124
5:30 PM	15	8	53	45	13	31	44	391	13	58	398	12	1081
5:45 PM	12	14	57	36	9	34	34	344	5	50	324	8	927
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 226	NT 119	NR 665	SL 573	ST 123	SR 335	EL 381	ET 3802	ER 81	WL 780	WT 4029	WR 133	TOTAL 11247

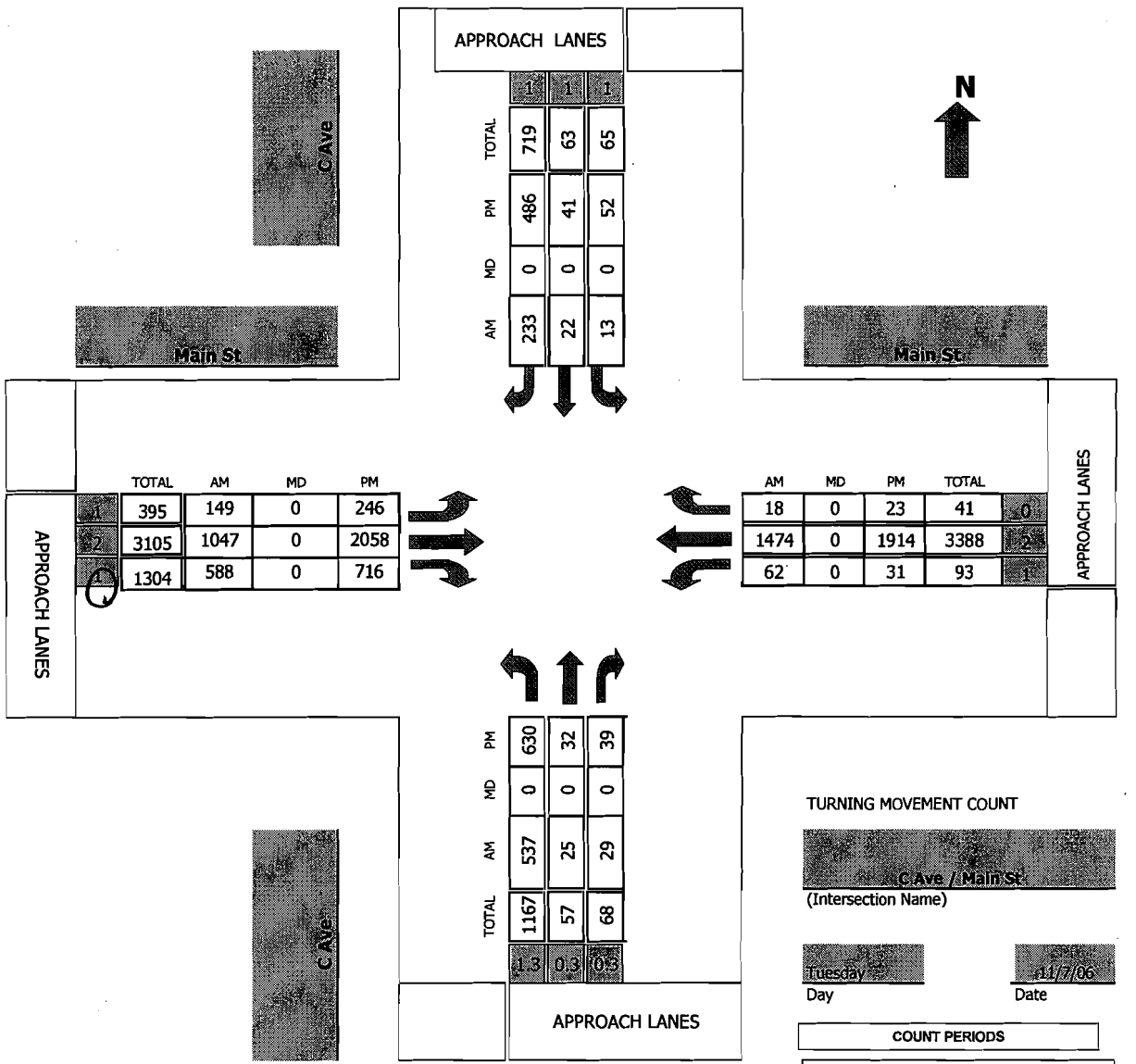
PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	156	71	435	347	77	198	221	2238	51	512	2452	86	6844
PEAK HR. FACTOR:		0.858			0.931			0.938			0.906		0.938

CONTROL: Signalized

TMC Summary of C Ave/Main St

Project #: 06-3448-012



TURNING MOVEMENT COUNT

C Ave / Main St
(Intersection Name)

Tuesday — Day

11/7/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	700 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: C Ave DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: TUESDAY PROJECT# 06-3448-012

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1.3	0.3	0.3	1	1	1	1	2	1	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	140	6	6	3	3	50	40	218	103	12	422	4	1007
7:15 AM	108	6	8	3	8	49	25	235	135	19	338	4	938
7:30 AM	123	8	3	3	7	71	33	225	145	12	311	6	947
7:45 AM	166	5	12	4	4	63	51	369	205	19	403	4	1305
8:00 AM	140	7	7	4	2	50	37	229	117	12	274	5	884
8:15 AM	120	1	7	2	5	42	41	212	119	9	208	7	773
8:30 AM	103	5	5	5	5	53	51	194	113	13	222	4	773
8:45 AM	96	3	3	2	1	47	49	205	109	6	213	2	736
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 996	NT 41	NR 51	SL 26	ST 35	SR 425	EL 327	ET 1887	ER 1046	WL 102	WT 2391	WR 36	TOTAL 7363

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	537	25	29	13	22	233	149	1047	588	62	1474	18	4197
PEAK HR. FACTOR:		0.807			0.827			0.714			0.887		0.804

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: C Ave DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: TUESDAY PROJECT# 06-3448-012

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1.3	0.3	0.3	1	1	1	1	2	1	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	165	4	8	12	6	132	54	552	165	8	540	7	1653
4:15 PM	157	9	11	12	13	131	78	529	203	11	482	3	1639
4:30 PM	166	7	11	16	10	112	49	518	171	5	466	6	1537
4:45 PM	142	12	9	12	12	111	65	459	177	7	426	7	1439
5:00 PM	131	9	6	16	14	92	43	398	127	5	338	5	1184
5:15 PM	118	4	7	9	11	72	41	379	106	7	281	9	1044
5:30 PM	125	4	3	8	6	73	46	324	119	3	263	4	978
5:45 PM	115	5	5	6	8	69	37	306	94	4	304	4	957
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	1119	54	60	91	80	792	413	3465	1162	50	3100	45	10431

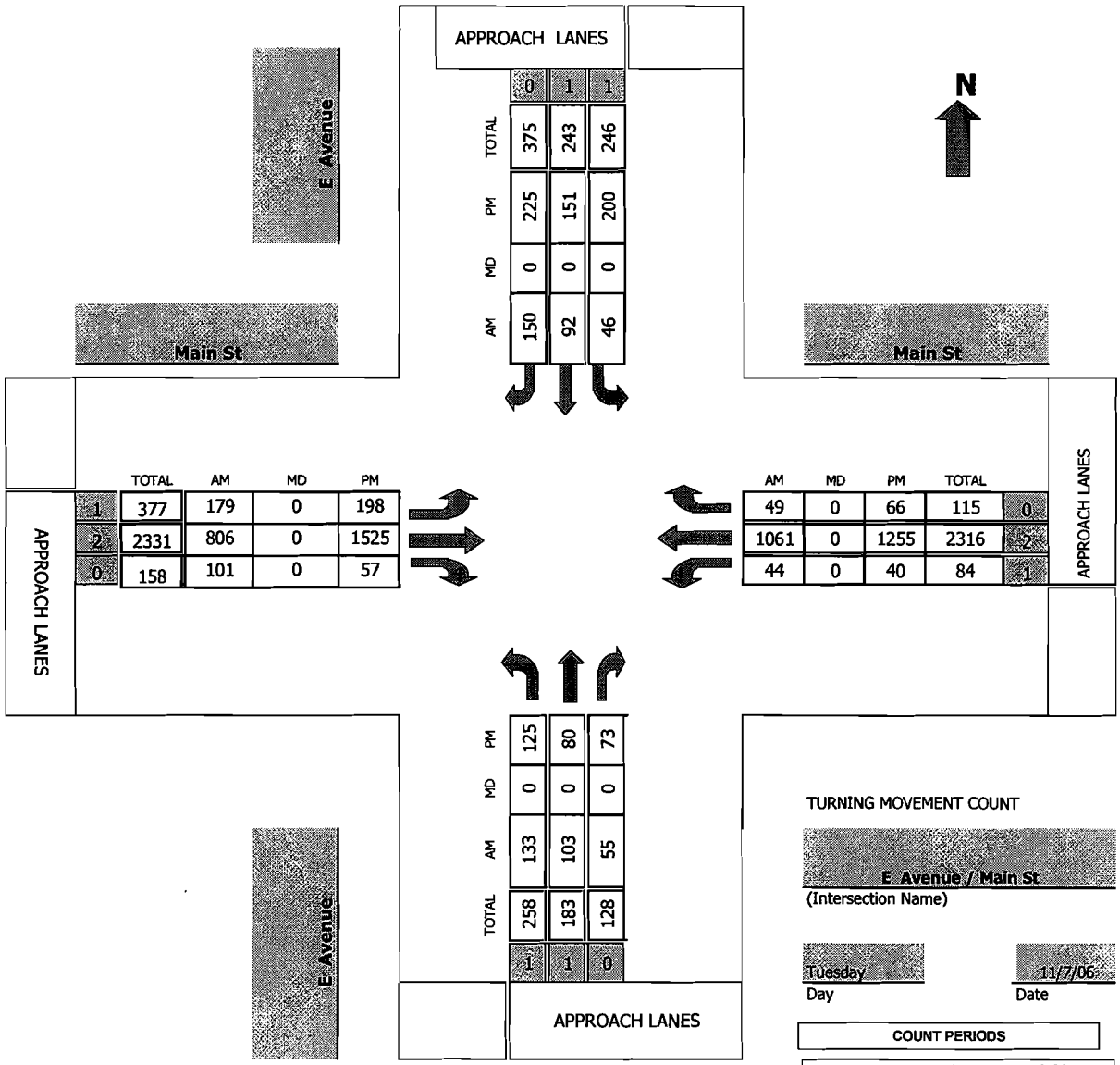
PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	630	32	39	52	41	486	246	2058	716	31	1914	23	6268
PEAK HR. FACTOR:		0.952			0.928			0.932			0.886		0.948

CONTROL: Signalized

TMC Summary of E Avenue/Main St

Project #: 06-3448-013



TURNING MOVEMENT COUNT

E Avenue / Main St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: TUESDAY PROJECT# 06-3448-013

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	18	8	4	8	11	28	26	125	17	3	214	11	473
7:15 AM	21	15	5	10	14	25	31	134	21	1	215	8	500
7:30 AM	17	21	8	11	30	40	30	203	30	11	270	7	678
7:45 AM	52	39	16	10	43	40	53	169	27	11	310	20	790
8:00 AM	38	22	21	12	10	37	58	195	24	16	264	14	711
8:15 AM	26	21	10	13	9	33	38	239	20	6	217	8	640
8:30 AM	35	8	15	18	17	39	40	218	23	3	243	9	668
8:45 AM	31	21	12	17	10	29	52	190	20	16	251	7	656
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 238	NT 155	NR 91	SL 99	ST 144	SR 271	EL 328	ET 1473	ER 182	WL 67	WT 1984	WR 84	TOTAL 5116

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	133	103	55	46	92	150	179	806	101	44	1061	49	2819
PEAK HR. FACTOR:		0.680			0.774			0.914			0.846		0.892

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: TUESDAY PROJECT# 06-3448-013

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	32	26	22	55	51	53	36	352	20	11	292	16	966
4:15 PM	31	10	10	58	34	76	41	395	20	14	306	13	1008
4:30 PM	36	21	22	62	39	67	43	386	18	9	300	20	1023
4:45 PM	27	20	14	44	44	57	32	399	12	14	302	16	981
5:00 PM	32	19	22	49	41	56	88	321	10	9	292	12	951
5:15 PM	30	20	15	45	27	45	35	419	17	8	361	18	1040
5:30 PM	25	8	13	32	22	46	29	435	18	11	330	17	986
5:45 PM	26	11	10	26	18	31	21	396	15	7	296	12	869
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 239	NT 135	NR 128	SL 371	ST 276	SR 431	EL 325	ET 3103	ER 130	WL 83	WT 2479	WR 124	TOTAL 7824

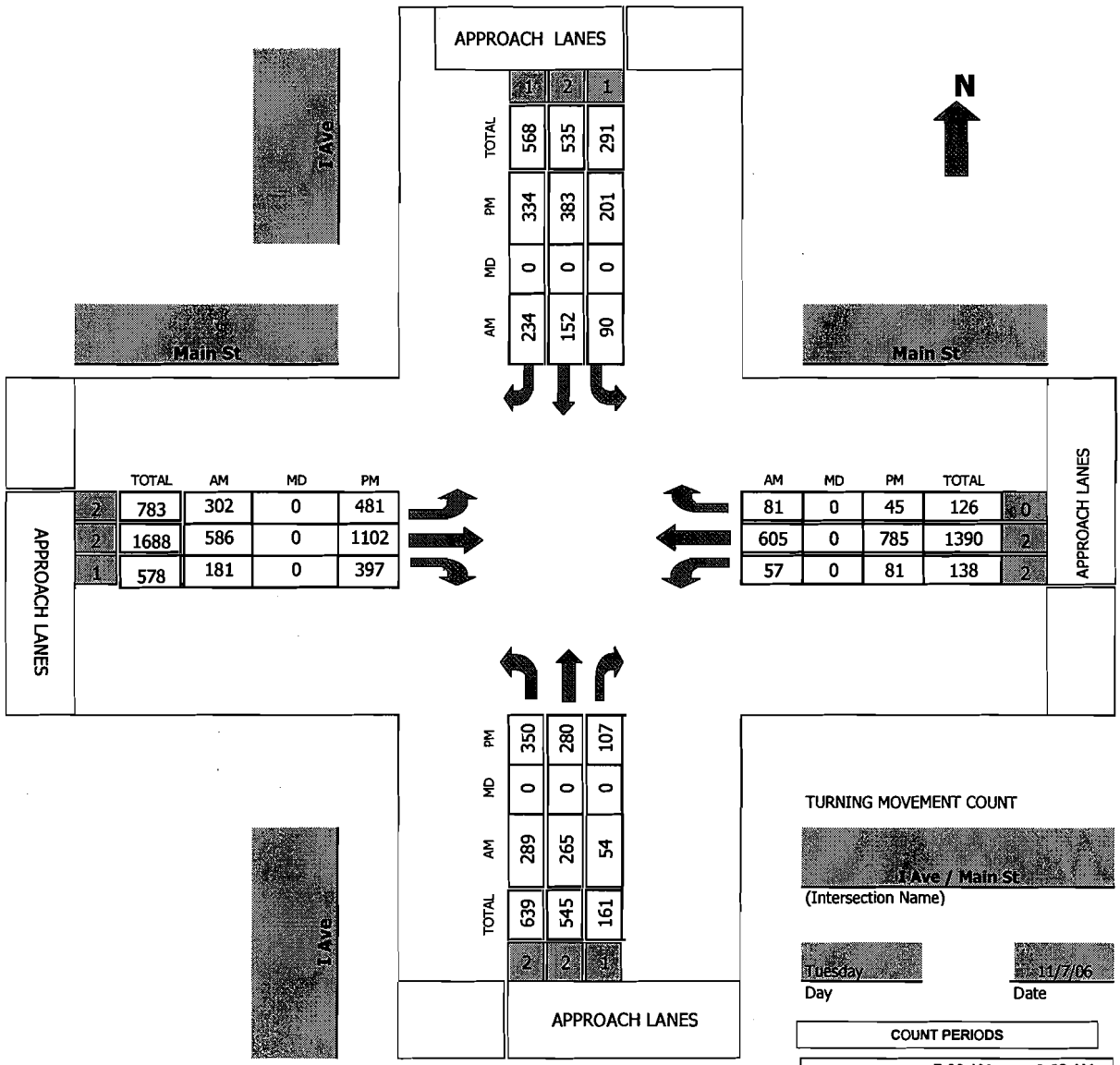
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	125	80	73	200	151	225	198	1525	57	40	1255	66	3995
PEAK HR. FACTOR:		0.880			0.857			0.945			0.879		0.960

CONTROL: Signalized

TMC Summary of I Ave/Main St

Project #: 06-3448-014



TURNING MOVEMENT COUNT

I Ave / Main St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Main St DAY: TUESDAY PROJECT# 06-3448-014

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	2	1	1	2	1	2	2	0	2	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	70	61	12	15	31	44	71	119	34	12	135	12	616
7:15 AM	50	45	13	10	33	33	45	108	31	14	157	16	555
7:30 AM	57	64	7	15	34	50	50	123	40	18	155	16	629
7:45 AM	67	82	15	15	38	51	85	142	40	19	194	23	771
8:00 AM	81	80	18	16	33	54	84	157	46	12	122	18	721
8:15 AM	75	43	11	34	34	63	74	159	45	13	140	20	711
8:30 AM	66	60	10	25	47	66	59	128	50	13	149	20	693
8:45 AM	45	52	10	19	30	78	98	151	39	17	158	25	722
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 511	NT 487	NR 96	SL 149	ST 280	SR 439	EL 566	ET 1087	ER 325	WL 118	WT 1210	WR 150	TOTAL 5418

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	289	265	54	90	152	234	302	586	181	57	605	81	2896
PEAK HR. FACTOR:		0.849			0.862			0.931			0.787		0.939

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave | DATE: 11/7/2006 | LOCATION: City of Hesperia

E-W STREET: Main St | DAY: TUESDAY | PROJECT# 06-3448-014

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	2	1	1	2	1	2	2	0	2	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	77	73	18	36	93	93	118	223	72	26	149	19	997
4:15 PM	57	48	25	31	74	85	141	266	85	21	161	20	1014
4:30 PM	75	64	23	34	103	102	122	203	77	13	139	11	966
4:45 PM	59	47	23	37	74	93	110	202	66	25	149	18	903
5:00 PM	115	86	25	78	99	104	135	279	106	28	198	9	1262
5:15 PM	84	69	30	49	115	81	146	268	112	21	213	12	1200
5:30 PM	80	65	26	39	91	80	103	284	92	15	191	17	1083
5:45 PM	71	60	26	35	78	69	97	271	87	17	183	7	1001
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 618	NT 512	NR 196	SL 339	ST 727	SR 707	EL 972	ET 1996	ER 697	WL 166	WT 1383	WR 113	TOTAL 8426

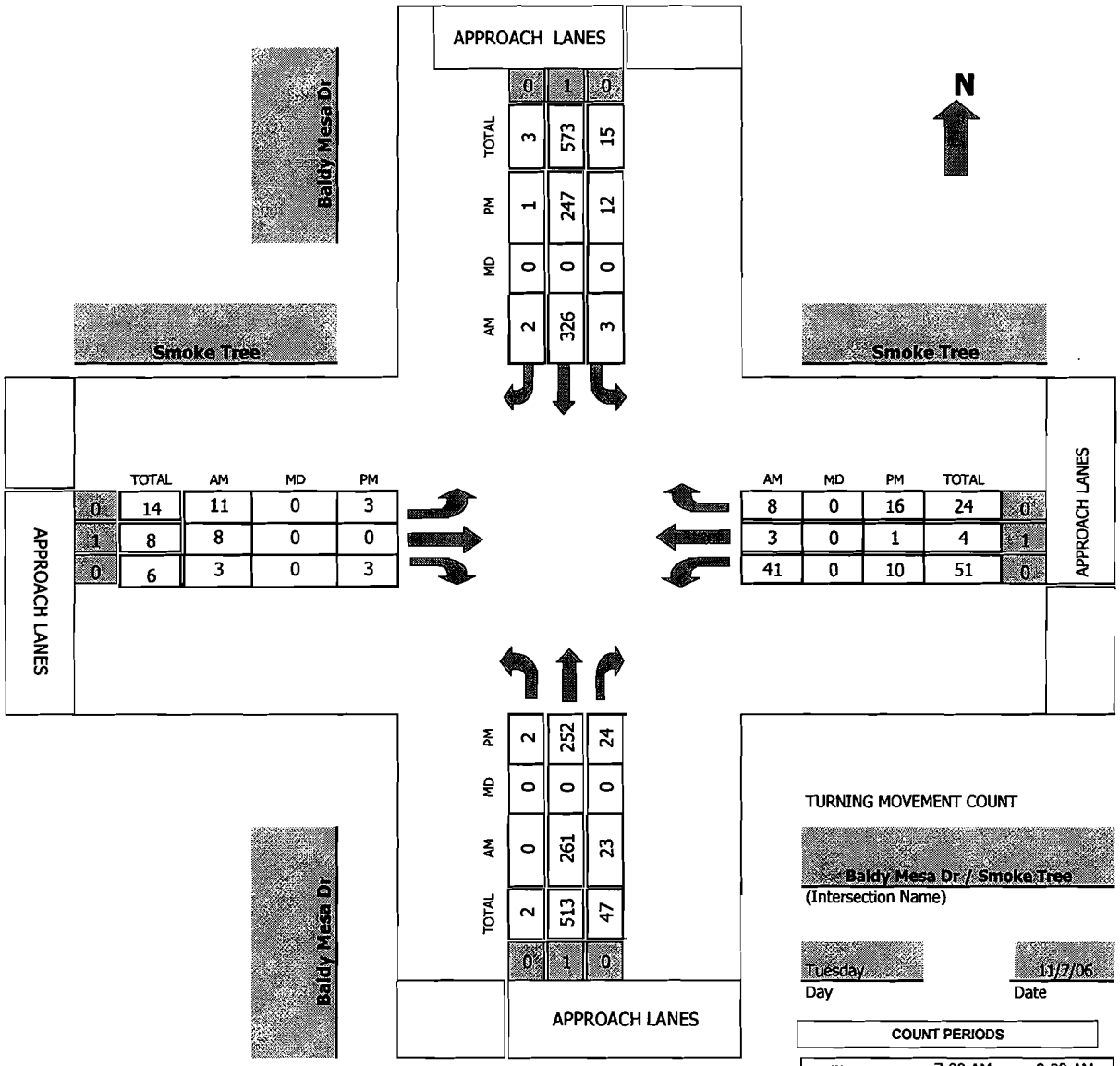
PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	350	280	107	201	383	334	481	1102	397	81	785	45	4546
PEAK HR. FACTOR:		0.815			0.817			0.941			0.926		0.901

CONTROL: Signalized

TMC Summary of Baldy Mesa Dr/Smoke Tree

Project #: 06-3448-015



TURNING MOVEMENT COUNT

Baldy Mesa Dr / Smoke Tree
(Intersection Name)

Tuesday — Day

11/7/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Baldy Mesa Dr DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Smoke Tree DAY: TUESDAY PROJECT# 06-3448-015

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	51	1	0	36	0	0	0	0	2	0	4	94
7:15 AM	0	48	2	1	64	1	1	0	1	5	0	3	126
7:30 AM	0	69	6	0	118	0	3	3	0	14	2	1	216
7:45 AM	0	81	11	0	96	1	4	3	1	16	1	2	216
8:00 AM	0	63	4	2	48	0	3	2	1	6	0	2	131
8:15 AM	0	38	1	1	35	0	0	0	0	5	0	3	83
8:30 AM	1	36	0	1	48	0	1	0	0	3	0	2	92
8:45 AM	0	39	1	1	40	0	0	0	0	5	0	1	87
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	1	425	26	6	485	2	12	8	3	56	3	18	1045

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	0	261	23	3	326	2	11	8	3	41	3	8	689
PEAK HR. FACTOR:		0.772			0.701			0.688			0.684		0.797

CONTROL: 2-Way Stop E & W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Baldy Mesa Dr DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Smoke Tree DAY: TUESDAY PROJECT# 06-3448-015

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1	54	6	3	56	1	1		0	4	0	2	128
4:15 PM	0	68	5	2	60	0	0		0	2	1	5	143
4:30 PM	0	50	7	3	70	0	2		2	5	0	3	142
4:45 PM	2	77	4	2	55	0	1		1	1	0	4	147
5:00 PM	0	57	8	5	62	1	0		0	2	0	4	139
5:15 PM	1	55	7	5	56	0	0		0	5	0	3	132
5:30 PM	0	42	6	5	57	0	0		0	2	0	2	114
5:45 PM	0	34	3	2	44	1	0		0	3	0	1	88
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 4	NT 437	NR 46	SL 27	ST 460	SR 3	EL 4	ET 0	ER 3	WL 24	WT 1	WR 24	TOTAL 1033

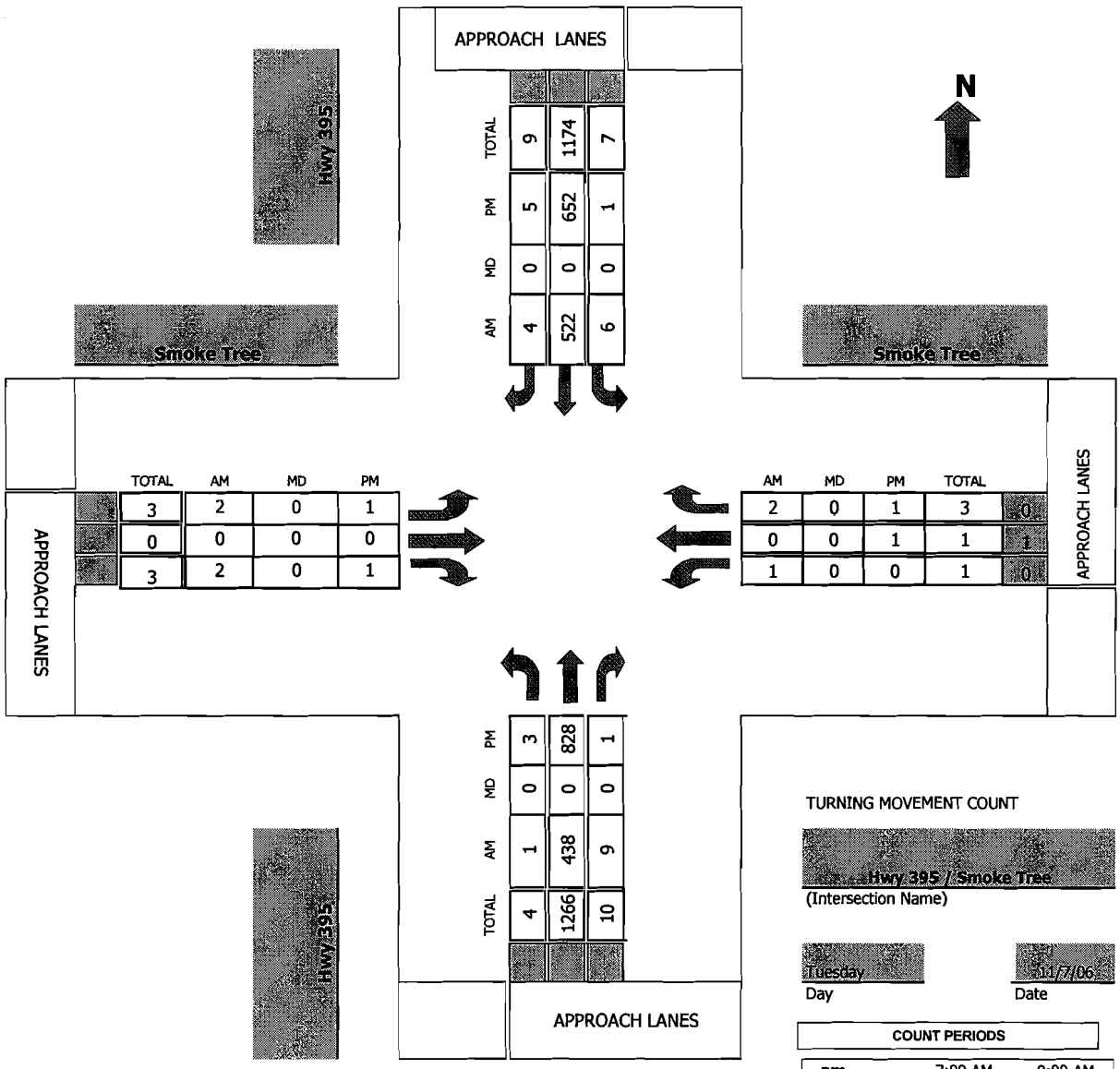
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	2	252	24	12	247	1	3	0	3	10	1	16	571
PEAK HR. FACTOR:		0.837			0.890			0.375			0.844		0.971

CONTROL: 2-Way Stop E & W

TMC Summary of Hwy 395/Smoke Tree

Project #: 06-3448-016



TURNING MOVEMENT COUNT

Hwy 395 / Smoke Tree
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hwy 395 DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Smoke Tree DAY: TUESDAY PROJECT# 06-3448-016

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	88	1	0	104	0	0		0	0		0	193
7:15 AM	1	109	2	2	125	0	0		1	0		0	240
7:30 AM	0	113	0	3	169	0	2		1	0		0	288
7:45 AM	0	130	5	1	123	4	0		0	0		2	265
8:00 AM	0	86	2	0	105	0	0		0	1		0	194
8:15 AM	0	82	1	1	107	0	0		0	1		0	192
8:30 AM	0	128	1	0	102	3	0		0	0		0	234
8:45 AM	0	127	0	0	108	0	0		0	0		0	235
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	1	863	12	7	943	7	2	0	2	2	0	2	1841

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	1	438	9	6	522	4	2	0	2	1	0	2	987
PEAK HR. FACTOR:		0.830			0.773			0.333			0.375		0.857

CONTROL: 2-Way Stop E & W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hwy 395 DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Smoke Tree DAY: TUESDAY PROJECT# 06-3448-016

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	1	172	2	0	118	0	0		0	0	0	0	293
4:15 PM	0	165	3	0	123	0	0		0	0	2	0	293
4:30 PM	0	174	2	1	124	2	0		0	1	0	0	304
4:45 PM	0	228	3	1	89	0	0		0	0	1	6	328
5:00 PM	0	177	0	1	86	2	1		0	0	1	0	268
5:15 PM	0	208	0	0	140	1	0		1	0	0	1	351
5:30 PM	3	218	1	0	139	0	0		0	0	0	0	361
5:45 PM	0	225	0	0	287	2	0		0	0	0	0	514
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	4	1567	11	3	1106	7	1	0	1	1	4	7	2712

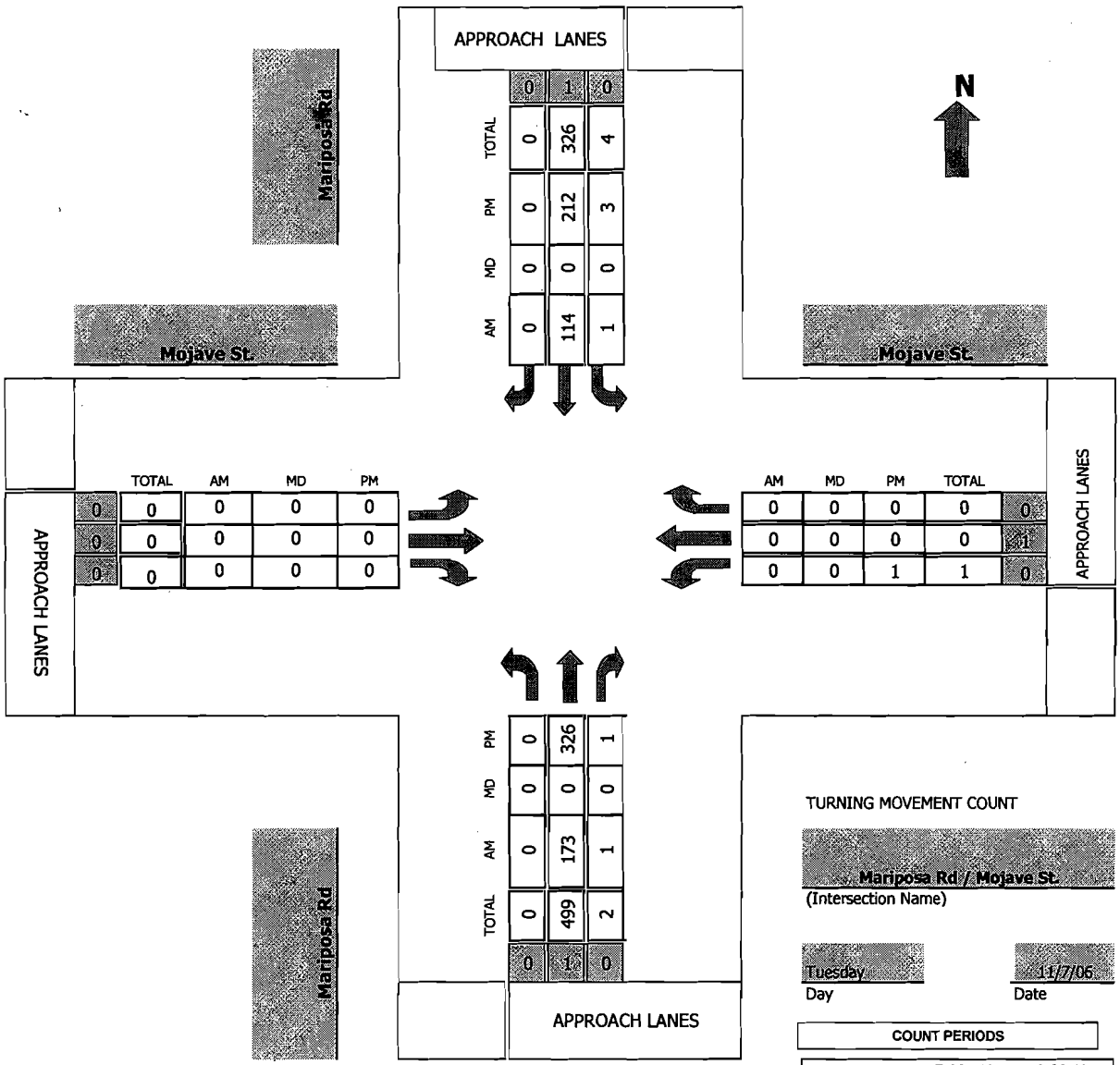
PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	3	828	1	1	652	5	1	0	1	0	1	1	1494
PEAK HR. FACTOR:		0.924			0.569			0.500			0.500		0.727

CONTROL: 2-Way Stop E & W

TMC Summary of Mariposa Rd/Mojave St.

Project #: 06-3448-017



TURNING MOVEMENT COUNT

Mariposa Rd / Mojave St.
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mariposa Rd DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Mojave St. DAY: TUESDAY PROJECT# 06-3448-017

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		13	0	0	24					0		0	37
7:15 AM		33	0	0	22					0		0	55
7:30 AM		49	0	0	27					0		0	76
7:45 AM		46	0	1	31					0		0	78
8:00 AM		44	0	0	35					0		0	79
8:15 AM		34	1	0	21					0		0	56
8:30 AM		34	0	0	31					0		0	65
8:45 AM		33	0	0	27					0		0	60
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 286	NR 1	SL 1	ST 218	SR 0	EL 0	ET 0	ER 0	WL 0	WT 0	WR 0	TOTAL 506

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	173	1	1	114	0	0	0	0	0	0	0	289
PEAK HR. FACTOR:		0.888			0.821			0.000			0.000		0.915

CONTROL: 1-Way Stop W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mariposa Rd DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Mojave St. DAY: TUESDAY PROJECT# 06-3448-017

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		104	0	0	62					1		0	167
4:15 PM		95	1	0	51					0		0	147
4:30 PM		68	0	2	47					0		0	117
4:45 PM		59	0	1	52					0		0	112
5:00 PM		54	0	1	64					0		0	119
5:15 PM		41	0	0	65					0		0	106
5:30 PM		45	0	0	53					0		0	98
5:45 PM		34	0	1	41					0		0	76
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 500	NR 1	SL 5	ST 435	SR 0	EL 0	ET 0	ER 0	WL 1	WT 0	WR 0	TOTAL 942

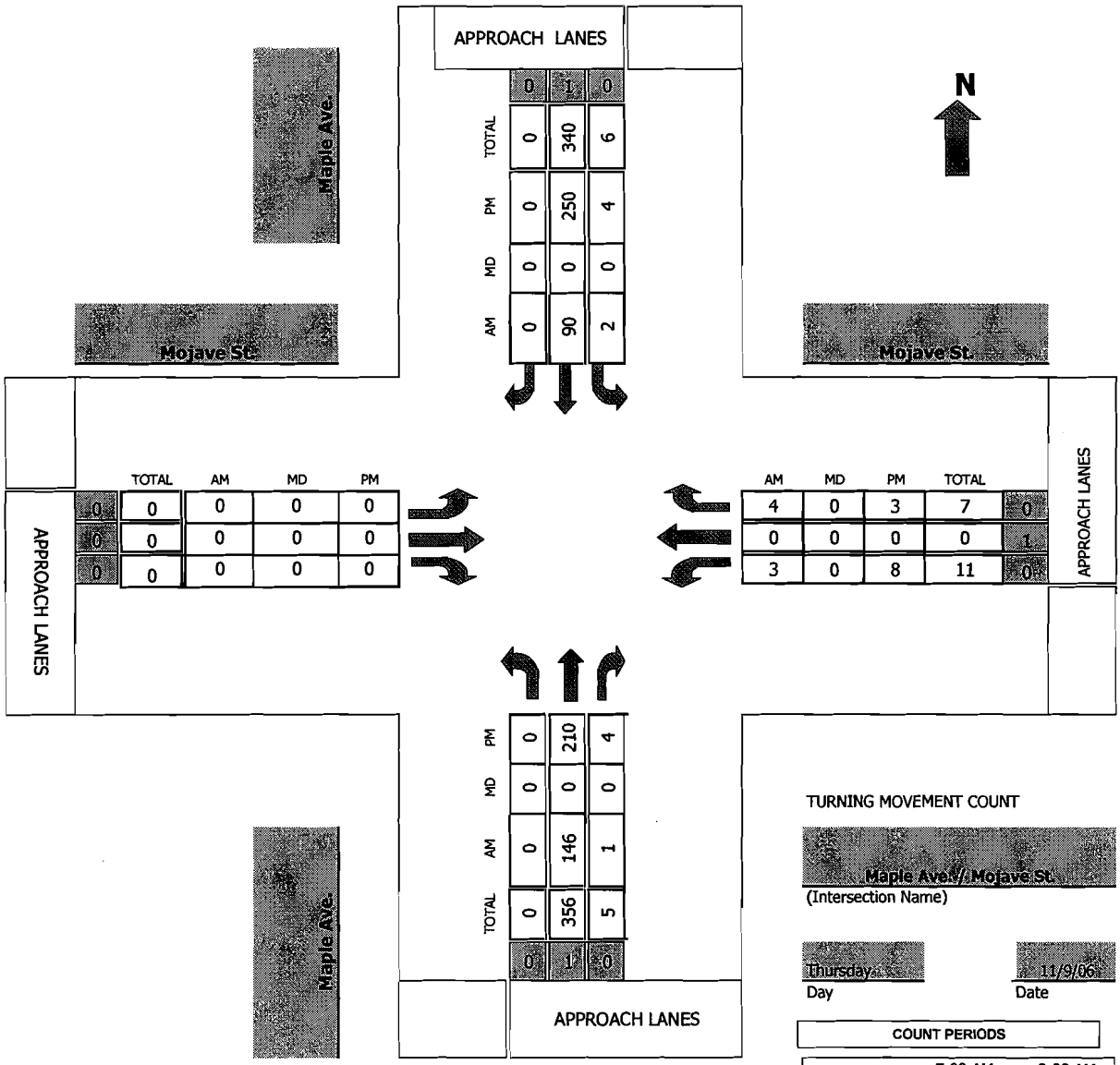
PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	0	326	1	3	212	0	0	0	0	1	0	0	543
PEAK HR. FACTOR:		0.786			0.867			0.000			0.250		0.813

CONTROL: 1-Way Stop W

TMC Summary of Maple Ave./Mojave St.

Project #: 06-3448-018



TURNING MOVEMENT COUNT

Maple Ave./ Mojave St.
(Intersection Name)

Thursday
Day

11/9/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Mojave St. DAY: THURSDAY PROJECT# 06-3448-018

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		24	0	0	15					0		0	39
7:15 AM		22	0	0	14					0		0	36
7:30 AM		37	0	0	11					1		2	51
7:45 AM		36	0	0	35					0		0	71
8:00 AM		39	0	1	24					2		1	67
8:15 AM		34	1	1	20					0		1	57
8:30 AM		27	2	0	17					0		0	46
8:45 AM		20	1	1	11					1		0	34
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 239	NR 4	SL 3	ST 147	SR 0	EL 0	ET 0	ER 0	WL 4	WT 0	WR 4	TOTAL 401

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	146	1	2	90	0	0	0	0	3	0	4	246
PEAK HR. FACTOR:		0.942			0.657			0.000			0.583		0.866

CONTROL: 1-Way Stop W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Mojave St. DAY: THURSDAY PROJECT# 06-3448-018

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		43	0	0	46					4		0	93
4:15 PM		49	2	1	58					2		0	112
4:30 PM		40	1	0	63					3		2	109
4:45 PM		58	0	2	59					2		0	121
5:00 PM		63	1	1	70					1		1	137
5:15 PM		46	0	2	53					2		0	103
5:30 PM		61	2	0	49					3		0	115
5:45 PM		42	1	0	45					0		0	88
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 402	NR 7	SL 6	ST 443	SR 0	EL 0	ET 0	ER 0	WL 17	WT 0	WR 3	TOTAL 878

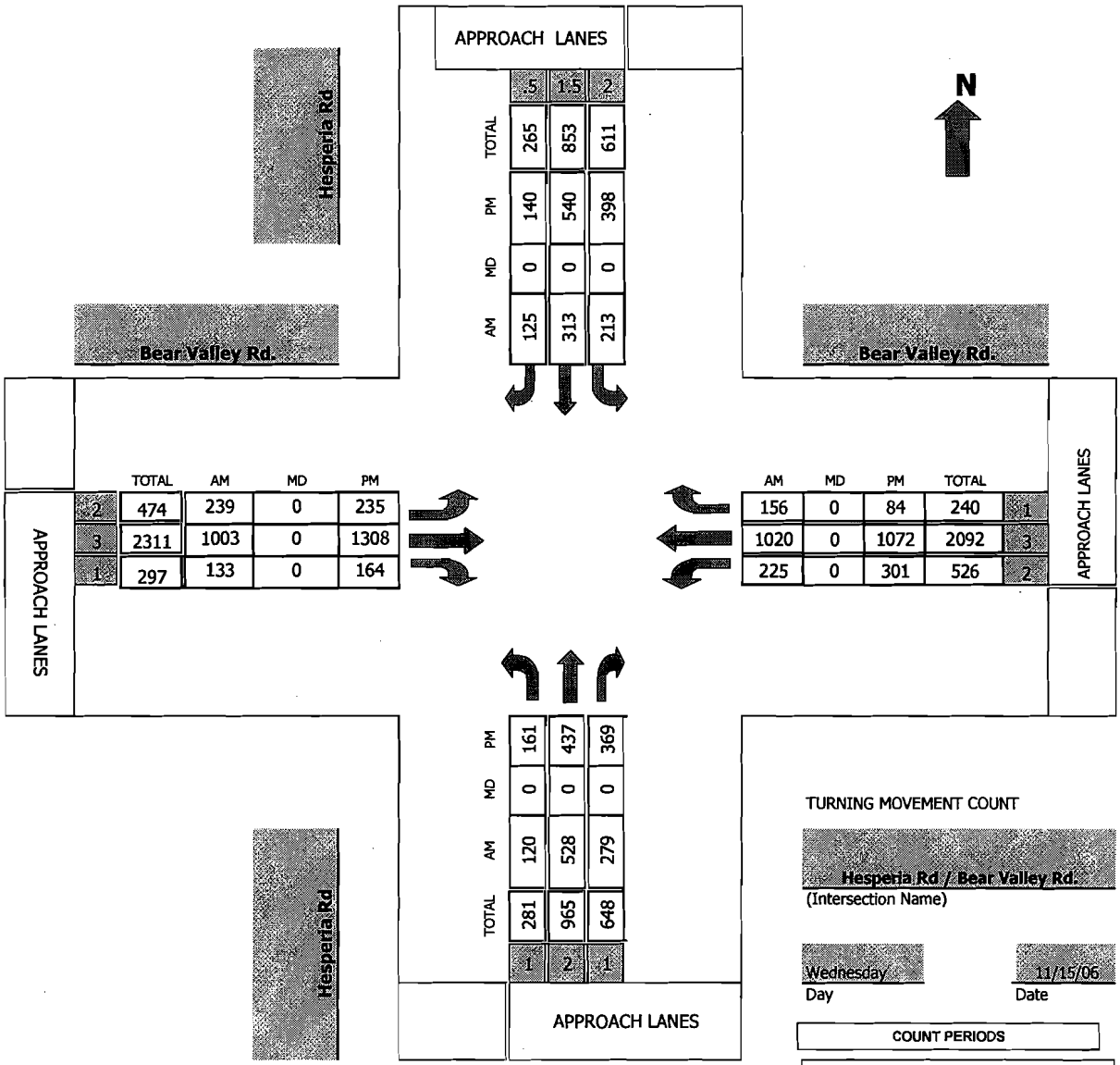
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	0	210	4	4	250	0	0	0	0	8	0	3	479
PEAK HR. FACTOR:		0.836			0.894			0.000			0.550		0.874

CONTROL: 1-Way Stop W

TMC Summary of Hesperia Rd/Bear Valley Rd.

Project #: 06-3448-019



TURNING MOVEMENT COUNT

Hesperia Rd / Bear Valley Rd.
(Intersection Name)

Wednesday
Day

11/15/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hesperia Rd DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Bear Valley Rd. DAY: WEDNESDAY PROJECT# 06-3448-019

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	2	1.5	.5	2	3	1	2	3	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	18	79	39	49	55	13	38	189	18	55	238	25	816
7:15 AM	20	84	47	55	64	14	41	198	20	59	242	29	873
7:30 AM	21	117	59	57	55	16	64	238	32	52	276	34	1021
7:45 AM	32	158	76	61	72	27	61	288	29	44	252	41	1141
8:00 AM	31	139	60	45	61	29	60	248	44	56	239	47	1059
8:15 AM	26	125	66	51	97	28	59	216	29	60	252	32	1041
8:30 AM	31	106	77	56	83	41	59	251	31	65	277	36	1113
8:45 AM	33	95	61	62	96	30	68	243	33	61	266	53	1101
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 212	NT 903	NR 485	SL 436	ST 583	SR 198	EL 450	ET 1871	ER 236	WL 452	WT 2042	WR 297	TOTAL 8165

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	120	528	279	213	313	125	239	1003	133	225	1020	156	4354
PEAK HR. FACTOR:		0.871			0.904			0.909			0.927		0.954

CONTROL: SIGNALIZED

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hesperia Rd DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Bear Valley Rd. DAY: WEDNESDAY PROJECT# 06-3448-019

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	2	1.5	.5	2	3	1	2	3	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	34	118	90	104	106	46	69	331	33	83	298	44	1356
4:15 PM	36	101	85	84	133	45	53	314	35	68	250	23	1227
4:30 PM	36	102	61	60	125	35	50	284	30	40	197	18	1038
4:45 PM	31	80	56	60	121	26	37	284	28	54	196	21	994
5:00 PM	45	146	102	84	128	33	59	337	37	74	253	18	1316
5:15 PM	37	122	118	115	165	37	70	332	41	86	282	23	1428
5:30 PM	38	89	80	101	151	35	49	308	41	77	302	25	1296
5:45 PM	41	80	69	98	96	35	57	331	45	64	235	18	1169
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 298	NT 838	NR 661	SL 706	ST 1025	SR 292	EL 444	ET 2521	ER 290	WL 546	WT 2013	WR 190	TOTAL 9824

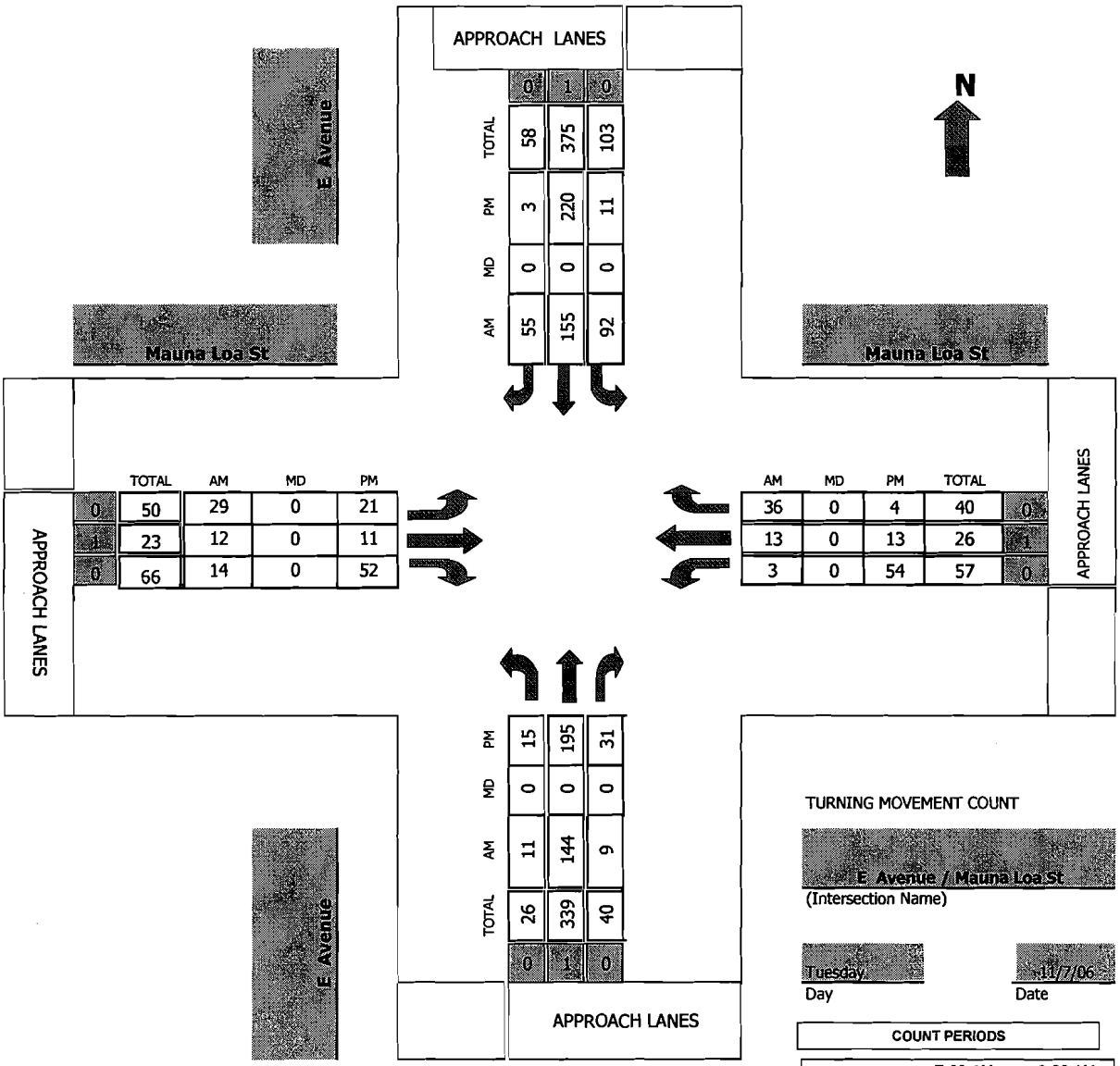
PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	161	437	369	398	540	140	235	1308	164	301	1072	84	5209
PEAK HR. FACTOR:		0.825			0.850			0.963			0.902		0.912

CONTROL: SIGNALIZED

TMC Summary of E Avenue/Mauna Loa St

Project #: 06-3448-020



TURNING MOVEMENT COUNT

E Avenue / Mauna Loa St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Mauna Loa St DAY: TUESDAY PROJECT# 06-3448-020

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	24	3	15	21	7	4	4	1	1	2	5	89
7:15 AM	4	29	4	19	32	9	7	2	2	0	3	7	118
7:30 AM	3	32	3	24	39	11	7	4	5	1	2	10	141
7:45 AM	5	39	2	25	34	19	9	5	5	2	4	9	158
8:00 AM	2	36	1	21	38	11	7	2	3	0	1	11	133
8:15 AM	1	37	3	22	44	14	6	1	1	0	6	6	141
8:30 AM	5	36	0	14	35	13	4	3	2	0	1	6	119
8:45 AM	5	43	1	23	25	14	11	16	3	1	2	20	164
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 27	NT 276	NR 17	SL 163	ST 268	SR 98	EL 55	ET 37	ER 22	WL 5	WT 21	WR 74	TOTAL 1063

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	11	144	9	92	155	55	29	12	14	3	13	36	573
PEAK HR. FACTOR:		0.891			0.944			0.724			0.867		0.907

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Mauna Loa St DAY: TUESDAY PROJECT# 06-3448-020

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	31	5	1	47	1	2	2	7	8	2	0	108
4:15 PM	4	37	6	3	46	1	4	4	11	9	3	1	129
4:30 PM	5	43	9	2	48	2	6	4	14	13	3	2	151
4:45 PM	4	53	11	4	53	0	7	4	16	10	5	0	167
5:00 PM	3	49	7	3	60	0	3	2	14	15	2	1	159
5:15 PM	3	50	4	2	59	1	5	1	8	16	3	1	153
5:30 PM	7	44	9	2	44	0	1	3	12	7	1	0	130
5:45 PM	5	30	10	0	42	1	5	3	11	4	1	1	113
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	33	337	61	17	399	6	33	23	93	82	20	6	1110

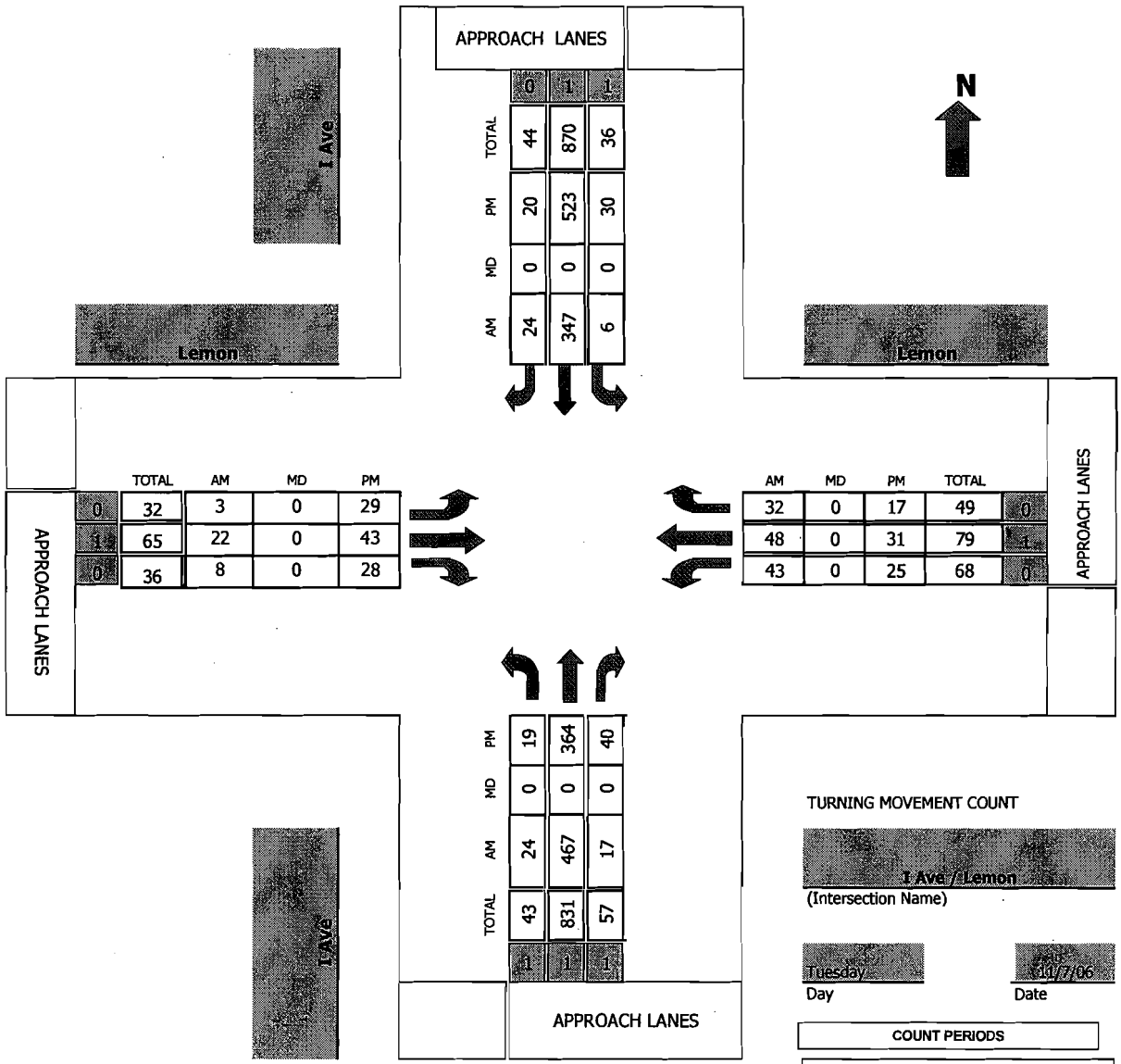
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	15	195	31	11	220	3	21	11	52	54	13	4	630
PEAK HR. FACTOR:		0.886			0.929			0.778			0.888		0.943

CONTROL: 4-Way Stop

TMC Summary of I Ave/Lemon

Project #: 06-3448-021



TURNING MOVEMENT COUNT

I Ave / Lemon
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave | DATE: 11/7/2006 | LOCATION: City of Hesperia

E-W STREET: Lemon | DAY: TUESDAY | PROJECT# 06-3448-021

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	64	3	1	48	6	3	0	0	4	8	6	145
7:15 AM	2	72	3	0	69	2	2	6	1	5	9	7	178
7:30 AM	3	106	2	2	75	3	0	4	1	13	10	7	226
7:45 AM	6	138	5	1	97	6	0	5	1	6	13	11	289
8:00 AM	8	122	6	1	90	10	2	7	4	15	14	8	287
8:15 AM	7	101	4	2	85	5	1	6	2	9	11	6	239
8:30 AM	7	79	2	1	64	7	0	5	2	12	17	6	202
8:45 AM	3	59	2	0	52	4	1	3	1	11	14	9	159
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	38	741	27	8	580	43	9	36	12	75	96	60	1725

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	24	467	17	6	347	24	3	22	8	43	48	32	1041
PEAK HR. FACTOR:		0.852			0.906			0.635			0.831		0.901

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Lemon DAY: TUESDAY PROJECT# 06-3448-021

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	3	89	6	6	122	6	9	9	3	6	12	3	274
4:15 PM	3	88	13	7	168	5	10	16	7	8	8	4	337
4:30 PM	5	97	6	6	122	4	5	9	10	4	7	4	279
4:45 PM	3	88	10	8	109	4	6	8	5	5	7	4	257
5:00 PM	8	91	11	9	124	7	8	10	6	8	9	5	296
5:15 PM	5	100	8	9	104	5	7	11	6	7	10	2	274
5:30 PM	3	87	7	5	101	3	8	7	5	7	9	3	245
5:45 PM	2	77	5	4	91	2	9	7	2	4	6	2	211
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	32	717	66	54	941	36	62	77	44	49	68	27	2173

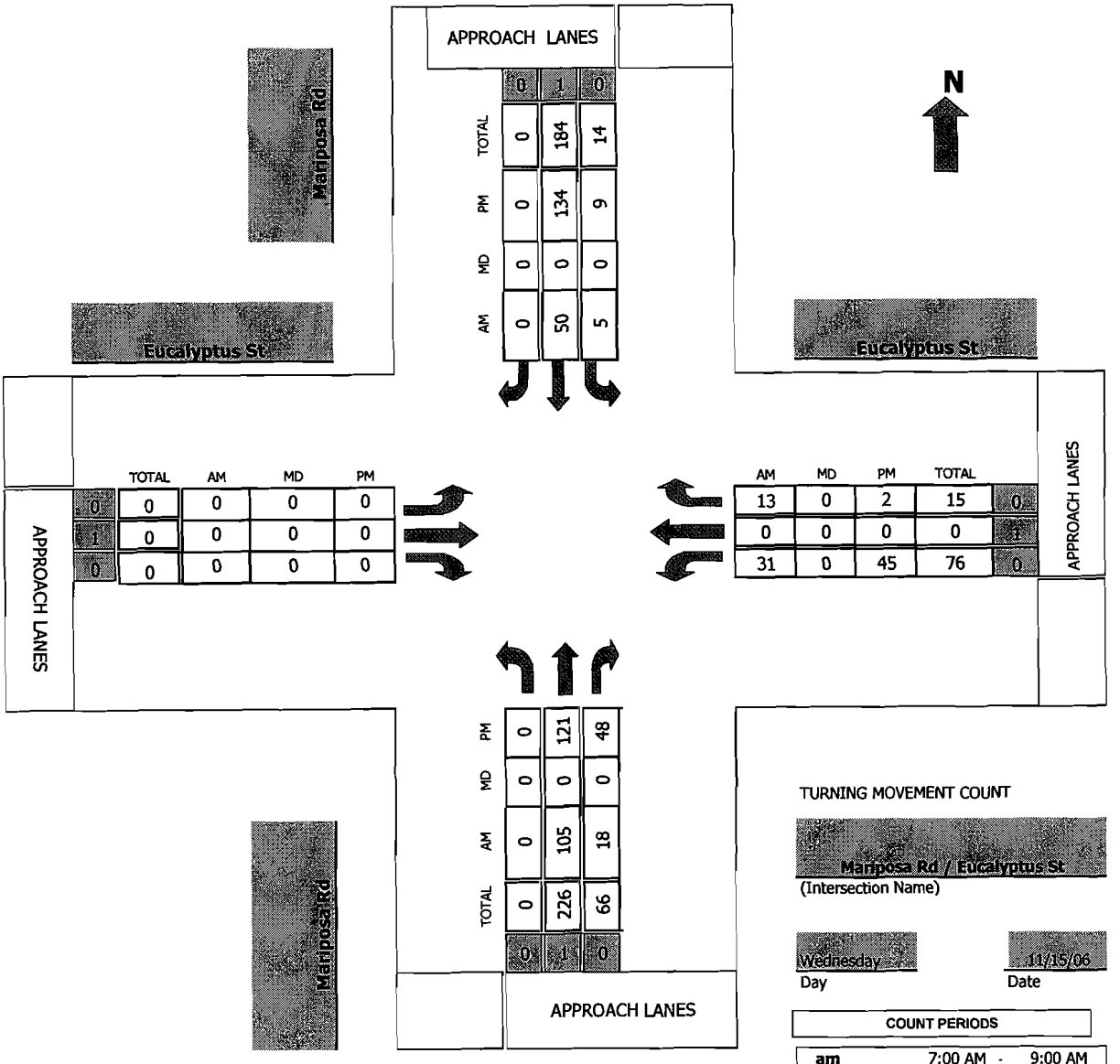
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	19	364	40	30	523	20	29	43	28	25	31	17	1169
PEAK HR. FACTOR:		0.961			0.796			0.758			0.830		0.867

CONTROL: 4-Way Stop

TMC Summary of Mariposa Rd/Eucalyptus St

Project #: 06-3448-022



0	1	0
0	184	14
0	134	9
0	0	0
0	50	5

	TOTAL	AM	MD	PM
0	0	0	0	0
1	0	0	0	0
0	0	0	0	0

AM	MD	PM	TOTAL	
13	0	2	15	0
0	0	0	0	1
31	0	45	76	0

PM	0	121	48
MD	0	0	0
AM	0	105	18
TOTAL	0	226	66
	0	1	0

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mariposa Rd DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: WEDNESDAY PROJECT# 06-3448-022

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		9	2	1	1		0		0	13		1	27
7:15 AM		14	3	1	12		0		0	6		2	38
7:30 AM		23	4	1	17		0		0	10		4	59
7:45 AM		20	5	2	14		0		0	5		1	47
8:00 AM		27	6	1	12		0		0	9		5	60
8:15 AM		22	4	0	15		0		0	11		2	54
8:30 AM		29	5	2	14		0		0	6		5	61
8:45 AM		27	3	2	9		0		0	5		1	47
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 171	NR 32	SL 10	ST 94	SR 0	EL 0	ET 0	ER 0	WL 65	WT 0	WR 21	TOTAL 393

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	0	105	18	5	50	0	0	0	0	31	0	13	222
PEAK HR. FACTOR:		0.904			0.859			0.000			0.786		0.910

CONTROL: 2-Way Stop E & W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Mariposa Rd DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: WEDNESDAY PROJECT# 06-3448-022

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		17	8	2	28					6		1	62
4:15 PM		24	11	4	37					4		3	83
4:30 PM		35	12	2	41					8		0	98
4:45 PM		26	7	3	31					5		0	72
5:00 PM		32	13	4	33					18		1	101
5:15 PM		28	16	0	29					14		1	88
5:30 PM		21	14	0	22					20		2	79
5:45 PM		28	18	1	24					8		0	79
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 211	NR 99	SL 16	ST 245	SR 0	EL 0	ET 0	ER 0	WL 83	WT 0	WR 8	TOTAL 662

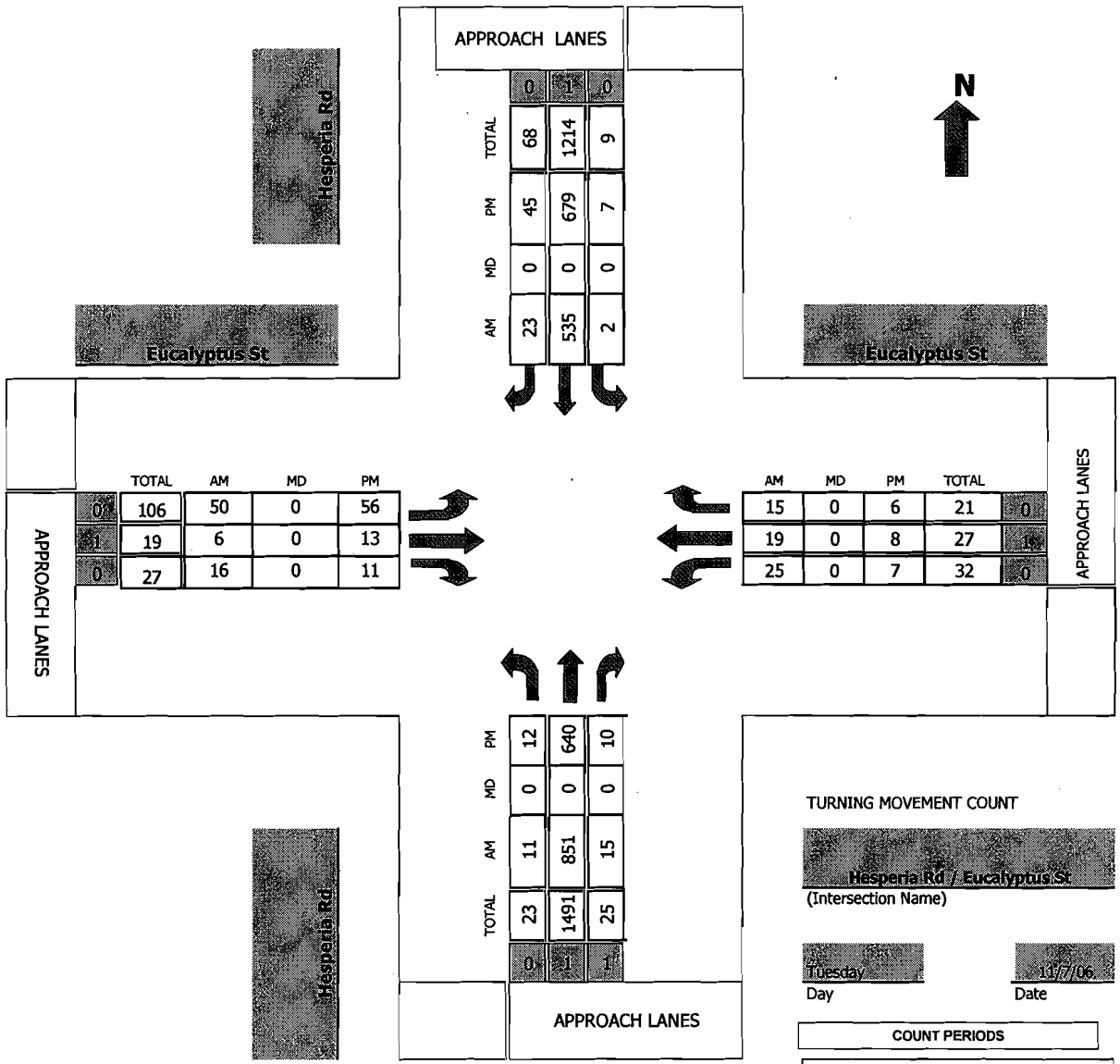
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	0	121	48	9	134	0	0	0	0	45	0	2	359
PEAK HR. FACTOR:		0.899			0.831			0.000			0.618		0.889

CONTROL: 2-Way Stop E & W

TMC Summary of Hesperia Rd/Eucalyptus St

Project #: 06-3448-023



TURNING MOVEMENT COUNT

Hesperia Rd / Eucalyptus St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hesperia Rd DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: TUESDAY PROJECT# 06-3448-023

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	1	116	2	1	99	3	4	1	1	2	3	2	235
7:15 AM	0	131	0	2	145	5	2	1	0	2	3	1	292
7:30 AM	2	202	4	0	152	4	9	0	2	5	5	1	386
7:45 AM	2	234	3	0	134	6	17	1	5	6	6	4	418
8:00 AM	3	213	5	2	128	7	13	3	6	7	3	7	397
8:15 AM	4	202	3	0	121	6	11	2	3	7	5	3	367
8:30 AM	3	193	4	0	105	8	7	0	4	6	7	5	342
8:45 AM	1	178	2	1	93	3	5	1	2	3	4	2	295
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	16	1469	23	6	977	42	68	9	23	38	36	25	2732

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	11	851	15	2	535	23	50	6	16	25	19	15	1568
PEAK HR. FACTOR:		0.917			0.897			0.783			0.868		0.938

CONTROL: 2-Way Stop E & W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hesperia Rd DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: TUESDAY PROJECT# 06-3448-023

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	1	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	3	157	1	1	175	16	10	4	1	0	1	4	373
4:15 PM	2	172	4	0	144	14	17	3	3	1	2	1	363
4:30 PM	4	174	2	3	178	6	12	1	3	1	2	1	387
4:45 PM	3	137	3	3	182	9	17	5	4	5	3	0	371
5:00 PM	5	130	5	2	169	10	14	6	3	0	6	1	351
5:15 PM	4	121	3	0	153	5	12	2	1	2	4	0	307
5:30 PM	2	106	4	1	148	8	18	3	2	1	5	1	299
5:45 PM	1	99	2	0	139	7	11	2	1	0	2	0	264
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 24	NT 1096	NR 24	SL 10	ST 1288	SR 75	EL 111	ET 26	ER 18	WL 10	WT 25	WR 8	TOTAL 2715

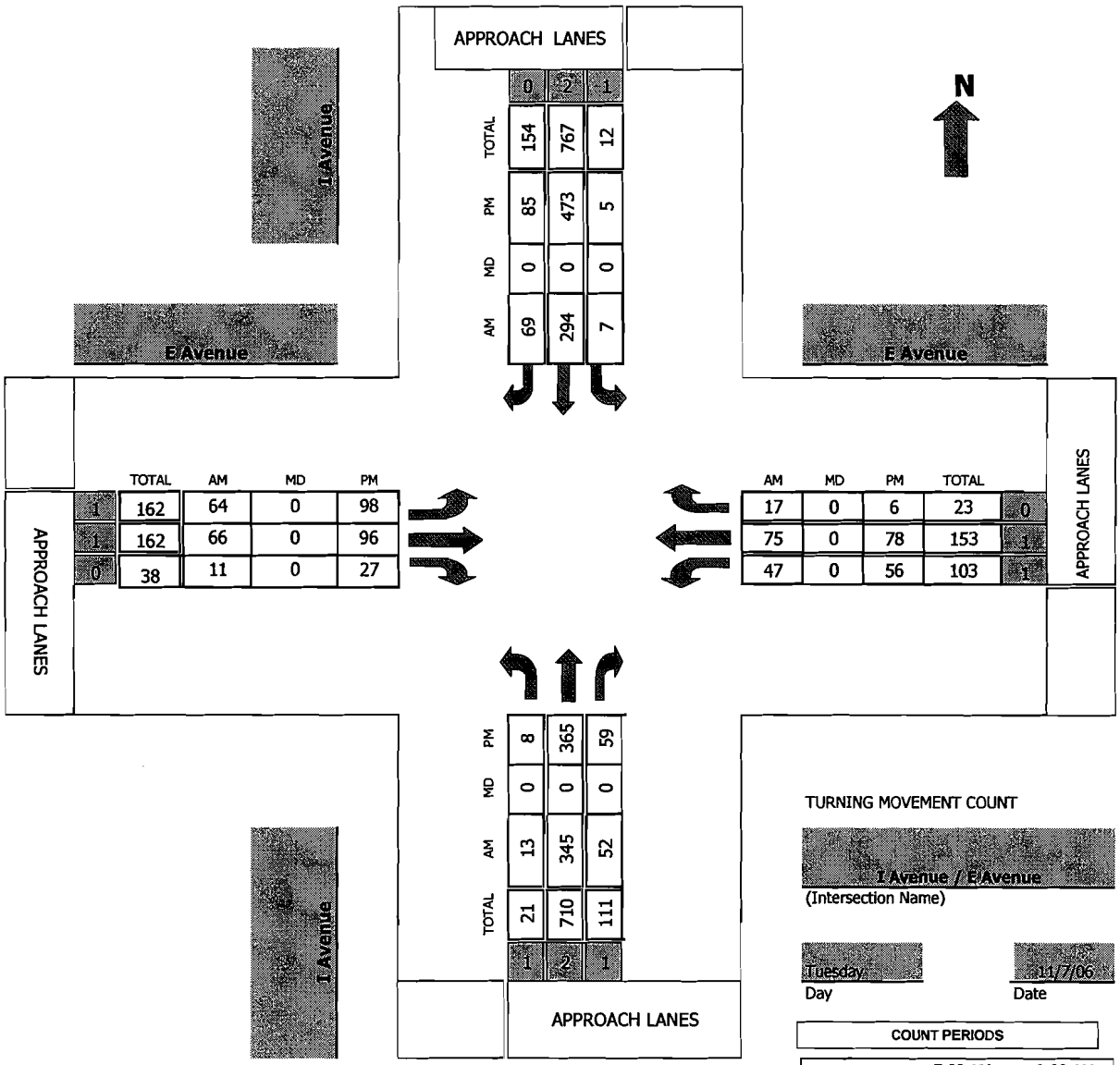
PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	12	640	10	7	679	45	56	13	11	7	8	6	1494
PEAK HR. FACTOR:		0.919			0.942			0.769			0.656		0.965

CONTROL: 2-Way Stop E & W

TMC Summary of I Avenue/E Avenue

Project #: 06-3448-024



TURNING MOVEMENT COUNT

I Avenue / E Avenue
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: E Avenue DAY: TUESDAY PROJECT# 06-3448-024

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	2	0	1	1	0	1	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	55	7	0	55	12	15	9	1	8	15	3	182
7:15 AM	4	68	9	1	59	17	21	17	3	11	21	6	237
7:30 AM	5	88	11	1	64	22	17	22	3	13	25	6	277
7:45 AM	6	90	13	0	70	16	22	19	0	10	21	7	274
8:00 AM	3	76	16	1	64	13	17	14	2	7	22	5	240
8:15 AM	3	90	13	3	62	17	18	16	3	12	17	2	256
8:30 AM	3	71	10	2	82	18	13	17	3	16	17	5	257
8:45 AM	4	108	13	1	86	21	16	19	3	12	19	5	307
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	30	646	92	9	542	136	139	133	18	89	157	39	2030

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	13	345	52	7	294	69	64	66	11	47	75	17	1060
PEAK HR. FACTOR:		0.820			0.856			0.928			0.914		0.863

CONTROL: Signal

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: E Avenue DAY: TUESDAY PROJECT# 06-3448-024

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	2	0	1	1	0	1	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	69	8	1	87	15	22	16	4	15	25	2	266
4:15 PM	3	78	8	0	93	25	27	19	8	22	15	4	302
4:30 PM	1	94	11	2	100	27	24	22	11	17	23	2	334
4:45 PM	3	91	18	2	114	21	26	25	10	15	15	1	341
5:00 PM	5	106	18	0	128	24	18	27	11	12	18	1	368
5:15 PM	0	87	13	2	109	18	25	26	3	11	18	1	313
5:30 PM	0	81	10	1	122	22	29	18	3	18	27	3	334
5:45 PM	1	76	12	1	106	17	22	21	2	14	16	2	290
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 15	NT 682	NR 98	SL 9	ST 859	SR 169	EL 193	ET 174	ER 52	WL 124	WT 157	WR 16	TOTAL 2548

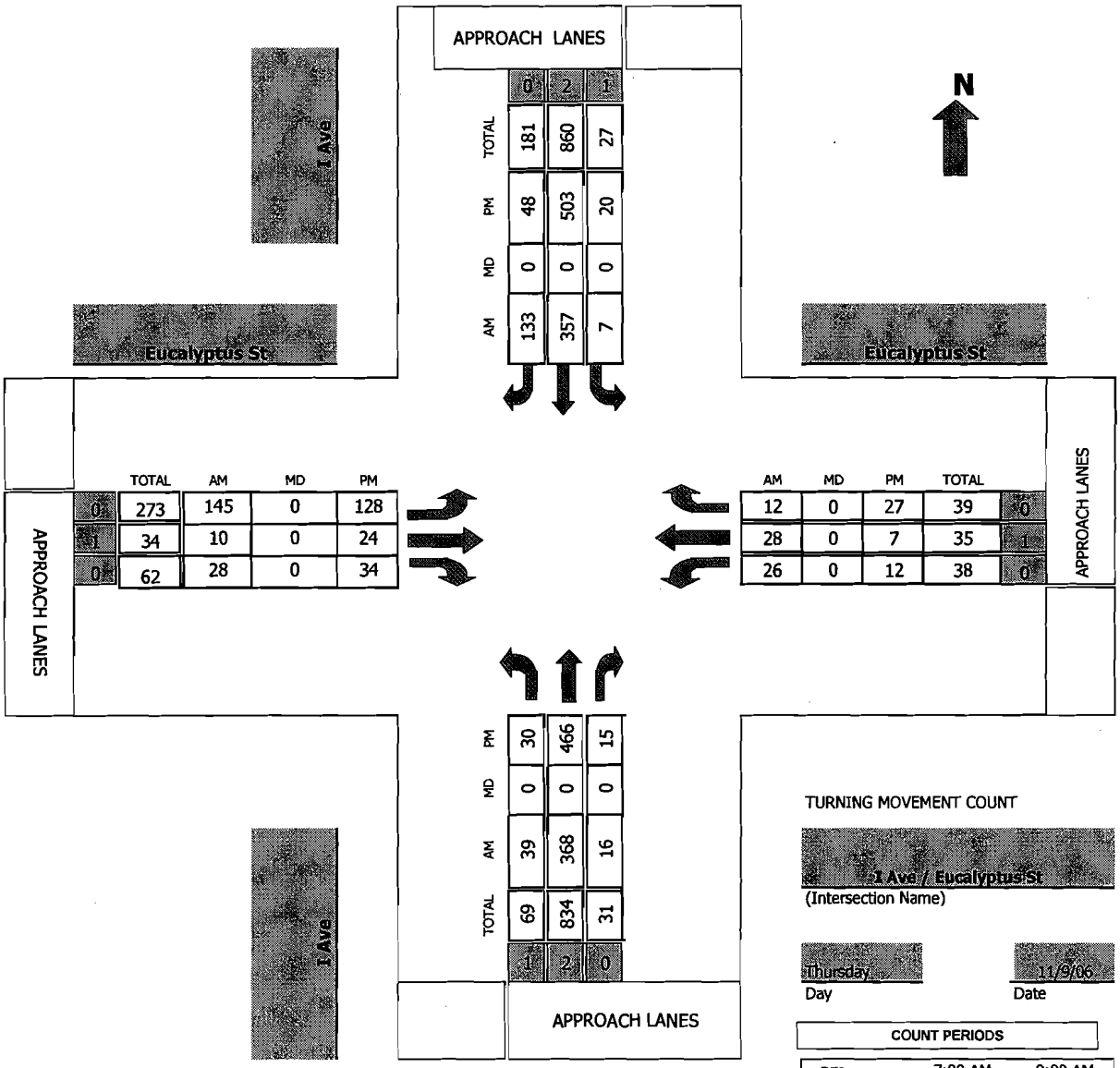
PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	8	365	59	5	473	85	98	96	27	56	78	6	1356
PEAK HR. FACTOR:		0.837			0.926			0.906			0.729		0.921

CONTROL: Signal

TMC Summary of I Ave/Eucalyptus St

Project #: 06-3448-025



TURNING MOVEMENT COUNT

I Ave / Eucalyptus St
(Intersection Name)

Thursday — Day

11/9/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: THURSDAY PROJECT# 06-3448-025

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	5	76	2	1	56	15	27	1	5	6	6	2	202
7:15 AM	7	87	2	0	65	23	32	2	5	7	6	2	238
7:30 AM	10	92	4	2	73	34	30	1	10	6	5	3	270
7:45 AM	9	88	5	1	79	41	37	4	9	11	9	5	298
8:00 AM	8	90	4	3	93	38	44	3	8	9	4	4	308
8:15 AM	11	90	2	3	99	32	35	2	6	2	8	1	291
8:30 AM	11	100	5	0	86	22	29	1	5	4	7	2	272
8:45 AM	13	103	1	0	69	19	29	0	2	4	4	1	245
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	74	726	25	10	620	224	263	14	50	49	49	20	2124
AM Peak Hr Begins at:		745 AM											
PEAK VOLUMES =	39	368	16	7	357	133	145	10	28	26	28	12	1169
PEAK HR. FACTOR:		0.912			0.927			0.832			0.660		0.949

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Eucalyptus St DAY: THURSDAY PROJECT# 06-3448-025

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	5	81	2	3	92	7	21	3	11	1	0	7	233
4:15 PM	8	111	5	4	101	7	27	7	13	4	1	7	295
4:30 PM	8	107	5	6	127	11	33	7	9	2	2	8	325
4:45 PM	9	121	6	7	125	15	37	8	11	4	1	10	354
5:00 PM	6	119	3	5	119	13	30	5	6	3	2	4	315
5:15 PM	7	119	1	2	132	9	28	4	8	3	2	5	320
5:30 PM	5	88	4	6	143	13	21	5	9	0	1	3	298
5:45 PM	4	72	1	4	98	5	18	2	4	1	1	3	213
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 52	NT 818	NR 27	SL 37	ST 937	SR 80	EL 215	ET 41	ER 71	WL 18	WT 10	WR 47	TOTAL 2353

PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	30	466	15	20	503	48	128	24	34	12	7	27	1314
PEAK HR. FACTOR:		0.939			0.971			0.830			0.767		0.928

CONTROL: 4-Way Stop

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-002

Location: I-15 SB Off-Ramp & Joshua St. City: Hesperia Date: 03/07/06 Day: TUESDAY

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
LANES:					0	1	0	0	1	0	0	1	0
7:00	CARS				5		10		42			52	
	2-axle						4					1	
	3-axle												
	4-axle												
	5-axle +						7		3				
7:15	CARS				6		14		51			58	
	2-axle						3		1				
	3-axle						1						
	4-axle												
	5-axle +						4		7				
7:30	CARS				8		16		52			56	
	2-axle						3						
	3-axle												
	4-axle												
	5-axle +						8		1				
7:45	CARS				6		13		42			44	
	2-axle						2		1				
	3-axle						1						
	4-axle												
	5-axle +						3		6				
8:00	CARS				7		14		32			24	
	2-axle				1		1		1				
	3-axle												
	4-axle												
	5-axle +						7		2				
8:15	CARS				5		17		24			18	
	2-axle											1	
	3-axle												
	4-axle												
	5-axle +						8		9				
8:30	CARS				4		21		21			26	
	2-axle												
	3-axle												
	4-axle												
	5-axle +						1		2				
8:45	CARS				3		16		16			20	
	2-axle				1								
	3-axle												
	4-axle												
	5-axle +						8		3				

MOVEMENT TOTALS

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
CARS	0	0	0	44	0	121	0	280	0	0	298	0
2-axle	0	0	0	2	0	13	0	3	0	0	2	0
3-axle	0	0	0	0	0	2	0	0	0	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	0	46	0	33	0	0	0	0
TOTALS	0	0	0	46	0	182	0	316	0	0	300	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	0	0	25	0	89	0	206	0	0	211	0
PEAK HR. FACTOR:		0.000			0.814			0.873			0.909	

CONTROL: 1-Way Stop S

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-002

Location: I-15 SB Off-Ramp & Joshua St. City: Hesperia Date: 03/07/06 Day: TUESDAY

	LANES:				0	1	0	0	1	0	0	1	0
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS				10		14		41			21	
	2-axle								1				
	3-axle												
	4-axle												
	5-axle +						4		4				
16:15	CARS				11		18		54			26	
	2-axle				1		1						
	3-axle												
	4-axle												
	5-axle +						9		5				
16:30	CARS				14		22		43			33	
	2-axle						3						
	3-axle												
	4-axle												
	5-axle +						8		6				
16:45	CARS				19		30		48			32	
	2-axle								1				
	3-axle												
	4-axle												
	5-axle +						11		10				
17:00	CARS				18		24		58			26	
	2-axle											1	
	3-axle						4						
	4-axle												
	5-axle +						4		9				
17:15	CARS				15		18		67			20	
	2-axle												
	3-axle						3						
	4-axle												
	5-axle +						4		5				
17:30	CARS				11		15		52			14	
	2-axle				1				1				
	3-axle												
	4-axle												
	5-axle +						9		5				
17:45	CARS				8		11		50			15	
	2-axle												
	3-axle												
	4-axle												
	5-axle +						10		7				

MOVEMENT TOTALS

CARS	0	0	0	106	0	152	0	413	0	0	187	0
2-axle	0	0	0	2	0	4	0	3	0	0	1	0
3-axle	0	0	0	0	0	7	0	0	0	0	0	0
4-axle	0	0	0	0	0	0	0	0	0	0	0	0
5-axle +	0	0	0	0	0	59	0	51	0	0	0	0
TOTALS	0	0	0	108	0	222	0	467	0	0	188	0
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

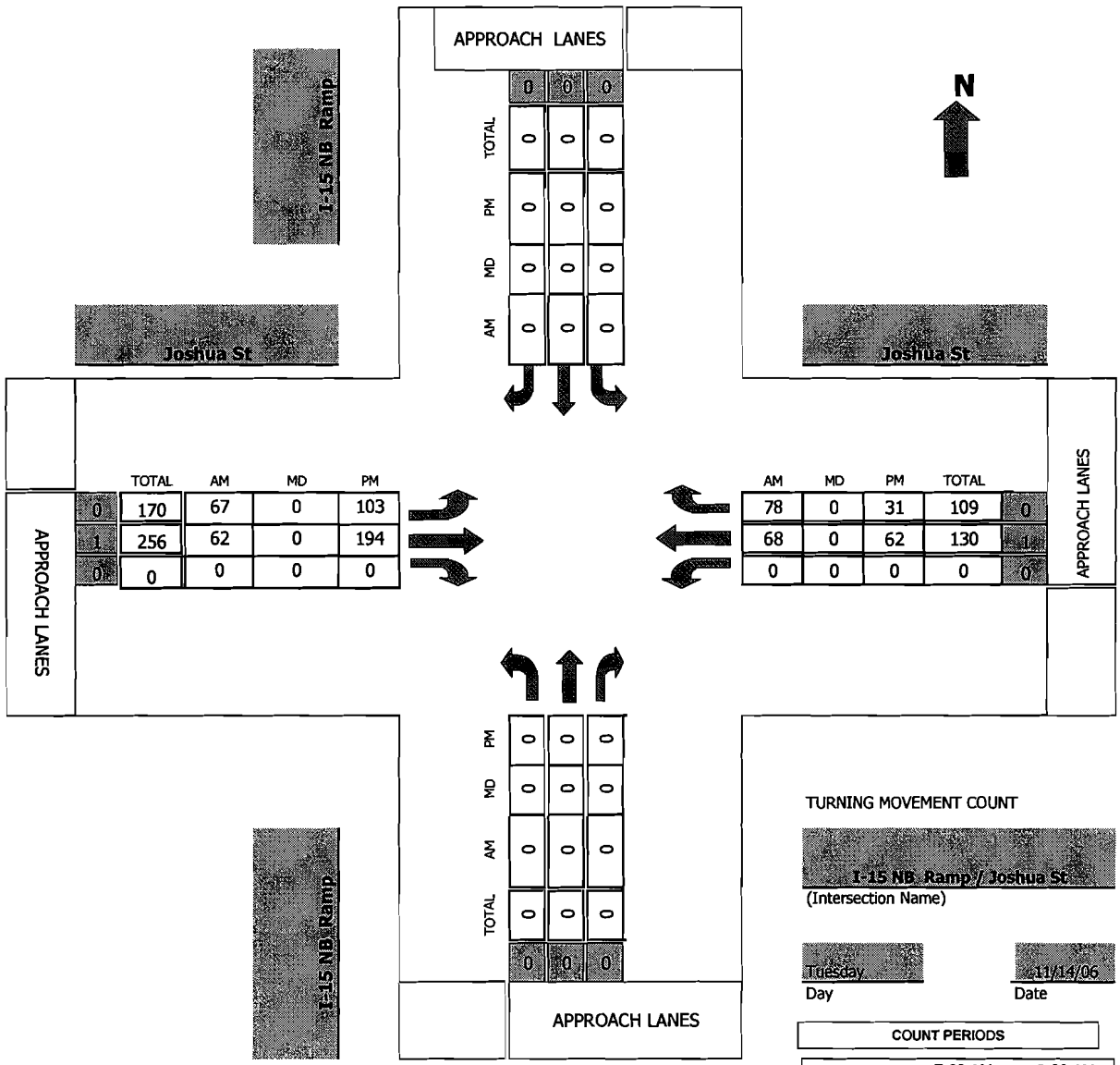
PM Peak Hr Begins at: 1630 PM

PEAK VOLUMES =	0	0	0	66	0	131	0	247	0	0	112	0
PEAK HR. FACTOR:		0.000			0.821			0.858			0.848	

CONTROL: 1-Way Stop S

TMC Summary of I-15 NB Ramp/Joshua St

Project #: 06-3448-026



AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I-15 NB Ramp DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Joshua St DAY: TUESDAY PROJECT# 06-3448-026

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	0	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM							7	18			18	13	56
7:15 AM							9	16			25	17	67
7:30 AM							24	12			18	20	74
7:45 AM							14	15			13	29	71
8:00 AM							15	13			19	16	63
8:15 AM							14	22			18	13	67
8:30 AM							28	21			11	13	73
8:45 AM							8	18			11	20	57
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	0	0	0	0	0	0	119	135	0	0	133	141	528

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	0	0	0	0	0	67	62	0	0	68	78	275
PEAK HR. FACTOR:		0.000			0.000			0.896			0.869		0.929

CONTROL: None

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I-15 NB Ramp DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Joshua St DAY: TUESDAY PROJECT# 06-3448-026

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	0	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM							13	36			19	6	74
4:15 PM							26	43			15	7	91
4:30 PM							15	42			18	7	82
4:45 PM							23	44			10	10	87
5:00 PM							32	63			24	8	127
5:15 PM							29	48			12	5	94
5:30 PM							19	39			16	8	82
5:45 PM							12	27			11	9	59
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	0	0	0	0	0	0	169	342	0	0	125	60	696

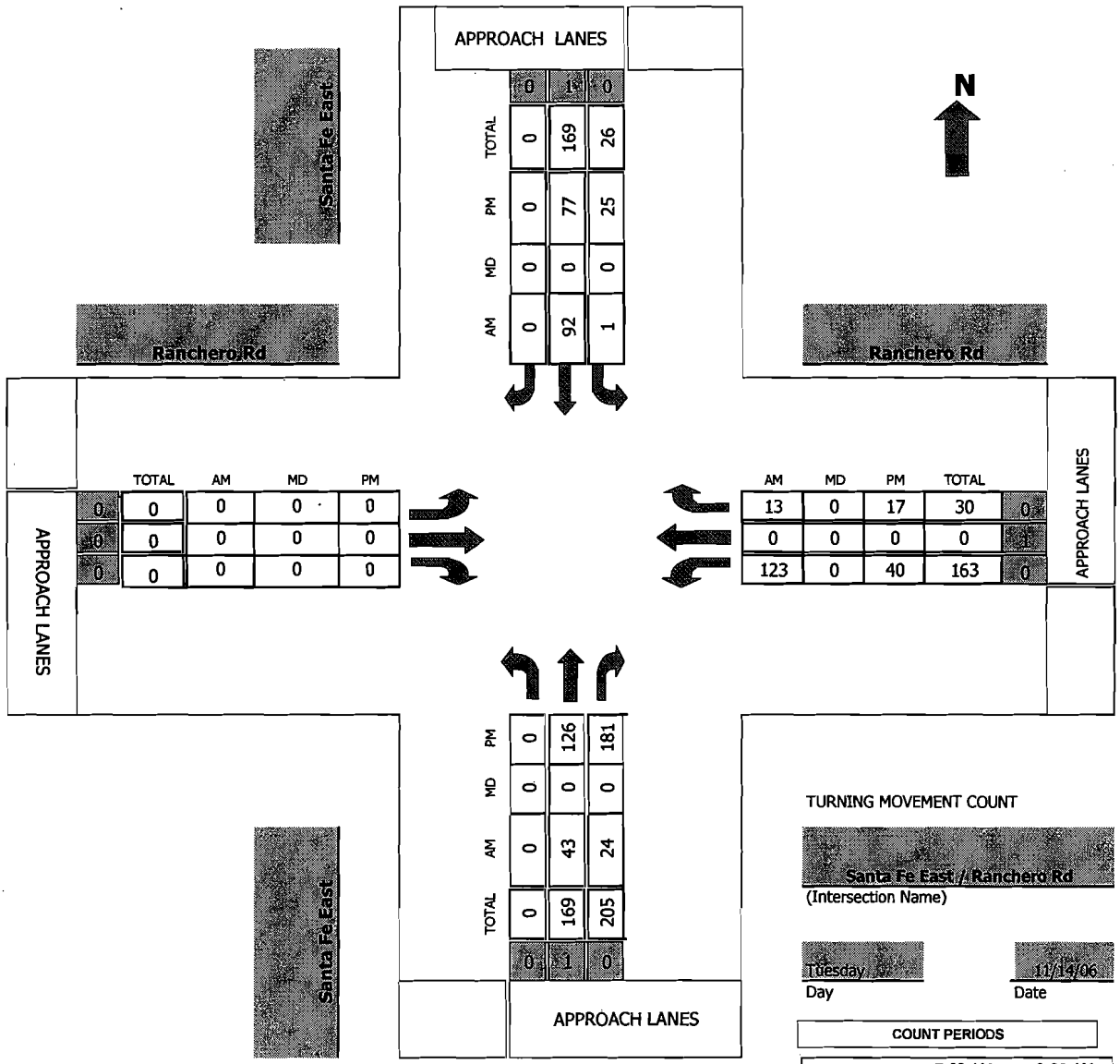
PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	0	0	0	0	0	0	103	194	0	0	62	31	390
PEAK HR. FACTOR:		0.000			0.000			0.782			0.727		0.768

CONTROL: None

TMC Summary of Santa Fe East/Ranchero Rd

Project #: 06-3448-027



TURNING MOVEMENT COUNT

Santa Fe East / Rancherd Rd
(Intersection Name)

Tuesday
Day

11/14/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Santa Fe East DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-027

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		7	5	0	22					26		3	63
7:15 AM		9	6	1	27					31		6	80
7:30 AM		9	8	0	19					36		3	75
7:45 AM		14	8	0	20					33		2	77
8:00 AM		11	2	0	26					23		2	64
8:15 AM		12	7	2	17					28		4	70
8:30 AM		8	5	2	21					15		8	59
8:45 AM		9	6	2	19					17		6	59
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 79	NR 47	SL 7	ST 171	SR 0	EL 0	ET 0	ER 0	WL 209	WT 0	WR 34	TOTAL 547

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	0	43	24	1	92	0	0	0	0	123	0	13	296
PEAK HR. FACTOR:		0.761			0.830			0.000			0.872		0.925

CONTROL: One- Way Stop w/b

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Santa Fe East DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-027

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	0	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		34	36	5	16					12		5	108
4:15 PM		31	46	5	19					5		5	111
4:30 PM		44	54	6	22					6		3	135
4:45 PM		26	36	6	16					12		0	96
5:00 PM		25	45	8	20					17		9	124
5:15 PM		29	34	4	17					9		4	97
5:30 PM		33	31	5	15					9		3	96
5:45 PM		27	24	3	16					7		5	82
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 249	NR 306	SL 42	ST 141	SR 0	EL 0	ET 0	ER 0	WL 77	WT 0	WR 34	TOTAL 849

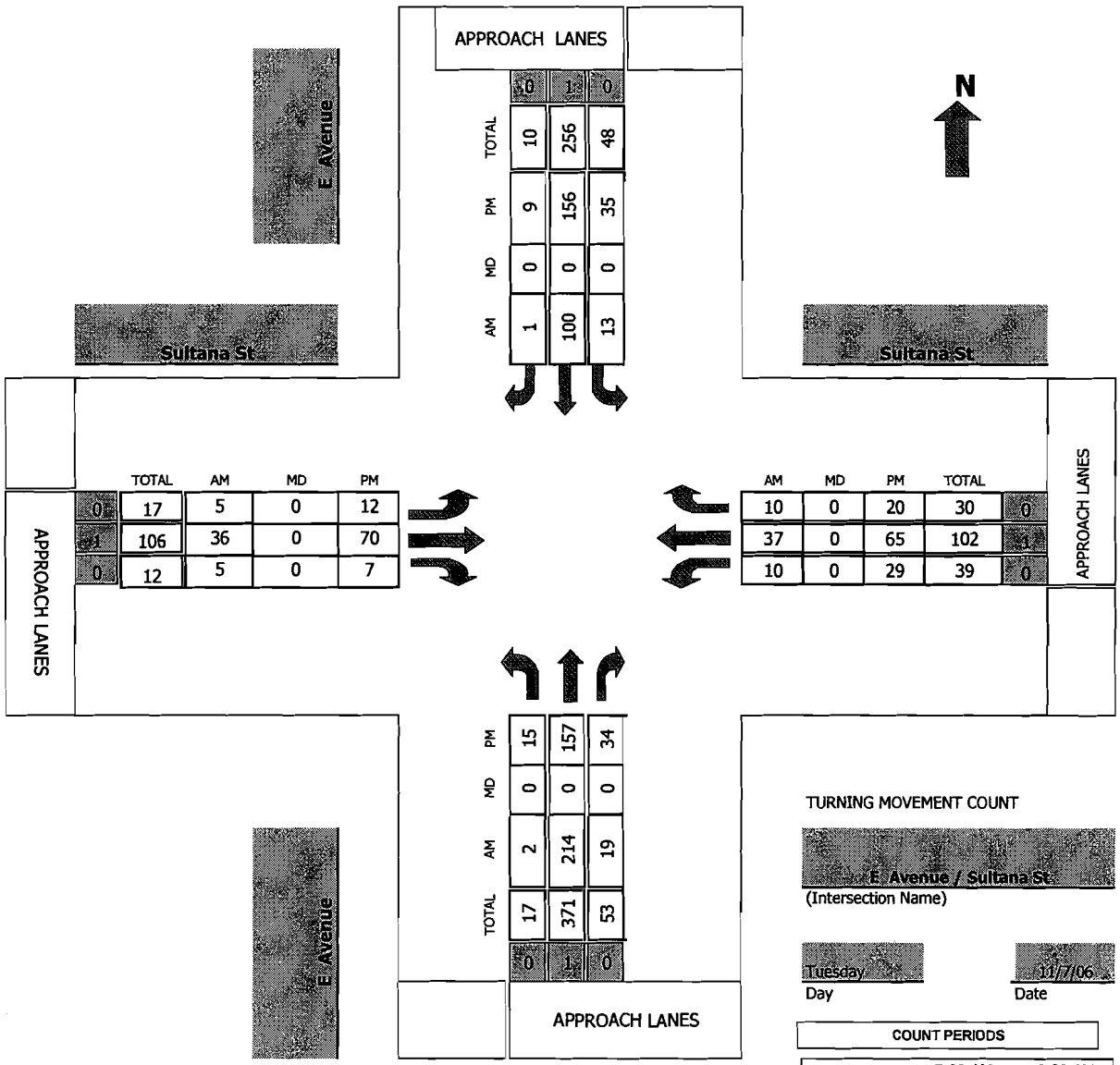
PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	0	126	181	25	77	0	0	0	0	40	0	17	466
PEAK HR. FACTOR:		0.783			0.911			0.000			0.548		0.863

CONTROL: One- Way Stop w/b

TMC Summary of E Avenue/Sultana St

Project #: 06-3448-028



TURNING MOVEMENT COUNT

E Avenue / Sultana St
(Intersection Name)

Tuesday — Day

11/7/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Sultana St DAY: TUESDAY PROJECT# 06-3448-028

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	31	4	2	11	1	2	15	1	5	12	4	88
7:15 AM	0	27	1	0	17	1	1	8	0	0	9	1	65
7:30 AM	2	35	2	1	16	0	1	4	1	1	9	1	73
7:45 AM	0	60	2	7	19	0	1	13	3	1	14	3	123
8:00 AM	0	47	3	4	19	0	4	8	0	4	13	4	106
8:15 AM	0	43	7	0	38	1	0	7	0	4	5	2	107
8:30 AM	2	64	7	2	24	0	0	8	2	1	5	1	116
8:45 AM	1	57	5	3	20	1	0	5	2	1	3	2	100
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	5	364	31	19	164	4	9	68	9	17	70	18	778
PEAK VOLUMES =	2	214	19	13	100	1	5	36	5	10	37	10	452
PEAK HR. FACTOR:		0.805			0.731			0.676			0.679		0.919

AM Peak Hr Begins at: 745 AM

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: E Avenue DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Sultana St DAY: TUESDAY PROJECT# 06-3448-028

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	45	5	4	49	1	2	12	3	10	13	2	148
4:15 PM	1	34	3	5	40	2	0	18	4	5	10	3	125
4:30 PM	2	35	4	9	36	3	2	15	3	6	20	7	142
4:45 PM	5	46	12	10	48	1	6	19	2	6	16	5	176
5:00 PM	5	36	11	9	42	2	3	20	1	10	17	3	159
5:15 PM	3	40	7	7	30	3	1	16	1	7	12	5	132
5:30 PM	1	31	4	8	32	0	2	21	2	4	9	4	118
5:45 PM	1	26	2	10	27	1	0	15	1	4	8	4	99
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 20	NT 293	NR 48	SL 62	ST 304	SR 13	EL 16	ET 136	ER 17	WL 52	WT 105	WR 33	TOTAL 1099

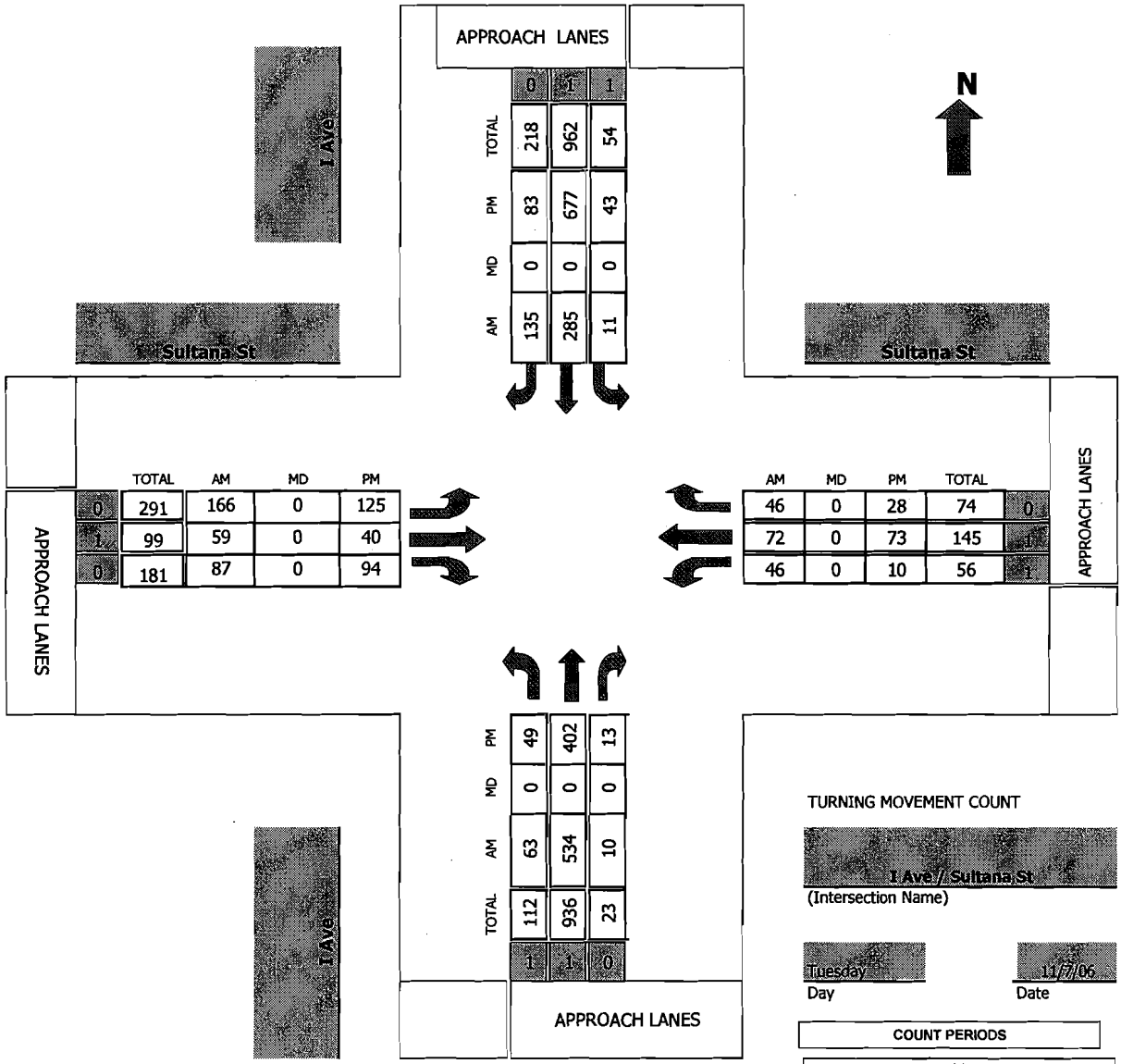
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	15	157	34	35	156	9	12	70	7	29	65	20	609
PEAK HR. FACTOR:		0.817			0.847			0.824			0.864		0.865

CONTROL: 4-Way Stop

TMC Summary of I Ave/Sultana St

Project #: 06-3448-029



TURNING MOVEMENT COUNT

I Ave // Sultana St
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/7/2006 LOCATION: City of Hesperia

E-W STREET: Sultana St DAY: TUESDAY PROJECT# 06-3448-029

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	0	1	1	0	1	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	8	79	0	2	50	10	9	2	4	2	7	3	176
7:15 AM	24	130	3	2	65	43	48	17	22	13	28	9	404
7:30 AM	26	181	3	1	100	67	63	21	29	30	28	27	576
7:45 AM	12	131	1	4	61	12	47	17	28	1	9	6	329
8:00 AM	1	92	3	4	59	13	8	4	8	2	7	4	205
8:15 AM	2	62	2	6	48	9	5	4	9	3	5	3	158
8:30 AM	2	52	3	3	44	9	6	5	11	6	9	3	153
8:45 AM	4	48	2	5	37	7	10	3	5	4	7	1	133
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	79	775	17	27	464	170	196	73	116	61	100	56	2134

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	63	534	10	11	285	135	166	59	87	46	72	46	1514
PEAK HR. FACTOR:		0.723			0.641			0.690			0.482		0.657

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave | DATE: 11/7/2006 | LOCATION: City of Hesperia

E-W STREET: Sultana St | DAY: TUESDAY | PROJECT# 06-3448-029

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	1	1	0	1	1	0	1	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	13	97	3	11	147	20	34	8	28	2	22	4	389
4:15 PM	11	112	2	13	169	17	29	9	24	4	16	8	414
4:30 PM	10	98	4	9	184	25	36	12	22	1	20	7	428
4:45 PM	15	95	4	10	177	21	26	11	20	3	15	9	406
5:00 PM	9	107	3	7	155	14	23	7	14	0	14	7	360
5:15 PM	9	98	0	9	192	23	14	12	17	1	7	4	386
5:30 PM	3	97	1	6	138	18	8	9	12	5	7	4	308
5:45 PM	14	92	0	4	135	31	10	3	10	1	6	5	311
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 84	NT 796	NR 17	SL 69	ST 1297	SR 169	EL 180	ET 71	ER 147	WL 17	WT 107	WR 48	TOTAL 3002

PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	49	402	13	43	677	83	125	40	94	10	73	28	1637
PEAK HR. FACTOR:		0.928			0.921			0.925			0.991		0.956

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-001

Location: SR-395 & Joshua St. City: Hesperia Date: 03/08/06 Day: WEDNESDAY

	LANES:	1	2	1	1	2	1	1	0.5	0.5	1	1	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	0	115	6	21	227	8	4	18	10	38	24	23
	2-axle		11	3		3			1			1	1
	3-axle					1					1		
	4-axle												
	5-axle +		19	2	7	19		1			5		2
7:15	CARS	0	89	17	4	178	5	12	16	2	21	7	24
	2-axle		8		2	5	2	1		1		1	1
	3-axle		1			1							
	4-axle												
	5-axle +		16	2	5	25	1				2		2
7:30	CARS	3	112	14	16	184	7	12	19	4	23	18	20
	2-axle		15	7	3	10	2		2		2	1	1
	3-axle		1									1	
	4-axle									1			
	5-axle +		18	2	2	35					3		3
7:45	CARS	1	88	14	13	152	9	4	12	6	17	20	17
	2-axle		10		1	4			1		2	1	1
	3-axle		1	1	1	1		1					1
	4-axle												
	5-axle +		13	1	3	27					3	1	6
8:00	CARS	3	68	11	9	148	6	6	9	1	15	15	19
	2-axle		10	1	1	2		1			1		
	3-axle		1			2							1
	4-axle					1							
	5-axle +		22	2	1	29					6		4
8:15	CARS	2	79	5	6	100	4	6	15	1	16	7	14
	2-axle		16		4	4		1	3		2		1
	3-axle					2	1	1	1				1
	4-axle												
	5-axle +		26	3	2	38					4	1	3
8:30	CARS	4	80	6	10	98	2	6	14	1	17	8	16
	2-axle		5		1	4					2	1	1
	3-axle					1							
	4-axle												
	5-axle +		16	1	3	37					2		2
8:45	CARS	0	56	13	8	121	4	7	9	1	12	10	21
	2-axle	2	5	1		5							1
	3-axle							1	1				
	4-axle												
	5-axle +		25	3	2	30		1	1		2		1

MOVEMENT TOTALS

CARS	13	687	86	87	1208	45	57	112	26	159	109	154
2-axle	2	80	12	12	37	4	3	7	1	9	5	7
3-axle	0	4	1	1	8	1	3	2	0	1	1	3
4-axle	0	0	0	0	1	0	0	0	1	0	0	0
5-axle +	0	155	16	25	240	1	2	1	0	27	2	23
TOTALS	15	926	115	125	1494	51	65	122	28	196	117	187
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	4	517	69	78	872	34	35	69	24	117	75	102
PEAK HR. FACTOR:		0.858			0.860			0.842			0.774	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3115-001

Location: SR-395 & Joshua St. City: Hesperia Date: 03/08/06 Day: WEDNESDAY

	LANES:	1	2	1	1	2	1	1	0.5	0.5	1	1	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS	5	109	21	16	147	4	12	19	0	22	10	16
	2-axle	1	2	1	2	7		2			1	1	1
	3-axle		1										
	4-axle												
	5-axle +		26	4	8	21							5
16:15	CARS	5	216	22	14	132	11	13	18	2	18	10	24
	2-axle	1	4	1		5	2		1		2	1	1
	3-axle					2							
	4-axle												
	5-axle +		28	2	2	29					5		5
16:30	CARS	7	186	19	11	94	3	8	14	0	11	8	20
	2-axle		2			7	1	1	1		2	2	1
	3-axle		1					1			1		1
	4-axle												
	5-axle +		25	1	3	17					2	1	4
16:45	CARS	16	178	20	18	98	10	16	24	2	13	11	18
	2-axle		2		0	12					1	1	
	3-axle				2	4						1	
	4-axle												
	5-axle +		24	2	8	28							7
17:00	CARS	4	150	16	6	79	4	9	16	1	10	11	13
	2-axle		4		1	2		1					1
	3-axle							1					
	4-axle					1							
	5-axle +		33	4	2	22					2	2	4
17:15	CARS	12	226	18	12	93	3	28	30	1	15	13	23
	2-axle	1	3		1	5	2		1		2	1	
	3-axle			1		1							
	4-axle		1										
	5-axle +		25	5	5	23					1		3
17:30	CARS	14	222	20	8	102	10	19	18	2	10	12	17
	2-axle		6			3		1	1	1	1	2	1
	3-axle					1					1		
	4-axle												
	5-axle +		22	3	5	29					2		2
17:45	CARS	14	234	18	5	82	4	21	33	2	10	9	15
	2-axle		2			4		1					
	3-axle												
	4-axle												
	5-axle +		5	2	1	2						3	2

MOVEMENT TOTALS

CARS	77	1521	154	90	827	49	126	172	10	109	84	146
2-axle	3	25	2	4	45	5	6	4	1	9	8	5
3-axle	0	2	1	2	8	0	2	0	0	2	1	1
4-axle	0	1	0	0	1	0	0	0	0	0	0	0
5-axle +	0	188	23	34	171	0	0	0	0	12	6	32
TOTALS	80	1737	180	130	1052	54	134	176	11	132	99	184
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 1600 PM

PEAK VOLUMES =	35	804	93	84	603	31	53	77	4	78	46	103
PEAK HR. FACTOR:		0.835			0.876			0.798			0.860	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-007Axl

Location: I-15 NB Ramps & Main St. City: Hesperia Date: 02/08/2006 Day: WEDNESDAY

	LANES:	0.5	0.5	1.5	0	0	0	0	3	0	0	3	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
7:00	CARS	6	0	96					138	43		228	44
	2-axle	4							9	2		5	1
	3-axle											2	1
	4-axle			1									
	5-axle +	3		1					4			3	2
7:15	CARS	6	0	99					118	39		270	74
	2-axle	1		1					10			2	1
	3-axle	1								1			1
	4-axle	1							3				
	5-axle +	2		2					4			6	4
7:30	CARS	2	0	99					123	42		268	88
	2-axle	3		1					7	4		1	1
	3-axle									1		3	2
	4-axle			1									
	5-axle +	4							6			4	3
7:45	CARS	2	0	84					125	63		210	62
	2-axle	4							8	1		1	3
	3-axle	1		1					1			1	
	4-axle	2							1				1
	5-axle +	5		2					3	1		6	3
8:00	CARS	1	0	91					129	29		216	43
	2-axle	4		2					9	2		2	4
	3-axle			2					1				1
	4-axle	1							1				
	5-axle +			2					7			2	2
8:15	CARS	6	2	75					103	28		213	50
	2-axle	5		1					12	2		4	4
	3-axle	1							1			1	1
	4-axle												
	5-axle +	1		1					7			3	5
8:30	CARS	5	0	73					132	26		194	38
	2-axle	5							4			4	1
	3-axle	4							4				1
	4-axle												
	5-axle +			1					9	1		5	1
8:45	CARS	8	0	76					112	16		179	54
	2-axle	6							10	1		4	5
	3-axle			4					4				1
	4-axle	1											
	5-axle +	4		1					3	2		1	

MOVEMENT TOTALS

CARS	36	2	693	0	0	0	0	980	286	0	1778	453
2-axle	32	0	5	0	0	0	0	69	12	0	23	20
3-axle	7	0	7	0	0	0	0	11	2	0	7	8
4-axle	5	0	2	0	0	0	0	5	0	0	0	1
5-axle +	19	0	10	0	0	0	0	43	4	0	30	20
TOTALS	99	2	717	0	0	0	0	1108	304	0	1838	502
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

PM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	47	0	388	0	0	0	0	560	197	0	1010	291
PEAK HR. FACTOR:		0.962			0.000			0.932			0.879	

CONTROL: Signalized

SOUTHLAND CAR COUNTERS

Axle Count

Project # 06-3063-007Axl

Location: I-15 NB Ramps & Main St. City: Hesperia Date: 02/08/2006 Day: WEDNESDAY

	LANES:	0.5	0.5	1.5	0	0	0	0	3	0	0	3	1
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
16:00	CARS	21	1	201					168	15		249	63
	2-axle	1							10			4	3
	3-axle	1							2				2
	4-axle											1	
	5-axle +	2		2					2			3	1
16:15	CARS	10	0	218					177	16		267	71
	2-axle	1							6				1
	3-axle			1					2			1	3
	4-axle	2											
	5-axle +	2							3			2	3
16:30	CARS	17	0	210					162	12		272	65
	2-axle								3	1		4	4
	3-axle	1							1	1		1	1
	4-axle												
	5-axle +								4	1		3	
16:45	CARS	27	0	235					163	13		297	51
	2-axle	3							7			2	1
	3-axle												2
	4-axle												
	5-axle +	2							7			8	
17:00	CARS	19	0	239					157	19		290	61
	2-axle	2		2					7			2	5
	3-axle	1							1			1	
	4-axle	1											
	5-axle +								5				1
17:15	CARS	22	1	237					158	14		295	68
	2-axle	4							4	2		1	4
	3-axle								1	2			
	4-axle												
	5-axle +	3		1					7				2
17:30	CARS	20	0	214					155	11		263	55
	2-axle	1							6			2	3
	3-axle								4				
	4-axle								1				
	5-axle +			2					3			6	3
17:45	CARS	13	0	167					148	10		251	57
	2-axle								6			1	3
	3-axle	1										2	
	4-axle								1				1
	5-axle +	1		1					3	2		2	2

MOVEMENT TOTALS

CARS	149	2	1721	0	0	0	0	1288	110	0	2184	491
2-axle	12	0	2	0	0	0	0	49	3	0	16	24
3-axle	4	0	1	0	0	0	0	11	3	0	5	8
4-axle	3	0	0	0	0	0	0	2	0	0	1	1
5-axle +	10	0	6	0	0	0	0	34	3	0	24	12
TOTALS	178	2	1730	0	0	0	0	1384	119	0	2230	536
	NL	*NT*	*NR*	*SL*	*ST*	*SR*	*EL*	*ET*	*ER*	*WL*	*WT*	*WR*

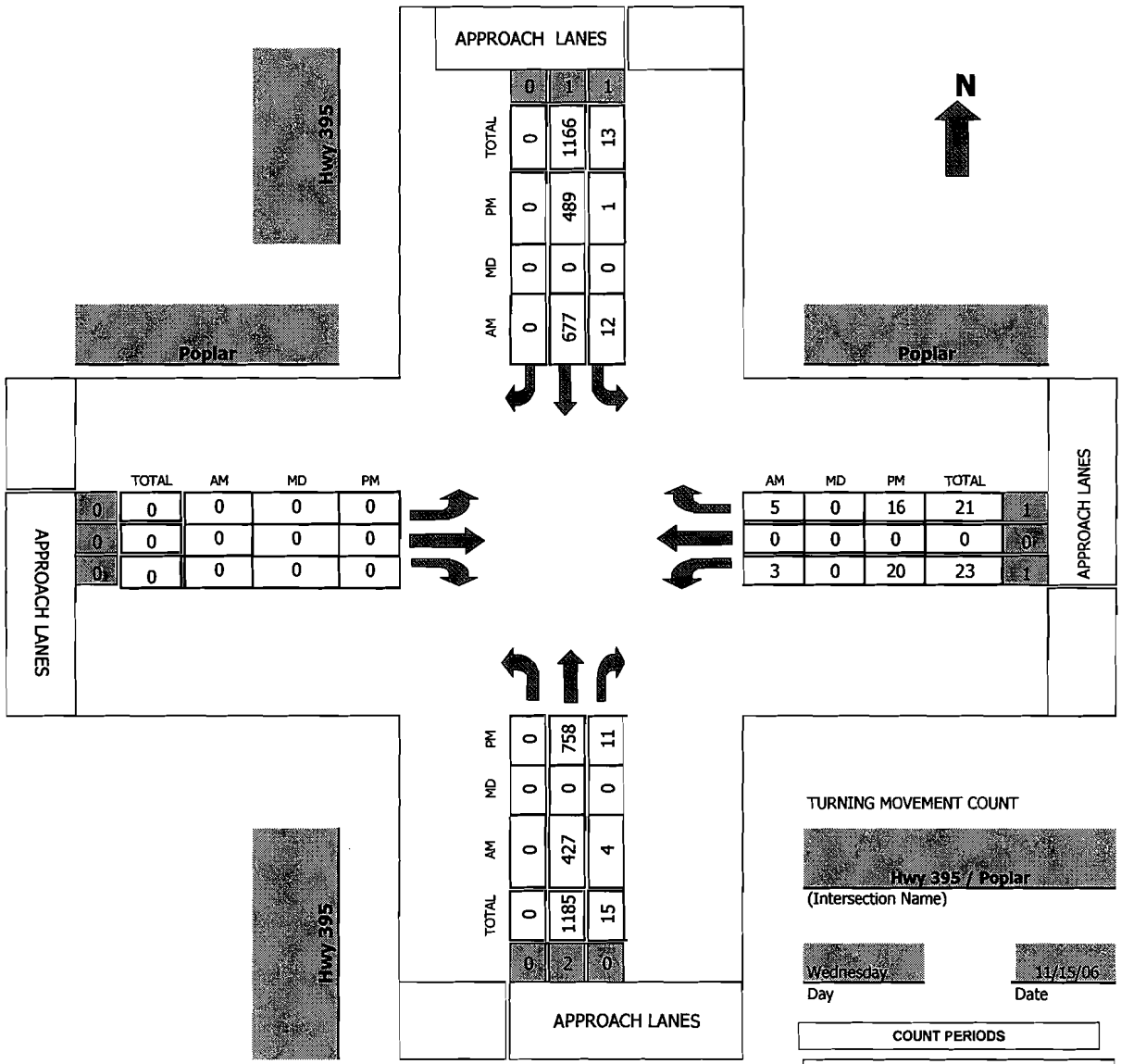
PM Peak Hr Begins at: 1630 PM

PEAK VOLUMES =	102	1	924	0	0	0	0	687	65	0	1176	265
PEAK HR. FACTOR:		0.958			0.000			0.989			0.974	

CONTROL: Signalized

TMC Summary of Hwy 395/Poplar

Project #: 06-3448-031



TURNING MOVEMENT COUNT

Hwy 395 / Poplar
(Intersection Name)

Wednesday — Day

11/15/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	430 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hwy 395 DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Poplar DAY: WEDNESDAY PROJECT# 06-3448-031

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	2	0	1	1	0	0	0	0	1	0	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	125	2	2	127					1		1	258
7:15 AM	0	106	3	1	132					0		2	244
7:30 AM	0	133	1	4	151					2		3	294
7:45 AM	0	118	0	5	151					0		0	274
8:00 AM	0	93	3	1	181					1		1	280
8:15 AM	0	83	0	2	194					0		1	280
8:30 AM	0	76	2	1	189					1		0	269
8:45 AM	1	74	1	0	156					0		1	233
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	1	808	12	16	1281	0	0	0	0	5	0	9	2132

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	0	427	4	12	677	0	0	0	0	3	0	5	1128
PEAK HR. FACTOR:		0.804			0.879			0.000			0.400		0.959

CONTROL: 1-Way Stop W

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Hwy 395 DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: Poplar DAY: WEDNESDAY PROJECT# 06-3448-031

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	2	0	1	1	0	0	0	0	1	0	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		119	4	0	88					0		7	218
4:15 PM		173	6	0	113					3		7	302
4:30 PM		185	5	0	124					4		9	327
4:45 PM		191	4	1	134					7		4	341
5:00 PM		196	0	0	118					4		2	320
5:15 PM		186	2	0	113					5		1	307
5:30 PM		174	1	0	104					4		4	287
5:45 PM		166	0	0	87					1		2	256
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	0	1390	22	1	881	0	0	0	0	28	0	36	2358

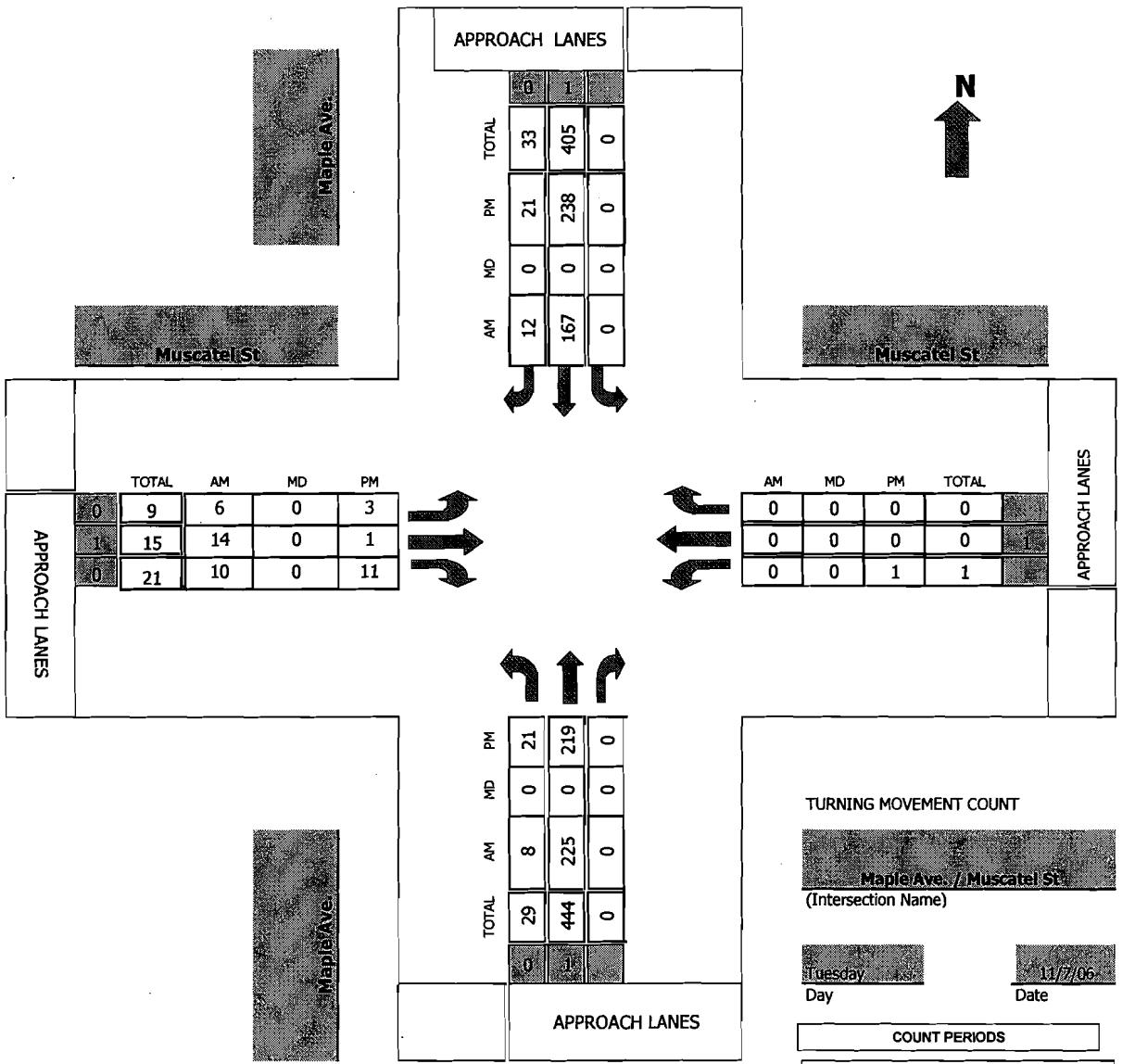
PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	0	758	11	1	489	0	0	0	0	20	0	16	1295
PEAK HR. FACTOR:		0.981			0.907			0.000			0.692		0.949

CONTROL: 1-Way Stop W

TMC Summary of Maple Ave./Muscatel St

Project #: 06-3448-033



0	1		
33	405	0	TOTAL
21	238	0	PM
0	0	0	MD
12	167	0	AM

0	9	6	0	3
15	15	14	0	1
0	21	10	0	11

0	0	0	0	
0	0	0	0	1
0	0	1	1	

21	219	0	PM
0	0	0	MD
8	225	0	AM
29	444	0	TOTAL
0	1		

COUNT PERIODS

am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	700 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Muscatel St DAY: TUESDAY PROJECT# 06-3448-033

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1			1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	84			50	2	2	2	1	0	0	0	143
7:15 AM	1	66			44	5	0	4	4	0	0	0	124
7:30 AM	3	40			43	3	1	5	2	0	0	0	97
7:45 AM	2	35			30	2	3	3	3	0	0	0	78
8:00 AM	4	30			35	4	5	5	2	0	1	0	86
8:15 AM	2	44			40	5	4	3	1	0	0	0	99
8:30 AM	0	40			33	3	2	4	3	0	0	0	85
8:45 AM	1	35			32	2	3	2	3	0	0	0	78
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	15	374	0	0	307	26	20	28	19	0	1	0	790

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	8	225	0	0	167	12	6	14	10	0	0	0	442
PEAK HR. FACTOR:		0.677			0.861			0.833			0.000		0.773

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Maple Ave. DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Muscatel St DAY: TUESDAY PROJECT# 06-3448-033

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1			1	0	0	1	0				
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	51			55	2	4	0	2	0	0	0	116
4:15 PM	4	51			59	4	2	1	2	0	0	1	124
4:30 PM	3	45			64	5	3	0	1	0	0	0	121
4:45 PM	5	40			50	3	2	0	0	0	0	0	100
5:00 PM	6	60			57	5	0	0	2	0	0	0	130
5:15 PM	7	54			74	7	1	0	4	0	0	0	147
5:30 PM	5	50			54	5	0	1	3	1	0	0	119
5:45 PM	3	55			53	4	2	0	2	0	0	0	119
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 35	NT 406	NR 0	SL 0	ST 466	SR 35	EL 14	ET 2	ER 16	WL 1	WT 0	WR 1	TOTAL 976

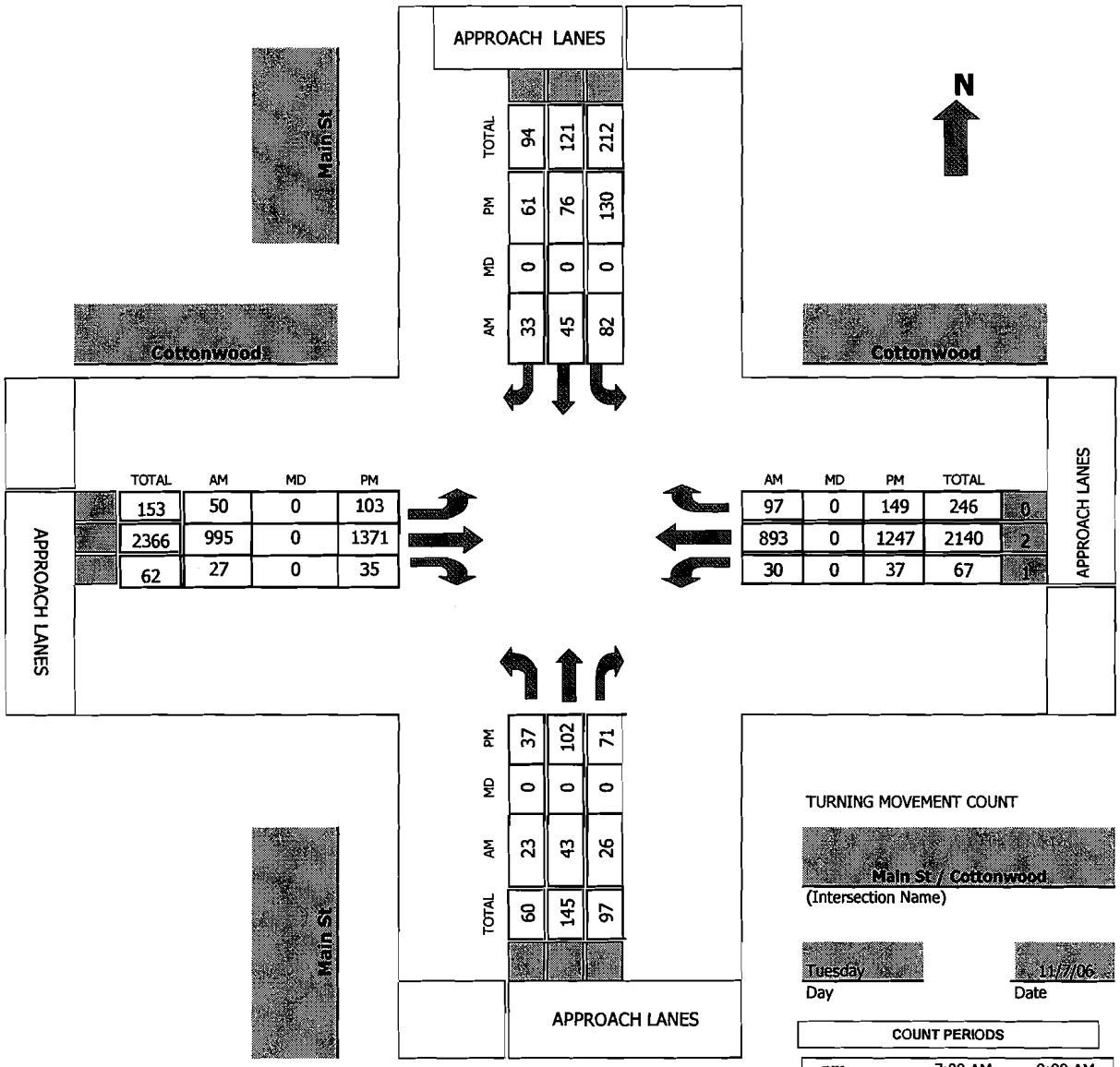
PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	21	219	0	0	238	21	3	1	11	1	0	0	515
PEAK HR. FACTOR:		0.909			0.799			0.750			0.250		0.876

CONTROL: Signalized;

TMC Summary of Main St/Cottonwood

Project #: 06-3448-034



TURNING MOVEMENT COUNT

Main St / Cottonwood
(Intersection Name)

Tuesday
Day

11/7/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Cottonwood DAY: TUESDAY PROJECT# 06-3448-034

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	10	16	10	30	11	8	10	201	2	2	222	18	540
7:15 AM	8	15	8	25	15	10	8	214	3	5	234	16	561
7:30 AM	6	21	6	20	16	6	6	201	5	6	247	15	555
7:45 AM	7	20	7	16	18	7	8	222	4	7	257	18	591
8:00 AM	5	15	6	15	17	8	7	233	6	5	245	21	583
8:15 AM	6	15	8	21	11	6	6	242	7	6	211	22	561
8:30 AM	7	11	6	22	8	8	15	254	6	8	222	30	597
8:45 AM	5	2	6	24	9	11	22	266	8	11	215	24	603
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	54	115	57	173	105	64	82	1833	41	50	1853	164	4591

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	23	43	26	82	45	33	50	995	27	30	893	97	2344
PEAK HR. FACTOR:		0.793			0.909			0.905			0.941		0.972

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Cottonwood DAY: TUESDAY PROJECT# 06-3448-034

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	10	17	11	25	22	17	11	312	10	17	286	31	769
4:15 PM	11	18	15	30	25	15	17	313	8	10	295	28	785
4:30 PM	15	15	20	42	25	21	20	322	7	13	321	22	843
4:45 PM	13	25	21	40	15	20	25	305	6	15	332	40	857
5:00 PM	10	22	15	35	18	15	26	346	10	11	313	35	856
5:15 PM	8	30	18	30	22	15	30	352	11	6	311	30	863
5:30 PM	6	25	17	25	21	11	22	368	8	5	291	44	843
5:45 PM	15	20	11	20	18	10	21	363	6	2	286	40	812
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 88	NT 172	NR 128	SL 247	ST 166	SR 124	EL 172	ET 2681	ER 66	WL 79	WT 2435	WR 270	TOTAL 6628

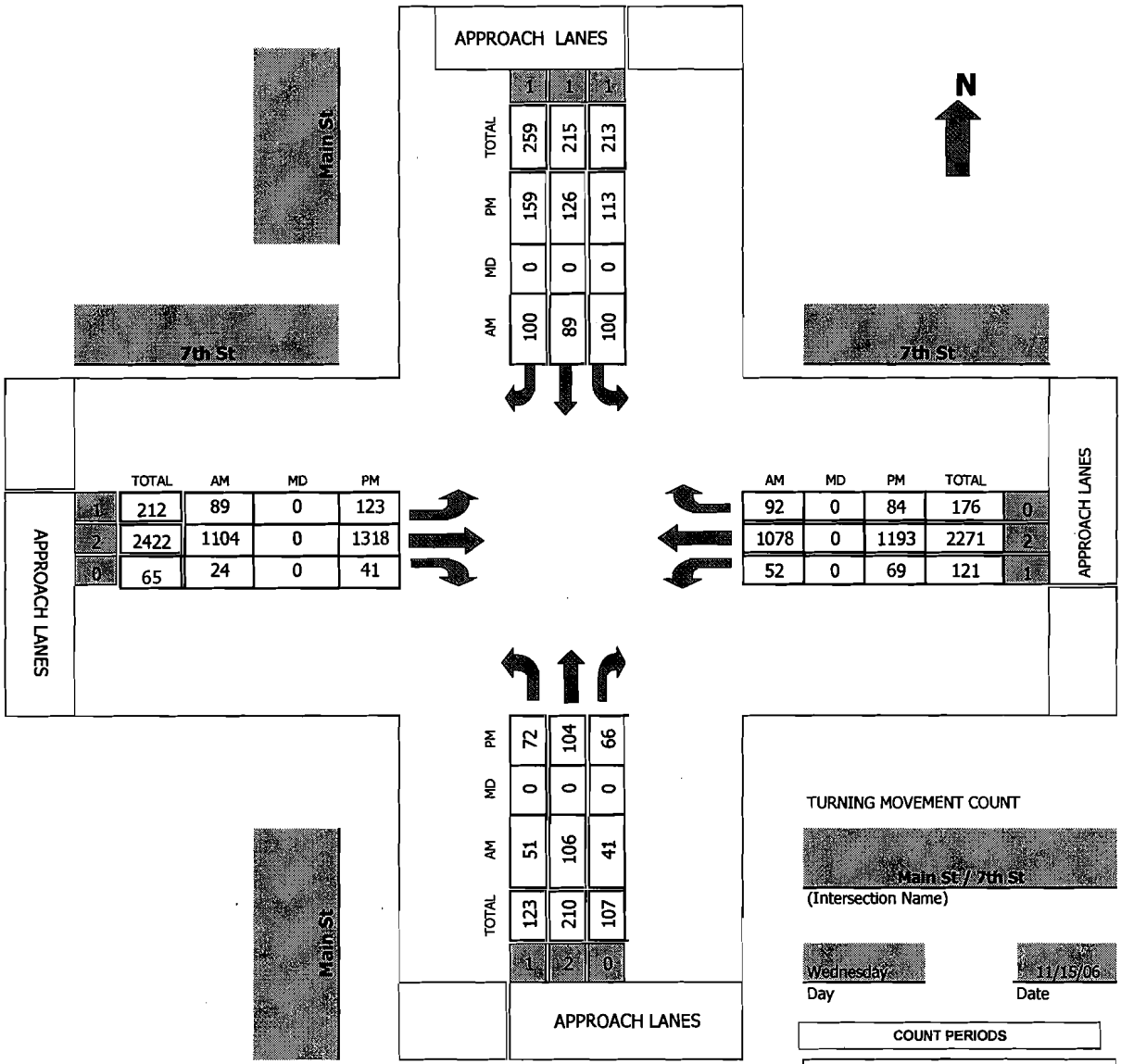
PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	37	102	71	130	76	61	103	1371	35	37	1247	149	3419
PEAK HR. FACTOR:		0.890			0.890			0.948			0.926		0.990

CONTROL: Signalized

TMC Summary of Main St/7th St

Project #: 06-3448-035



TURNING MOVEMENT COUNT

Main St / 7th St
(Intersection Name)

Wednesday
Day

11/15/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	730 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: 7th St DAY: WEDNESDAY PROJECT# 06-3448-035

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	1	1	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	10	10	5	10	11	18	27	175	16	11	269	26	588
7:15 AM	13	20	8	22	14	19	19	231	8	5	248	38	645
7:30 AM	16	26	11	25	12	19	23	251	7	11	254	18	673
7:45 AM	12	31	11	24	28	29	21	309	4	11	259	22	761
8:00 AM	14	27	10	28	29	32	20	286	5	13	297	27	788
8:15 AM	9	22	9	23	20	20	25	258	8	17	268	25	704
8:30 AM	12	19	6	17	13	21	24	200	7	15	277	17	628
8:45 AM	9	13	6	20	13	13	11	169	5	20	232	20	531
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 95	NT 168	NR 66	SL 169	ST 140	SR 171	EL 170	ET 1879	ER 60	WL 103	WT 2104	WR 193	TOTAL 5318

AM Peak Hr Begins at: 730 AM

PEAK VOLUMES =	51	106	41	100	89	100	89	1104	24	52	1078	92	2926
PEAK HR. FACTOR:		0.917			0.812			0.911			0.907		0.928

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/15/2006 LOCATION: City of Hesperia

E-W STREET: 7th St DAY: WEDNESDAY PROJECT# 06-3448-035

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	1	1	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	14	29	16	32	26	30	31	361	8	25	332	24	928
4:15 PM	14	28	17	23	25	46	31	319	15	12	327	21	878
4:30 PM	19	27	13	28	39	40	28	298	7	17	245	15	776
4:45 PM	25	20	20	30	36	43	33	340	11	15	289	24	886
5:00 PM	18	19	24	27	37	40	34	352	9	20	282	20	882
5:15 PM	20	22	18	24	30	34	24	303	12	25	254	17	783
5:30 PM	16	17	21	26	33	27	30	278	13	22	198	15	696
5:45 PM	12	11	24	20	24	22	19	247	12	17	201	11	620
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 138	NT 173	NR 153	SL 210	ST 250	SR 282	EL 230	ET 2498	ER 87	WL 153	WT 2128	WR 147	TOTAL 6449

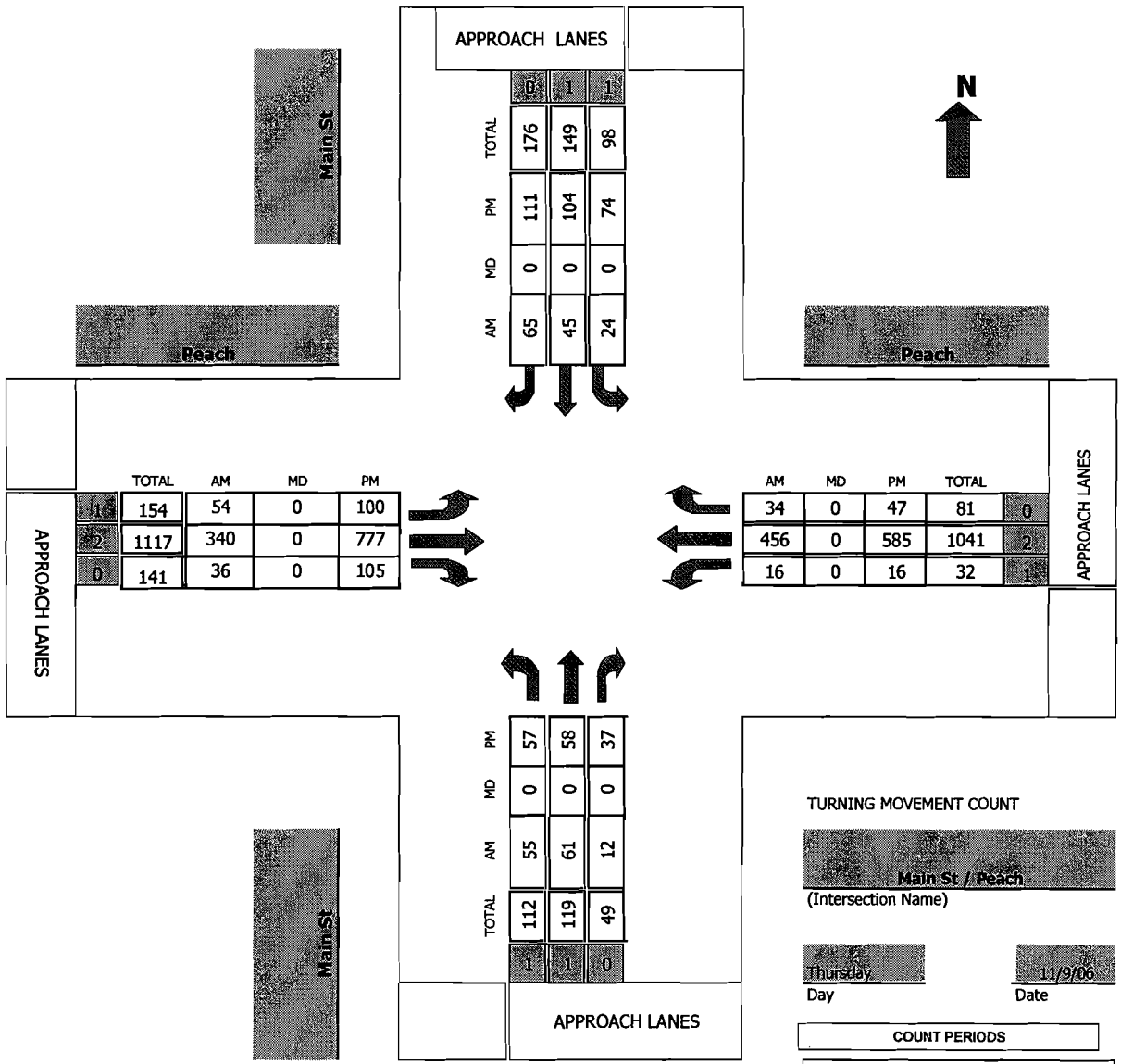
PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	72	104	66	113	126	159	123	1318	41	69	1193	84	3468
PEAK HR. FACTOR:		0.931			0.913			0.926			0.883		0.934

CONTROL: Signalized

TMC Summary of Main St/Peach

Project #: 06-3448-036



TURNING MOVEMENT COUNT

Main St / Peach
(Intersection Name)

Thursday
Day

11/9/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Peach DAY: THURSDAY PROJECT# 06-3448-036

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	20	15	4	4	10	19	22	86	3	3	66	7	259
7:15 AM	25	27	4	9	15	21	18	91	7	5	69	11	302
7:30 AM	21	18	5	5	11	33	17	102	9	1	64	8	294
7:45 AM	16	13	2	4	6	16	19	114	9	3	72	6	280
8:00 AM	19	10	4	2	9	10	16	96	14	6	78	3	267
8:15 AM	13	11	6	6	13	14	14	78	10	2	103	16	286
8:30 AM	12	21	0	3	9	25	10	79	8	4	138	4	313
8:45 AM	11	19	2	13	14	16	14	87	4	4	137	11	332
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 137	NT 134	NR 27	SL 46	ST 87	SR 154	EL 130	ET 733	ER 64	WL 28	WT 727	WR 66	TOTAL 2333

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	55	61	12	24	45	65	54	340	36	16	456	34	1198
PEAK HR. FACTOR:		0.970			0.779			0.853			0.832		0.902

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Main St DATE: 11/9/2006 LOCATION: City of Hesperia

E-W STREET: Peach DAY: THURSDAY PROJECT# 06-3448-036

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	8	12	8	7	12	12	9	87	7	5	59	4	230
4:15 PM	11	7	6	6	12	14	11	109	7	9	74	9	275
4:30 PM	8	8	8	9	16	22	18	140	10	7	66	7	319
4:45 PM	14	9	6	18	15	24	18	201	15	3	139	9	471
5:00 PM	9	18	13	16	25	21	24	202	25	2	131	9	495
5:15 PM	18	14	7	18	38	36	32	213	36	4	182	16	614
5:30 PM	16	17	11	22	26	30	26	161	29	7	133	13	491
5:45 PM	18	19	9	15	32	22	17	82	22	11	105	6	358
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 102	NT 104	NR 68	SL 111	ST 176	SR 181	EL 155	ET 1195	ER 151	WL 48	WT 889	WR 73	TOTAL 3253

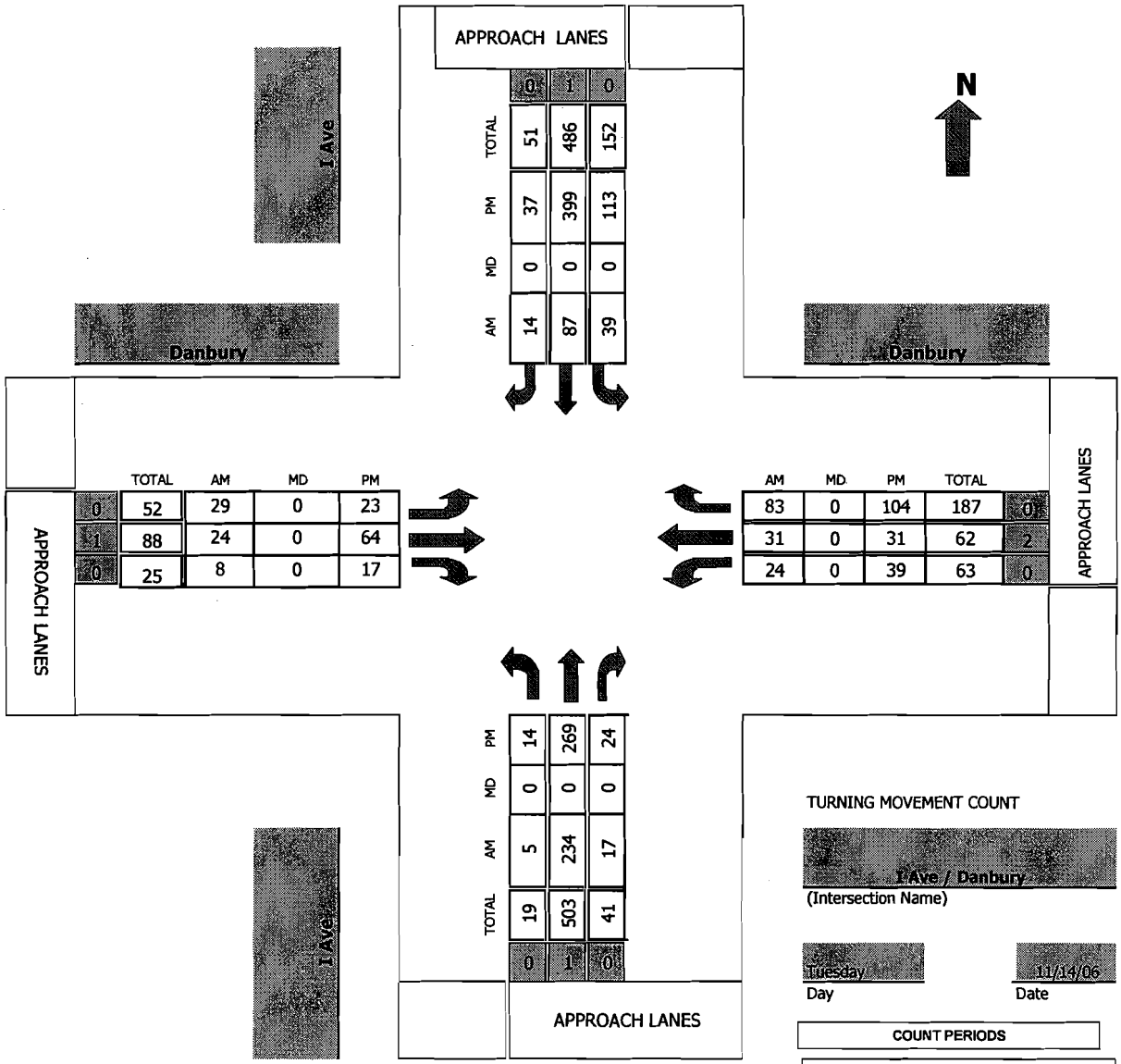
PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	57	58	37	74	104	111	100	777	105	16	585	47	2071
PEAK HR. FACTOR:		0.864			0.785			0.874			0.802		0.843

CONTROL: Signalized

TMC Summary of I Ave/Danbury

Project #: 06-3448-037



TURNING MOVEMENT COUNT

I Ave / Danbury
(Intersection Name)

Tuesday
Day

11/14/06
Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Danbury DAY: TUESDAY PROJECT# 06-3448-037

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	0	1	0	0	2	0	0	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	47	2	11	19	4	2	6	1	4	10	29	137
7:15 AM	2	54	2	8	13	2	8	7	3	3	8	32	142
7:30 AM	3	61	1	6	23	3	8	3	3	3	8	36	158
7:45 AM	1	47	7	6	16	2	13	10	3	3	9	21	138
8:00 AM	2	34	1	9	21	5	8	4	1	6	13	21	125
8:15 AM	1	51	2	12	19	2	5	2	2	7	8	25	136
8:30 AM	1	72	8	10	30	4	9	10	3	6	4	22	179
8:45 AM	1	77	6	8	17	3	7	8	2	5	6	15	155
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 13	NT 443	NR 29	SL 70	ST 158	SR 25	EL 60	ET 50	ER 18	WL 37	WT 66	WR 201	TOTAL 1170

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	5	234	17	39	87	14	29	24	8	24	31	83	595
PEAK HR. FACTOR:		0.762			0.795			0.693			0.863		0.831

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: I Ave DATE: 11/14/2006 LOCATION: City of Hesperia

E-W STREET: Danbury DAY: TUESDAY PROJECT# 06-3448-037

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	0	1	0	0	2	0	0	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	5	39	4	34	72	7	8	10	4	3	11	21	218
4:15 PM	2	42	3	18	80	15	12	16	8	9	14	26	245
4:30 PM	1	48	5	21	79	7	5	12	7	5	7	21	218
4:45 PM	6	61	10	24	71	6	5	12	7	5	9	25	241
5:00 PM	6	68	5	33	85	6	6	19	4	9	11	25	277
5:15 PM	1	66	7	26	107	12	6	18	5	12	6	31	297
5:30 PM	4	73	7	31	116	9	6	15	4	11	8	26	310
5:45 PM	3	62	5	23	91	10	5	12	4	7	6	22	250
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 28	NT 459	NR 46	SL 210	ST 701	SR 72	EL 53	ET 114	ER 43	WL 61	WT 72	WR 197	TOTAL 2056

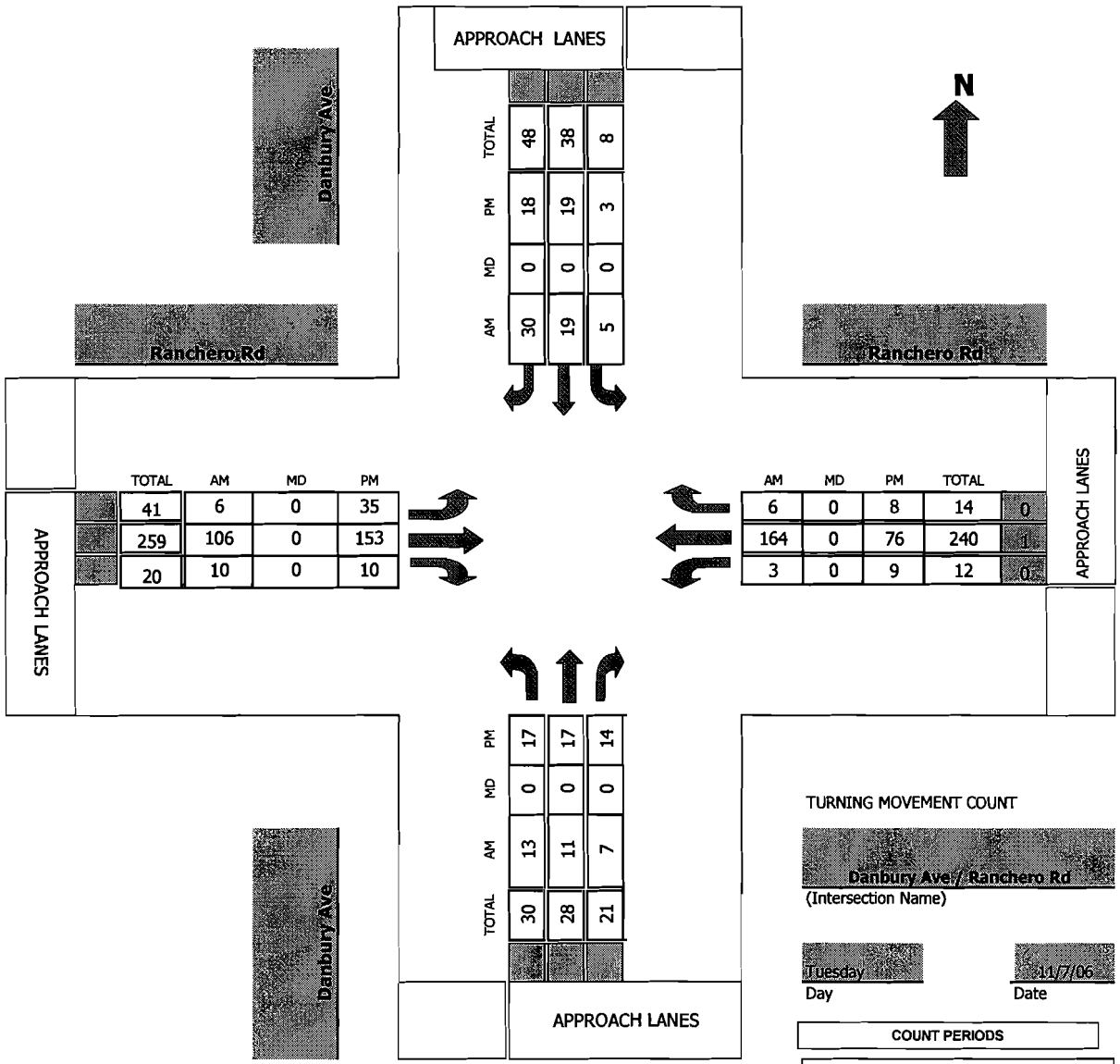
PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	14	269	24	113	399	37	23	64	17	39	31	104	1134
PEAK HR. FACTOR:		0.914			0.880			0.897			0.888		0.915

CONTROL: 4-Way Stop

TMC Summary of Danbury Ave/Ranchero Rd

Project #: 06-3448-038



TURNING MOVEMENT COUNT

Danbury Ave / Ranchero Rd
(Intersection Name)

Tuesday — Day

11/7/06 — Date

COUNT PERIODS		
am	7:00 AM -	9:00 AM
noon	11:00 AM -	1:00 PM
pm	4:00 PM -	6:00 PM

AM PEAK HOUR	715 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	415 PM

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Danbury Ave DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-038

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	1	2	1	2	8	2	11	2	1	40	1	73
7:15 AM	4	2	1	2	5	11	1	30	1	1	33	2	93
7:30 AM	3	4	3	1	6	5	3	40	3	0	39	3	110
7:45 AM	2	2	2	0	3	6	2	25	4	0	42	1	89
8:00 AM	4	3	1	2	5	8	0	11	2	2	50	0	88
8:15 AM	2	1	0	3	2	10	1	6	3	1	40	3	72
8:30 AM	3	0	2	1	4	3	2	5	1	0	30	1	52
8:45 AM	1	2	1	2	1	2	1	2	3	2	22	2	41
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	21	15	12	12	28	53	12	130	19	7	296	13	618
PEAK VOLUMES =	13	11	7	5	19	30	6	106	10	3	164	6	380
PEAK HR. FACTOR:		0.775			0.750			0.663			0.832		0.864

AM Peak Hr Begins at: 715 AM

CONTROL:

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Danbury Ave DATE: 11/07/2006 LOCATION: City of Hesperia

E-W STREET: Ranchero Rd DAY: TUESDAY PROJECT# 06-3448-038

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	2	10	2	1	4	4	2	38	2	2	22	2	91
4:15 PM	4	5	5	1	5	6	4	45	1	2	25	3	106
4:30 PM	5	3	4	0	3	3	5	40	3	4	20	2	92
4:45 PM	3	4	2	2	5	4	11	35	4	1	15	1	87
5:00 PM	5	5	3	0	6	5	15	33	2	2	16	2	94
5:15 PM	3	3	2	0	7	3	10	40	5	3	18	3	97
5:30 PM	5	1	0	1	5	4	8	44	4	1	20	1	94
5:45 PM	4	2	1	0	3	2	9	40	3	2	15	2	83
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	31	33	19	5	38	31	64	315	24	17	151	16	744

PM Peak Hr Begins at: 415 PM

PEAK VOLUMES =	17	17	14	3	19	18	35	153	10	9	76	8	379
PEAK HR. FACTOR:		0.857			0.833			0.990			0.775		0.894

CONTROL:

Appendix B

- **Synchro Analysis Worksheets**

Appendix B-1

- **Existing Conditions**



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	83	32	0	0	235	18	0	0	0	13	0	109
Peak Hour Factor	0.87	0.87	0.87	0.85	0.85	0.85	0.25	0.25	0.25	0.82	0.82	0.82
Hourly flow rate (veh/h)	95	37	0	0	276	21	0	0	0	16	0	133
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	298			37			648	525	37	515	515	287
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	298			37			648	525	37	515	515	287
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			100	100	100	96	100	82
cM capacity (veh/h)	1264			1574			298	423	1036	443	429	752

Direction, Lane #	EB 1	WB 1	SW 1
Volume Total	132	298	149
Volume Left	95	0	16
Volume Right	0	21	133
cSH	1264	1700	700
Volume to Capacity	0.08	0.18	0.21
Queue Length (ft)	6	0	20
Control Delay (s)	6.0	0.0	11.5
Lane LOS	A		B
Approach Delay (s)	6.0	0.0	11.5
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SWL	SWT	SWR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	235	72	0	0	47	18	0	0	0	17	0	79
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.25	0.25	0.25	0.80	0.80	0.80
Hourly flow rate (veh/h)	250	77	0	0	58	22	0	0	0	21	0	99
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	80			77			744	657	77	646	646	69
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80			77			744	657	77	646	646	69
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	84			100			100	100	100	94	100	90
cM capacity (veh/h)	1518			1522			260	321	984	336	326	994

Volume Total	EB	WB	SW
Volume Total	327	80	120
Volume Left	250	0	21
Volume Right	0	22	99
cSH	1518	1700	738
Volume to Capacity	0.16	0.05	0.16
Queue Length (ft)	15	0	14
Control Delay (s)	6.3	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	6.3	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A



Movement	EBL	EBR	EBR2	NBL	NBR	NWL2	NWL	NWR	SWL2	SWL	SWR
Lane Configurations											
Sign Control	Free			Stop			Free			Stop	
Grade	0%			0%			0%			0%	
Volume (veh/h)	0	48	60	0	0	447	37	0	17	0	12
Peak Hour Factor	0.61	0.61	0.61	0.92	0.92	0.76	0.76	0.76	0.66	0.66	0.66
Hourly flow rate (veh/h)	0	79	98	0	0	588	49	0	26	0	18
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type				None						None	
Median storage veh)											
Upstream signal (ft)											
pX, platoon unblocked											
vC, conflicting volume	49			1371	1353	177			1353	1402	49
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	49			1371	1353	177			1353	1402	49
tC, single (s)	4.1			7.1	6.5	4.1			7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	2.2			3.5	4.0	2.2			3.5	4.0	3.3
p0 queue free %	100			100	100	58			70	100	98
cM capacity (veh/h)	1558			81	87	1399			85	81	1020

Direction	EB	NB	SW	SW
Volume Total	177	637	126	18
Volume Left	0	588	26	0
Volume Right	98	49	0	18
cSH	1700	1399	85	1020
Volume to Capacity	0.10	0.42	0.30	0.02
Queue Length (ft)	0	53	28	1
Control Delay (s)	0.0	9.0	64.5	8.6
Lane LOS		A	F	A
Approach Delay (s)	0.0	9.0	41.4	
Approach LOS			E	

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	59.6%	ICU Level of Service	A



Movement	EBL	EBR	EBR2	NBL	NBR	NWL2	NWL	NWR	SWL2	SWL	SWR
Lane Configurations											
Sign Control	Free			Stop			Free			Stop	
Grade	0%			0%			0%			0%	
Volume (veh/h)	0	32	23	0	0	210	79	0	35	1	28
Peak Hour Factor	0.61	0.61	0.61	0.92	0.92	0.76	0.76	0.76	0.66	0.66	0.66
Hourly flow rate (veh/h)	0	52	38	0	0	276	104	0	53	2	42
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type				None						None	
Median storage veh)											
Upstream signal (ft)											
pX, platoon unblocked											
vC, conflicting volume	104			771	728	90			728	747	104
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	104			771	728	90			728	747	104
tC, single (s)	4.1			7.1	6.5	4.1			7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	2.2			3.5	4.0	2.2			3.5	4.0	3.3
p0 queue free %	100			100	100	82			82	99	96
cM capacity (veh/h)	1488			259	286	1505			291	279	951

Direction, Lane #	EB 1	NB 1	SW 1
Volume Total	90	380	55	42
Volume Left	0	276	53	0
Volume Right	38	0	0	42
cSH	1700	1505	291	951
Volume to Capacity	0.05	0.18	0.19	0.04
Queue Length (ft)	0	17	17	3
Control Delay (s)	0.0	6.2	20.2	9.0
Lane LOS		A	C	A
Approach Delay (s)	0.0	6.2	15.3	
Approach LOS			C	

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A



Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations											
Sign Control	Stop			Free			Free		Stop		
Grade	0%			0%			0%		0%		
Volume (veh/h)	109	47	0	29	89	0	0	0	80	0	23
Peak Hour Factor	0.70	0.70	0.76	0.76	0.76	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (veh/h)	156	67	0	38	117	0	0	0	103	0	29
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type	None								None		
Median storage veh)											
Upstream signal (ft)	1										
pX, platoon unblocked											
vC, conflicting volume	155	0	0			155			242	97	97
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	155	0	0			155			242	97	97
tC, single (s)	6.5	6.2	4.1			4.1			7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	4.0	3.3	2.2			2.2			3.5	4.0	3.3
p0 queue free %	79	94	100			100			82	100	97
cM capacity (veh/h)	737	1085	1623			1425			559	793	960

Direction, Lane #	EB 1	NB 1	NB 2	SW 2
Volume Total	223	155	103	29
Volume Left	0	0	103	0
Volume Right	67	117	0	29
cSH	816	1700	559	960
Volume to Capacity	0.27	0.09	0.18	0.03
Queue Length (ft)	28	0	17	2
Control Delay (s)	11.1	0.0	12.9	8.9
Lane LOS	B		B	A
Approach Delay (s)	11.1	0.0	12.0	
Approach LOS	B		B	

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A



Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR1	SWR2
Lane Configurations											
Sign Control	Stop			Free			Free		Stop		
Grade	0%			0%			0%		0%		
Volume (veh/h)	563	72	0	22	121	0	0	0	61	0	11
Peak Hour Factor	0.94	0.94	0.81	0.81	0.81	0.78	0.78	0.78	0.72	0.72	0.72
Hourly flow rate (veh/h)	599	77	0	27	149	0	0	0	85	0	15
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type	None								None		
Median storage veh)											
Upstream signal (ft)											
pX, platoon unblocked											
vC, conflicting volume	177	0	0			177			478	102	102
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	177	0	0			177			478	102	102
tC, single (s)	6.5	6.2	4.1			4.1			7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	4.0	3.3	2.2			2.2			3.5	4.0	3.3
p0 queue free %	16	93	100			100			39	100	98
cM capacity (veh/h)	717	1085	1623			1400			138	788	953

Volume Total	676	177	85	15							
Volume Left	0	0	85	0							
Volume Right	77	149	0	15							
cSH	746	1700	138	953							
Volume to Capacity	0.91	0.10	0.61	0.02							
Queue Length (ft)	303	0	80	1							
Control Delay (s)	37.8	0.0	65.6	8.8							
Lane LOS	E		F	A							
Approach Delay (s)	37.8	0.0	56.9								
Approach LOS	E		F								

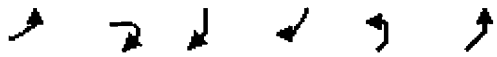
Average Delay	32.8		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	77	73	52	10	10	26
Peak Hour Factor	0.83	0.83	0.78	0.78	0.90	0.90
Hourly flow rate (veh/h)	93	88	67	13	11	29
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	172	26	40			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	172	26	40			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	92	96			
cM capacity (veh/h)	784	1050	1570			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	181	79	40
Volume Left	93	67	0
Volume Right	88	10	29
cSH	894	1570	1700
Volume to Capacity	0.20	0.04	0.02
Queue Length (ft)	19	3	0
Control Delay (s)	10.0	6.3	0.0
Lane LOS	B	A	
Approach Delay (s)	10.0	6.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A



Movement	EBL	EBR	SBL	SBR	NEL2	NEU
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	53	63	8	42	119	27
Peak Hour Factor	0.81	0.81	0.74	0.74	0.87	0.87
Hourly flow rate (veh/h)	65	78	11	57	137	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	344	39			168	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	344	39			168	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	92			91	
cM capacity (veh/h)	594	1032			1584	

Direction, Lane #	SE	NE	NW
Volume Total	143	168	
Volume Left	65	0	137
Volume Right	78	57	0
cSH	772	1700	1534
Volume to Capacity	0.19	0.04	0.09
Queue Length (ft)	17	0	7
Control Delay (s)	10.7	0.0	6.8
Lane LOS	B		A
Approach Delay (s)	10.7	0.0	6.3
Approach LOS	B		

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	24.4%	ICU Level of Service	A



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	427	128	39	134	77	55
Peak Hour Factor	0.82	0.82	0.87	0.87	0.92	0.92
Hourly flow rate (veh/h)	521	156	45	154	84	60

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	677	199	143
Volume Left (vph)	521	0	84
Volume Right (vph)	156	154	0
Hadj (s)	0.0	-0.4	0.2
Departure Headway (s)	4.9	5.4	6.1
Degree Utilization, x	0.92	0.30	0.24
Capacity (veh/h)	727	634	564
Control Delay (s)	38.3	10.7	11.0
Approach Delay (s)	38.3	10.7	11.0
Approach LOS	E	B	B

Intersection Summary			
Delay	29.1		
HCM Level of Service	D		
Intersection Capacity Utilization	68.0%	ICU Level of Service	B



Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	158	77	34	535	88	48
Peak Hour Factor	0.86	0.86	0.97	0.97	0.85	0.85
Hourly flow rate (veh/h)	184	90	35	552	104	56

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	273	587	160
Volume Left (vph)	184	0	104
Volume Right (vph)	90	552	0
Hadj (s)	0.0	-0.5	0.2
Departure Headway (s)	5.5	4.4	5.5
Degree Utilization, x	0.42	0.71	0.24
Capacity (veh/h)	608	801	619
Control Delay (s)	12.4	17.3	10.2
Approach Delay (s)	12.4	17.3	10.2
Approach LOS	B	C	B

Intersection Summary			
Delay		14.9	
HCM Level of Service		B	
Intersection Capacity Utilization	70.3%	ICU Level of Service	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	13	164	18	14	440	8	21	6	25	2	3	12
Peak Hour Factor	0.88	0.88	0.88	0.87	0.87	0.87	0.72	0.72	0.72	0.71	0.71	0.71
Hourly flow rate (veh/h)	15	186	20	16	506	9	29	8	35	3	4	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	515			207			783	773	197	797	779	510
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	515			207			783	773	197	797	779	510
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			90	97	96	99	99	97
cM capacity (veh/h)	1051			1364			293	821	845	281	319	563

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	207	16	515	72	24
Volume Left	15	0	16	0	29	3
Volume Right	0	20	0	9	35	17
cSH	1051	1700	1364	1700	433	449
Volume to Capacity	0.01	0.12	0.01	0.30	0.17	0.05
Queue Length (ft)	1	0	1	0	15	4
Control Delay (s)	8.5	0.0	7.7	0.0	15.0	13.5
Lane LOS	A		A		B	B
Approach Delay (s)	0.6		0.2		15.0	13.5
Approach LOS					B	B

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	38.9%	ICU Level of Service		A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	14	594	18	20	259	1	9	2	16	2	1	4
Peak Hour Factor	0.92	0.92	0.92	0.83	0.83	0.83	0.68	0.68	0.68	0.44	0.44	0.44
Hourly flow rate (veh/h)	15	646	20	24	312	1	13	3	24	5	2	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	313			665			1056	1047	655	1062	1056	313
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	313			665			1056	1047	655	1062	1056	313
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			93	99	95	98	99	99
cM capacity (veh/h)	1247			924			193	219	466	184	217	728

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	15	665	24	313	40	16	
Volume Left	15	0	24	0	13	5	
Volume Right	0	20	0	1	24	9	
cSH	1247	1700	924	1700	300	333	
Volume to Capacity	0.01	0.39	0.03	0.18	0.13	0.05	
Queue Length (ft)	1	0	2	0	11	4	
Control Delay (s)	7.9	0.0	9.0	0.0	18.8	16.3	
Lane LOS	A		A		C	C	
Approach Delay (s)	0.2		0.6		18.8	16.3	
Approach LOS					C	C	

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	55	185	16	10	241	70	28	29	9	56	30	121
Peak Hour Factor	0.88	0.88	0.88	0.80	0.80	0.80	0.72	0.72	0.72	0.78	0.78	0.78
Hourly flow rate (veh/h)	62	210	18	12	301	88	39	40	12	72	38	155

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	291	401	92	265
Volume Left (vph)	63	13	39	72
Volume Right (vph)	18	88	13	155
Hadj (s)	0.0	-0.1	0.0	-0.3
Departure Headway (s)	5.5	5.2	6.2	5.5
Degree Utilization, x	0.45	0.59	0.16	0.41
Capacity (veh/h)	613	656	505	597
Control Delay (s)	12.9	15.4	10.3	12.3
Approach Delay (s)	12.9	15.4	10.3	12.3
Approach LOS	B	C	B	B

Intersection Summary			
Delay	13.5		
HCM Level of Service	B		
Intersection Capacity Utilization	69.7%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	119	404	55	4	219	32	12	16	8	63	25	82
Peak Hour Factor	0.92	0.92	0.92	0.82	0.82	0.82	0.64	0.64	0.64	0.63	0.63	0.63
Hourly flow rate (veh/h)	129	439	60	5	267	39	19	25	12	100	40	130

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	628	311	56	270
Volume Left (vph)	129	5	19	100
Volume Right (vph)	60	39	13	130
Hadj (s)	0.0	0.0	0.0	-0.2
Departure Headway (s)	5.4	5.8	7.0	6.2
Degree Utilization, x	0.95	0.50	0.11	0.47
Capacity (veh/h)	655	593	458	549
Control Delay (s)	46.9	14.6	10.8	14.5
Approach Delay (s)	46.9	14.6	10.8	14.5
Approach LOS	E	B	B	B

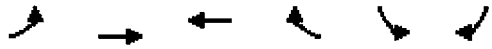
Intersection Summary			
Delay	30.4		
HCM Level of Service	D		
Intersection Capacity Utilization	82.9%	ICU Level of Service	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	323	184	0	0	227	10	0	0	0	11	0	147
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	351	200	0	0	247	11	0	0	0	12	0	160
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	258			200			1314	1160	200	1154	1154	252
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	258			200			1314	1160	200	1154	1154	252
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	73			100			100	100	100	91	100	80
cM capacity (veh/h)	1307			1372			85	143	841	138	144	786

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	551	258	172
Volume Left	351	0	12
Volume Right	0	11	160
cSH	1307	1700	593
Volume to Capacity	0.27	0.15	0.29
Queue Length (ft)	27	0	30
Control Delay (s)	6.6	0.0	13.5
Lane LOS	A		B
Approach Delay (s)	6.6	0.0	13.5
Approach LOS			B

Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	43	62	65	20	13	109
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	47	67	71	22	14	118
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	92				242	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92				242	82
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				98	88
cM capacity (veh/h)	1502				723	978

Volume Total	114	92	133			
Volume Left	47	0	14			
Volume Right	0	22	118			
cSH	1502	1700	943			
Volume to Capacity	0.03	0.05	0.14			
Queue Length (ft)	2	0	12			
Control Delay (s)	3.2	0.0	9.4			
Lane LOS	A		A			
Approach Delay (s)	3.2	0.0	9.4			
Approach LOS			A			

Average Delay	4.8		
Intersection Capacity Utilization	27.6%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	26	5	10	0	7	7	3	47	1	1	85	59
Peak Hour Factor	0.68	0.68	0.39	0.70	0.70	0.70	0.80	0.80	0.80	0.91	0.91	0.91
Hourly flow rate (veh/h)	38	7	26	0	10	10	4	59	1	1	93	65
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	210	196	126	224	227	59	158			60		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	210	196	126	224	227	59	158			60		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	99	97	100	99	99	100			100		
cM capacity (veh/h)	730	698	925	704	670	1006	1421			1544		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	71	64	159
Volume Left	38	4	1
Volume Right	26	1	65
cSH	786	1421	1544
Volume to Capacity	0.09	0.00	0.00
Queue Length (ft)	7	0	0
Control Delay (s)	10.0	0.5	0.1
Lane LOS	B	A	A
Approach Delay (s)	10.0	0.5	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	52	8	13	0	6	6	16	94	0	9	61	36
Peak Hour Factor	0.79	0.79	0.79	0.75	0.75	0.75	0.67	0.67	0.67	0.80	0.80	0.80
Hourly flow rate (veh/h)	66	10	16	0	8	8	24	140	0	11	76	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	321	309	99	331	332	140	121			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	321	309	99	331	332	140	121			140		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	98	98	100	99	99	98			99		
cM capacity (veh/h)	608	591	957	593	574	908	1466			1443		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	92	16	164	132
Volume Left	66	0	24	11
Volume Right	16	8	0	45
cSH	648	703	1466	1443
Volume to Capacity	0.14	0.02	0.02	0.01
Queue Length (ft)	12	2	1	1
Control Delay (s)	11.5	10.2	1.2	0.7
Lane LOS	B	B	A	A
Approach Delay (s)	11.5	10.2	1.2	0.7
Approach LOS	B	B		

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	38	0	14	0	3	84	23	9	0
Peak Hour Factor	0.25	0.25	0.25	0.93	0.93	0.93	0.68	0.68	0.68	0.80	0.80	0.80
Hourly flow rate (veh/h)	0	0	0	41	0	15	0	4	124	29	11	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	150	197	11	135	135	66	11			128		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	150	197	11	135	135	66	11			128		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	95	100	98	100			98		
cM capacity (veh/h)	793	685	1070	824	741	998	1608			1458		

Direction, Lane #	WB	NB	SB
Volume Total	56	128	40
Volume Left	41	0	29
Volume Right	15	124	0
cSH	864	1700	1458
Volume to Capacity	0.06	0.08	0.02
Queue Length (ft)	5	0	2
Control Delay (s)	9.5	0.0	5.4
Lane LOS	A		A
Approach Delay (s)	9.5	0.0	5.4
Approach LOS	A		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	43	0	13	0	5	65	12	6	0
Peak Hour Factor	0.25	0.25	0.25	0.88	0.88	0.88	0.83	0.83	0.83	0.64	0.64	0.64
Hourly flow rate (veh/h)	0	0	0	49	0	15	0	6	78	19	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	107	131	9	92	92	45	9			84		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	107	131	9	92	92	45	9			84		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	94	100	99	100			99		
cM capacity (veh/h)	852	750	1072	883	788	1025	1610			1512		

Volume Total	64	84	28
Volume Left	49	0	19
Volume Right	15	78	0
cSH	913	1700	1512
Volume to Capacity	0.07	0.05	0.01
Queue Length (ft)	6	0	1
Control Delay (s)	9.2	0.0	5.0
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	5.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	15.4%	ICU Level of Service	A



Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	91	36	35	51	45	28
Peak Hour Factor	0.88	0.88	0.83	0.83	0.76	0.76
Hourly flow rate (veh/h)	103	41	42	61	59	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	104				321	73
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	104				321	73
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				91	96
cM capacity (veh/h)	1488				626	989

Direction, Lane #	NB 1	SB 1	SE 1
Volume Total	144	104	96
Volume Left	103	0	59
Volume Right	0	61	37
cSH	1488	1700	729
Volume to Capacity	0.07	0.06	0.13
Queue Length (ft)	6	0	11
Control Delay (s)	5.6	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	5.6	0.0	10.7
Approach LOS			B

Intersection Summary					
Average Delay	5.3				
Intersection Capacity Utilization	26.7%	ICU Level of Service			A



Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	74	60	32	33	86	74
Peak Hour Factor	0.86	0.86	0.86	0.86	0.87	0.87
Hourly flow rate (veh/h)	86	70	37	38	99	85
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	76				298	56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	76				298	56
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				85	92
cM capacity (veh/h)	1524				654	1010

Volume Total	156	76	184			
Volume Left	86	0	99			
Volume Right	0	38	85			
cSH	1524	1700	781			
Volume to Capacity	0.06	0.04	0.24			
Queue Length (ft)	4	0	23			
Control Delay (s)	4.3	0.0	11.0			
Lane LOS	A		B			
Approach Delay (s)	4.3	0.0	11.0			
Approach LOS			B			

Average Delay	6.5		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A



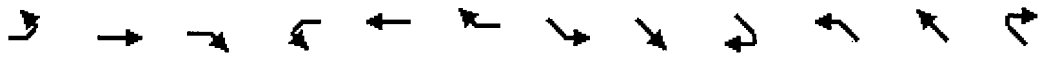
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		1.00			0.91		1.00	1.00		1.00	0.94	
Flt Protected		0.96			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1784			1686		1770	3537		1770	3323	
Flt Permitted		0.72			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1345			1668		1770	3537		1770	3323	
Volume (vph)	74	13	2	1	8	20	4	190	1	12	108	74
Peak-hour factor, PHF	0.83	0.83	0.83	0.52	0.52	0.52	0.81	0.81	0.81	0.87	0.87	0.87
Adj. Flow (vph)	89	16	2	2	15	38	5	235	1	14	124	85
Lane Group Flow (vph)	0	107	0	0	55	0	5	236	0	14	209	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		6.0			6.0		1.0	30.5		1.0	30.5	
Effective Green, g (s)		6.0			6.0		1.0	30.5		1.0	30.5	
Actuated g/C Ratio		0.12			0.12		0.02	0.62		0.02	0.62	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		163			202		36	2179		36	2048	
v/s Ratio Prot							0.00	c0.07		c0.01	0.06	
v/s Ratio Perm		c0.08			0.03							
v/c Ratio		0.66			0.27		0.14	0.11		0.39	0.10	
Uniform Delay, d1		20.8			19.8		23.8	3.9		23.9	3.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.2			0.7		1.8	0.0		6.8	0.0	
Delay (s)		29.9			20.5		25.6	3.9		30.8	3.9	
Level of Service		C			C		C	A		C	A	
Approach Delay (s)		29.9			20.5			4.4			5.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.98			0.90		1.00	1.00		1.00	0.97	
Flt Protected		0.96			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1761			1660		1770	3536		1770	3422	
Flt Permitted		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1832			1648		1770	3536		1770	3422	
Volume (vph)	53	5	8	2	3	17	7	161	1	36	254	72
Peak-hour factor, PHF	0.79	0.79	0.79	0.61	0.61	0.61	0.84	0.84	0.84	0.86	0.86	0.86
Adj. Flow (vph)	67	6	10	3	5	28	8	192	1	42	295	84
Lane Group Flow (vph)	0	83	0	0	36	0	8	193	0	42	379	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		2.5			2.5		1.0	35.2		1.0	35.2	
Effective Green, g (s)		2.5			2.5		1.0	35.2		1.0	35.2	
Actuated g/C Ratio		0.05			0.05		0.02	0.69		0.02	0.69	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		90			81		35	2455		35	2376	
v/s Ratio Prot							0.00	0.05		c0.02	c0.11	
v/s Ratio Perm		c0.05			0.02							
v/c Ratio		0.92			0.44		0.23	0.08		1.20	0.16	
Uniform Delay, d1		24.0			23.4		24.5	2.5		24.8	2.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		69.4			3.9		3.3	0.0		217.6	0.0	
Delay (s)		93.4			27.3		27.8	2.5		242.5	2.7	
Level of Service		F			C		C	A		F	A	
Approach Delay (s)		93.4			27.3			3.5			26.6	
Approach LOS		F			C			A			C	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	50.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBT	SBR	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	94	0	444	214	85	0	0	174	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	0	0	102	0	483	233	92	0	0	189	91
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1229	838	92	747	747	189	280			92		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1229	838	92	747	747	189	280			92		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	64	100	43	82			100		
cM capacity (veh/h)	58	248	965	283	280	853	1282			1502		

Direction, Lane #	WB 1	WB 2	SB 1	SB 2	NW 1	NW 2
Volume Total	102	488	233	92	189	91
Volume Left	102	0	233	0	0	0
Volume Right	0	483	0	0	0	91
cSH	283	853	1282	1700	1700	1700
Volume to Capacity	0.36	0.57	0.18	0.05	0.11	0.05
Queue Length (ft)	40	91	17	0	0	0
Control Delay (s)	24.7	14.6	8.4	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	16.3		6.0		0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A



Movement	WBL2	WBL	WBR	NBL	NBR	SBL	SBR	NEL	NER
Lane Configurations									
Sign Control		Stop		Free		Free		Stop	
Grade		0%		0%		0%		0%	
Volume (veh/h)	121	0	301	151	109	486	231	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	132	0	327	164	118	528	251	0	0
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type		None						None	
Median storage veh)									
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	1472	1472	164			283		1799	1590
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1472	1472	164			283		1799	1590
tC, single (s)	7.1	6.5	6.2			4.1		7.1	6.5
tC, 2 stage (s)									
tF (s)	3.5	4.0	3.3			2.2		3.5	4.0
p0 queue free %	0	100	63			59		100	100
cM capacity (veh/h)	71	75	880			1280		26	63

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	132	327	164	118	528	251
Volume Left	132	0	0	0	528	0
Volume Right	0	327	0	118	0	0
cSH	71	880	1700	1700	1280	1700
Volume to Capacity	1.85	0.37	0.10	0.07	0.41	0.15
Queue Length (ft)	294	43	0	0	52	0
Control Delay (s)	526.2	11.5	0.0	0.0	9.8	0.0
Lane LOS	F	B			A	
Approach Delay (s)	159.1		0.0		6.6	
Approach LOS	F					

Intersection Summary			
Average Delay	51.4		
Intersection Capacity Utilization	55.6%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3371		1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3371		1770	1863	1583	1770	1863	1583
Volume (vph)	205	627	30	13	356	165	33	100	54	231	49	195
Peak-hour factor, PHF	0.90	0.90	0.90	0.78	0.78	0.78	0.62	0.62	0.62	0.62	0.62	0.62
Adj. Flow (vph)	228	697	33	17	456	212	53	161	87	373	79	315
Lane Group Flow (vph)	228	697	33	17	668	0	53	161	87	373	79	315
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.0	25.3	25.3	0.7	22.0		2.3	11.5	11.5	4.0	13.2	13.2
Effective Green, g (s)	4.0	25.3	25.3	0.7	22.0		2.3	11.5	11.5	4.0	13.2	13.2
Actuated g/C Ratio	0.07	0.44	0.44	0.01	0.38		0.04	0.20	0.20	0.07	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	123	820	697	22	1290		71	373	317	123	428	363
v/s Ratio Prot	c0.13	c0.37		0.01	0.20		0.03	0.09		c0.21	0.04	
v/s Ratio Perm			0.02						0.05			c0.20
v/c Ratio	1.85	0.85	0.05	0.77	0.52		0.75	0.43	0.27	3.03	0.18	0.87
Uniform Delay, d1	26.8	14.4	9.2	28.3	13.7		27.3	20.1	19.5	26.8	17.8	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	413.7	8.4	0.0	93.0	0.4		34.2	0.8	0.5	936.0	0.2	19.1
Delay (s)	440.4	22.8	9.2	121.3	14.0		61.5	20.9	19.9	962.7	18.0	40.4
Level of Service	F	C	A	F	B		E	C	B	F	B	D
Approach Delay (s)		121.7			16.7			27.8			486.6	
Approach LOS		F			B			C			F	

Intersection Summary			
HCM Average Control Delay	188.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	D
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3441		1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3441		1770	1863	1583	1770	1863	1583
Volume (vph)	149	525	35	50	643	145	14	17	44	87	17	196
Peak-hour factor, PHF	0.89	0.89	0.89	0.87	0.87	0.87	0.72	0.72	0.72	0.97	0.97	0.97
Adj. Flow (vph)	167	590	39	57	739	167	19	24	61	90	18	202
Lane Group Flow (vph)	167	590	39	57	906	0	19	24	61	90	18	202
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.1	23.6	23.6	2.2	21.7		0.7	10.4	10.4	4.1	13.8	13.8
Effective Green, g (s)	4.1	23.6	23.6	2.2	21.7		0.7	10.4	10.4	4.1	13.8	13.8
Actuated g/C Ratio	0.07	0.42	0.42	0.04	0.39		0.01	0.18	0.18	0.07	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	129	781	664	69	1326		22	344	292	129	457	388
v/s Ratio Prot	c0.09	c0.32		0.03	0.26		0.01	0.01		c0.05	0.01	
v/s Ratio Perm			0.02						c0.04			c0.13
v/c Ratio	1.29	0.76	0.06	0.83	0.68		0.86	0.07	0.21	0.70	0.04	0.52
Uniform Delay, d1	26.1	13.9	9.7	26.9	14.4		27.8	19.0	19.5	25.5	16.2	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	178.2	4.2	0.0	52.7	1.5		129.4	0.1	0.4	15.2	0.0	1.3
Delay (s)	204.3	18.1	9.8	79.6	15.9		157.1	19.0	19.8	40.7	16.2	19.7
Level of Service	F	B	A	E	B		F	B	B	D	B	B
Approach Delay (s)		56.7			19.7			44.7			25.6	
Approach LOS		E			B			D			C	

Intersection Summary			
HCM Average Control Delay	35.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3399		1770	3357		1770	3534		1770	3503	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3399		1770	3357		1770	3534		1770	3503	
Volume (vph)	122	778	280	12	381	200	91	786	8	240	1279	94
Peak-hour factor, PHF	0.80	0.80	0.80	0.88	0.88	0.88	0.92	0.92	0.92	0.83	0.83	0.83
Adj. Flow (vph)	152	972	350	14	433	227	99	854	9	289	1541	113
Lane Group Flow (vph)	152	1322	0	14	660	0	99	863	0	289	1654	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.0	21.6		0.8	18.4		4.0	30.0		4.0	30.0	
Effective Green, g (s)	4.0	21.6		0.8	18.4		4.0	30.0		4.0	30.0	
Actuated g/C Ratio	0.06	0.30		0.01	0.25		0.06	0.41		0.06	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	98	1014		20	853		98	1464		98	1452	
v/s Ratio Prot	c0.09	c0.39		0.01	0.20		0.06	0.24		c0.16	c0.47	
v/s Ratio Perm												
v/c Ratio	1.55	1.30		0.70	0.77		1.01	0.59		2.95	1.14	
Uniform Delay, d1	34.2	25.4		35.7	25.1		34.2	16.4		34.2	21.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	291.9	143.9		73.4	4.4		93.7	0.6		904.0	71.5	
Delay (s)	326.1	169.3		109.1	29.5		127.9	17.0		938.2	92.7	
Level of Service	F	F		F	C		F	B		F	F	
Approach Delay (s)		185.5			31.1			28.4			218.5	
Approach LOS		F			C			C			F	

Intersection Summary			
HCM Average Control Delay	147.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	106.4%	ICU Level of Service	F
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3450		1770	3413		1770	3531		1770	3497	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3450		1770	3413		1770	3531		1770	3497	
Volume (vph)	117	538	109	15	686	215	184	1465	24	156	964	83
Peak-hour factor, PHF	0.91	0.91	0.91	0.84	0.84	0.84	0.83	0.83	0.83	0.90	0.90	0.90
Adj. Flow (vph)	129	591	120	18	817	256	222	1765	29	173	1071	92
Lane Group Flow (vph)	129	711	0	18	1073	0	222	1794	0	173	1163	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.0	23.4		0.8	20.2		4.0	30.0		4.0	30.0	
Effective Green, g (s)	4.0	23.4		0.8	20.2		4.0	30.0		4.0	30.0	
Actuated g/C Ratio	0.05	0.32		0.01	0.27		0.05	0.40		0.05	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	95	1088		19	929		95	1428		95	1414	
v/s Ratio Prot	c0.07	c0.21		0.01	c0.31		c0.13	c0.51		0.10	0.33	
v/s Ratio Perm												
v/c Ratio	1.36	0.65		0.95	1.16		2.34	1.26		1.82	0.82	
Uniform Delay, d1	35.1	21.9		36.7	27.0		35.1	22.1		35.1	19.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	214.9	1.4		179.6	82.0		633.1	121.2		407.6	4.0	
Delay (s)	250.0	23.3		216.3	109.0		668.2	143.3		442.7	23.7	
Level of Service	F	C		F	F		F	F		F	C	
Approach Delay (s)		58.1			110.8			201.1			78.0	
Approach LOS		E			F			F			E	

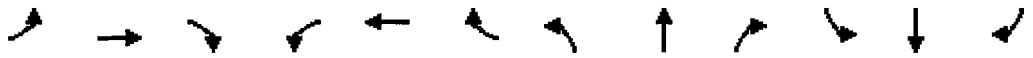
HCM Average Control Delay	128.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	G
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	3	33	27	43	38	6	18	171	37	7	115	1
Peak Hour Factor	0.88	0.88	0.88	0.78	0.78	0.78	0.90	0.90	0.90	0.68	0.68	0.68
Hourly flow rate (veh/h)	3	38	31	55	49	8	20	190	41	10	169	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	112	251	181
Volume Left (vph)	3	55	20	10
Volume Right (vph)	31	8	41	1
Hadj (s)	-0.2	0.1	0.0	0.0
Departure Headway (s)	4.8	5.0	4.5	4.7
Degree Utilization, x	0.10	0.16	0.31	0.23
Capacity (veh/h)	683	658	767	733
Control Delay (s)	8.3	9.0	9.6	9.1
Approach Delay (s)	8.3	9.0	9.6	9.1
Approach LOS	A	A	A	A

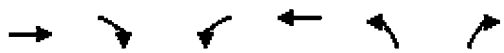
Intersection Summary				
Delay		9.2		
HCM Level of Service		A		
Intersection Capacity Utilization	38.2%		ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	7	77	18	56	85	19	15	185	56	11	210	1
Peak Hour Factor	0.71	0.71	0.71	0.89	0.89	0.89	0.96	0.96	0.96	0.93	0.93	0.93
Hourly flow rate (veh/h)	10	108	25	63	96	21	16	193	58	12	226	1

Direction, Lane #	EB	WB 1	NB 1	SB 1
Volume Total (vph)	144	180	267	239
Volume Left (vph)	10	63	16	12
Volume Right (vph)	25	21	58	1
Hadj (s)	-0.01	0.0	-0.1	0.0
Departure Headway (s)	5.4	5.4	5.0	5.2
Degree Utilization, x	0.21	0.27	0.37	0.34
Capacity (veh/h)	612	614	684	657
Control Delay (s)	9.8	10.4	10.9	10.8
Approach Delay (s)	9.8	10.4	10.9	10.8
Approach LOS	A	B	B	B

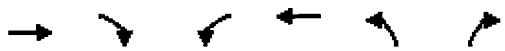
Intersection	
Delay	10.6
HCM Level of Service	B
Intersection Capacity Utilization	46.1%
ICU Level of Service	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	630	0	47	414	1	27
Peak Hour Factor	0.96	0.96	0.80	0.80	0.88	0.88
Hourly flow rate (veh/h)	656	0	59	518	1	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			656		1032	328
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			656		1032	328
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		99	95
cM capacity (veh/h)			927		214	668

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	438	219	231	345	32
Volume Left	0	0	59	0	1
Volume Right	0	0	0	0	31
cSH	1700	1700	927	1700	621
Volume to Capacity	0.26	0.13	0.06	0.20	0.05
Queue Length (ft)	0	0	5	0	4
Control Delay (s)	0.0	0.0	2.8	0.0	11.1
Lane LOS			A		B
Approach Delay (s)	0.0		1.1		11.1
Approach LOS					B

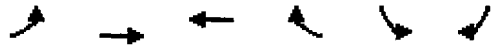
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	38.0%	ICU Level of Service		A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	571	0	26	729	1	74
Peak Hour Factor	0.94	0.94	0.95	0.95	0.65	0.65
Hourly flow rate (veh/h)	607	0	27	767	2	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			607		1046	304
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			607		1046	304
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		99	84
cM capacity (veh/h)			967		218	692

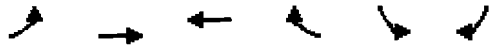
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	405	202	283	512	116
Volume Left	0	0	27	0	2
Volume Right	0	0	0	0	114
cSH	1700	1700	967	1700	673
Volume to Capacity	0.24	0.12	0.03	0.30	0.17
Queue Length (ft)	0	0	2	0	15
Control Delay (s)	0.0	0.0	1.1	0.0	11.5
Lane LOS			A		B
Approach Delay (s)	0.0		0.4		11.5
Approach LOS					B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	5085	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	5085	1863	1583	1770	1583
Volume (vph)	83	477	389	11	47	32
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.76	0.76
Adj. Flow (vph)	86	497	423	12	62	42
Lane Group Flow (vph)	86	497	423	12	62	42
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	2.0	18.9	12.9	12.9	7.2	7.2
Effective Green, g (s)	2.0	18.9	12.9	12.9	7.2	7.2
Actuated g/C Ratio	0.06	0.55	0.38	0.38	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	104	2818	705	599	374	334
v/s Ratio Prot	c0.05	0.10	c0.23		c0.04	
v/s Ratio Perm				0.01		0.03
v/c Ratio	0.83	0.18	0.60	0.02	0.17	0.13
Uniform Delay, d1	15.9	3.8	8.5	6.6	11.0	10.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	39.2	0.0	1.4	0.0	0.2	0.2
Delay (s)	55.1	3.8	10.0	6.7	11.2	11.1
Level of Service	E	A	A	A	B	B
Approach Delay (s)		11.3	9.9		11.2	
Approach LOS		B	A		B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	34.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	5085	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	5085	1863	1583	1770	1583
Volume (vph)	105	380	594	39	50	111
Peak-hour factor, PHF	0.91	0.91	0.89	0.89	0.96	0.96
Adj. Flow (vph)	115	363	667	44	52	116
Lane Group Flow (vph)	115	363	667	44	52	116
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	4.0	28.5	20.5	20.5	6.9	6.9
Effective Green, g (s)	4.0	28.5	20.5	20.5	6.9	6.9
Actuated g/C Ratio	0.09	0.66	0.47	0.47	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	3339	880	748	281	252
v/s Ratio Prot	c0.06	0.07	c0.36		0.03	
v/s Ratio Perm				0.03		c0.07
v/c Ratio	0.71	0.11	0.76	0.06	0.19	0.46
Uniform Delay, d1	19.1	2.8	9.4	6.2	15.8	16.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.0	0.0	3.8	0.0	0.3	1.3
Delay (s)	32.1	2.8	13.2	6.2	16.1	17.9
Level of Service	C	A	B	A	B	B
Approach Delay (s)		9.8	12.8		17.3	
Approach LOS		A	B		B	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
c Critical Lane Group			



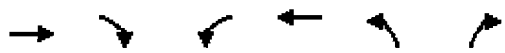
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5085	5085		3433	1583
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5085	5085		3433	1583
Volume (vph)	0	500	476	0	239	56
Peak-hour factor, PHF	0.96	0.96	0.81	0.81	0.86	0.86
Adj. Flow (vph)	0	521	588	0	278	65
Lane Group Flow (vph)	0	521	588	0	278	65
Turn Type						custom
Protected Phases		4	8			
Permitted Phases					6	6
Actuated Green, G (s)		8.3	8.3		7.4	7.4
Effective Green, g (s)		8.3	8.3		7.4	7.4
Actuated g/C Ratio		0.35	0.35		0.31	0.31
Clearance Time (s)		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1781	1781		1072	494
v/s Ratio Prot		0.10	c0.12			
v/s Ratio Perm					c0.08	0.04
v/c Ratio		0.29	0.33		0.26	0.13
Uniform Delay, d1		5.6	5.7		6.1	5.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.1		0.1	0.1
Delay (s)		5.7	5.8		6.2	6.0
Level of Service		A	A		A	A
Approach Delay (s)		5.7	5.8		6.2	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	23.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
c Critical Lane Group			



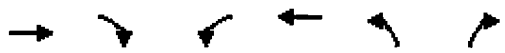
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5085	5085		3433	1583
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5085	5085		3433	1583
Volume (vph)	0	438	818	0	350	136
Peak-hour factor, PHF	0.95	0.95	0.97	0.97	0.87	0.87
Adj. Flow (vph)	0	461	843	0	402	156
Lane Group Flow (vph)	0	461	843	0	402	156
Turn Type					Custom	
Protected Phases		4	8			
Permitted Phases					6	6
Actuated Green, G (s)		11.3	11.3		9.1	9.1
Effective Green, g (s)		11.3	11.3		9.1	9.1
Actuated g/C Ratio		0.40	0.40		0.32	0.32
Clearance Time (s)		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2028	2023		1100	507
v/s Ratio Prot		0.09	c0.17			
v/s Ratio Perm					c0.12	0.10
v/c Ratio		0.23	0.42		0.37	0.31
Uniform Delay, d1		5.7	6.2		7.4	7.3
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	0.1		0.2	0.3
Delay (s)		5.7	6.3		7.6	7.6
Level of Service		A	A		A	A
Approach Delay (s)		5.7	6.3		7.6	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	6.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	28.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	1770	3539	3433	1583
Volume (vph)	711	219	189	959	237	265
Peak-hour factor, PHF	0.95	0.95	0.93	0.93	0.88	0.88
Adj. Flow (vph)	748	231	203	1031	269	301
Lane Group Flow (vph)	748	231	203	1031	269	301
Turn Type		Perm	Prot		custom	
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Actuated Green, G (s)	12.4	12.4	4.1	20.5	9.1	9.1
Effective Green, g (s)	12.4	12.4	4.1	20.5	9.1	9.1
Actuated g/C Ratio	0.33	0.33	0.11	0.55	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1677	522	193	1930	831	383
v/s Ratio Prot	0.15		c0.11	c0.29		
v/s Ratio Perm		0.15			0.08	c0.19
v/c Ratio	0.45	0.44	1.05	0.53	0.32	0.79
Uniform Delay, d1	9.9	9.9	16.8	5.5	11.7	13.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.6	79.1	0.3	0.2	10.2
Delay (s)	10.1	10.5	95.9	5.8	11.9	23.5
Level of Service	B	B	F	A	B	C
Approach Delay (s)	10.2			20.6	18.1	
Approach LOS	B			C	B	

HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	37.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	1770	3539	3433	1583
Volume (vph)	1216	299	220	1146	191	249
Peak-hour factor, PHF	0.97	0.97	0.96	0.96	0.95	0.95
Adj. Flow (vph)	1254	308	229	1194	201	262
Lane Group Flow (vph)	1254	308	229	1194	201	262
Turn Type		Perm	Prot		Custom	
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Actuated Green, G (s)	22.2	22.2	4.3	30.5	10.5	10.5
Effective Green, g (s)	22.2	22.2	4.3	30.5	10.5	10.5
Actuated g/C Ratio	0.45	0.45	0.09	0.62	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2304	717	155	2203	736	339
v/s Ratio Prot	0.25		c0.13	c0.34		
v/s Ratio Perm		0.19			0.06	c0.17
v/c Ratio	0.54	0.43	1.48	0.54	0.27	0.77
Uniform Delay, d1	9.7	9.1	22.4	5.3	16.1	18.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	246.2	0.3	0.2	10.5
Delay (s)	10.0	9.5	268.5	5.5	16.3	28.6
Level of Service	A	A	F	A	B	C
Approach Delay (s)	9.9			47.9	23.2	
Approach LOS	A			D	C	

Intersection Summary			
HCM Average Control Delay	27.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	49.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3504		1770	3500		1770	3320		3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3504		1770	3500		1770	3320		3433	3539	1583
Volume (vph)	50	832	59	69	999	79	156	157	110	82	82	59
Peak-hour factor, PHF	0.78	0.78	0.78	0.77	0.77	0.77	0.71	0.71	0.71	0.91	0.91	0.91
Adj. Flow (vph)	64	1067	76	90	1297	103	220	221	155	90	90	65
Lane Group Flow (vph)	64	1143	0	90	1400	0	220	376	0	90	90	65
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	3.0	27.7		4.1	28.8		4.1	11.7		3.0	10.6	10.6
Effective Green, g (s)	3.0	27.7		4.1	28.8		4.1	11.7		3.0	10.6	10.6
Actuated g/C Ratio	0.05	0.44		0.07	0.46		0.07	0.19		0.05	0.17	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	85	1553		116	1613		116	622		165	600	268
v/s Ratio Prot	0.04	0.33		c0.05	c0.40		c0.12	c0.11		0.03	0.03	
v/s Ratio Perm												0.04
v/c Ratio	0.75	0.74		0.78	0.87		1.90	0.60		0.55	0.15	0.24
Uniform Delay, d1	29.4	14.4		28.7	15.1		29.2	23.3		29.1	22.1	22.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.8	1.9		27.0	5.2		434.0	1.7		3.7	0.1	0.5
Delay (s)	60.2	16.2		55.8	20.4		463.2	24.9		32.7	22.2	22.9
Level of Service	E	B		E	C		F	C		C	C	C
Approach Delay (s)		18.6			22.5			186.7			26.3	
Approach LOS		B			C			F			C	

HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3486		1770	3510		1770	3266		3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3486		1770	3510		1770	3266		3433	3539	1583
Volume (vph)	88	1276	143	93	1247	72	105	91	96	145	186	95
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.86	0.86	0.86	0.83	0.83	0.83
Adj. Flow (vph)	96	1387	155	99	1327	77	122	106	112	175	224	114
Lane Group Flow (vph)	96	1542	0	99	1404	0	122	218	0	175	224	114
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	4.0	30.0		4.0	30.0		4.0	9.3		4.0	9.3	9.3
Effective Green, g (s)	4.0	30.0		4.0	30.0		4.0	9.3		4.0	9.3	9.3
Actuated g/C Ratio	0.06	0.47		0.06	0.47		0.06	0.15		0.06	0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	112	1652		112	1664		112	480		217	520	233
v/s Ratio Prot	0.05	c0.44		c0.06	0.40		c0.07	0.07		0.05	0.06	
v/s Ratio Perm												c0.07
v/c Ratio	0.80	0.93		0.88	0.84		1.09	0.45		0.81	0.43	0.49
Uniform Delay, d1	29.3	15.7		29.4	14.6		29.6	24.7		29.3	24.6	24.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.6	10.1		50.4	4.1		111.1	0.7		19.2	0.6	1.6
Delay (s)	61.9	25.8		79.8	18.7		140.7	25.4		48.5	25.2	26.4
Level of Service	E	C		E	B		F	C		D	C	C
Approach Delay (s)		27.8			22.7			66.8			33.4	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	C
c Critical Lane Group			



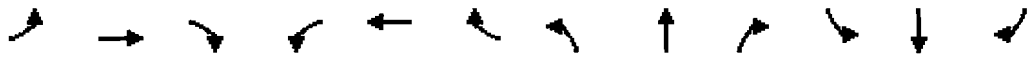
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5076		1681	1700	1583		1826	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5076		1681	1700	1583		1826	1583
Volume (vph)	23	1051	334	143	1180	14	340	35	107	22	33	31
Peak-hour factor, PHF	0.93	0.93	0.93	0.90	0.90	0.90	0.96	0.96	0.96	0.86	0.86	0.86
Adj. Flow (vph)	25	1130	359	159	1311	16	354	36	111	26	38	36
Lane Group Flow (vph)	25	1130	359	159	1327	0	190	200	111	0	64	36
Turn Type	Split		pt+ov	Split			Split		Perm	Split		Perm
Protected Phases	4	4	4 2	8	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)	16.3	16.3	29.2	16.3	16.3		12.9	12.9	12.9		6.4	6.4
Effective Green, g (s)	16.3	16.3	29.2	16.3	16.3		12.9	12.9	12.9		6.4	6.4
Actuated g/C Ratio	0.24	0.24	0.43	0.24	0.24		0.19	0.19	0.19		0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	425	1221	681	824	1219		319	323	301		172	149
v/s Ratio Prot	0.01	c0.22	0.23	0.05	c0.26		0.11	c0.12			c0.04	
v/s Ratio Perm									0.07			0.02
v/c Ratio	0.06	0.93	0.53	0.19	1.09		0.60	0.62	0.37		0.37	0.24
Uniform Delay, d1	19.9	25.2	14.3	20.6	25.8		25.1	25.2	24.0		28.9	28.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	11.8	0.7	0.1	53.4		3.0	3.5	0.8		1.4	0.8
Delay (s)	19.9	37.0	15.0	20.7	79.2		28.1	28.8	24.7		30.2	29.3
Level of Service	B	D	B	C	E		C	C	C		C	C
Approach Delay (s)		31.5			72.9			27.6			29.9	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM Average Control Delay	48.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5077		1681	1700	1583		1814	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5077		1681	1700	1583		1814	1583
Volume (vph)	52	1973	299	127	1381	15	480	49	236	26	23	35
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.95	0.95	0.95	0.88	0.88	0.88
Adj. Flow (vph)	57	2145	325	132	1439	16	505	52	248	30	26	40
Lane Group Flow (vph)	57	2145	325	132	1455	0	271	286	248	0	56	40
Turn Type	Split		pt+ov	Split			Split		Perm	Split		Perm
Protected Phases	4	4	4 2	8	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)	16.2	16.2	31.0	16.2	16.2		14.8	14.8	14.8		6.3	6.3
Effective Green, g (s)	16.2	16.2	31.0	16.2	16.2		14.8	14.8	14.8		6.3	6.3
Actuated g/C Ratio	0.23	0.23	0.45	0.23	0.23		0.21	0.21	0.21		0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	413	1185	706	800	1183		358	362	337		164	143
v/s Ratio Prot	0.03	c0.42	0.21	0.04	c0.29		0.16	c0.17			c0.03	
v/s Ratio Perm									0.16			0.03
v/c Ratio	0.14	1.81	0.46	0.16	1.23		0.76	0.79	0.74		0.34	0.28
Uniform Delay, d1	21.1	26.6	13.4	21.3	26.6		25.7	25.9	25.5		29.7	29.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	367.9	0.5	0.1	111.0		8.8	11.1	8.1		1.2	1.1
Delay (s)	21.3	394.6	13.9	21.4	137.7		34.5	37.0	33.6		30.9	30.6
Level of Service	C	F	B	C	F		C	D	C		C	C
Approach Delay (s)		337.2			128.0			35.1			30.8	
Approach LOS		F			F			D			C	

HCM Average Control Delay	216.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	69.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	C
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3523		3433	3522		1770	1863	1583	1681	1717	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3523		3433	3522		1770	1863	1583	1681	1717	1583
Volume (vph)	81	1226	40	383	1777	60	107	741	249	224	55	87
Peak-hour factor, PHF	0.83	0.83	0.83	0.88	0.88	0.88	0.89	0.89	0.89	0.79	0.79	0.79
Adj. Flow (vph)	98	1477	48	435	2019	68	120	46	280	284	70	110
Lane Group Flow (vph)	98	1525	0	435	2087	0	120	46	280	172	182	110
Turn Type	Prot			Prot			Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.0	73.1		4.0	73.1		18.3	18.3	18.3	17.0	17.0	17.0
Effective Green, g (s)	4.0	73.1		4.0	73.1		18.3	18.3	18.3	17.0	17.0	17.0
Actuated g/C Ratio	0.03	0.57		0.03	0.57		0.14	0.14	0.14	0.13	0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	107	2006		107	2005		252	266	226	223	227	210
v/s Ratio Prot	0.03	0.43		c0.13	c0.59		0.07	0.02		0.10	c0.11	
v/s Ratio Perm									c0.18			0.07
v/c Ratio	0.92	0.76		4.07	1.04		0.48	0.17	1.24	0.77	0.80	0.52
Uniform Delay, d1	62.0	21.0		62.2	27.6		50.6	48.4	55.0	53.8	54.1	51.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.4	1.7		1401.4	31.7		1.4	0.3	139.4	15.1	18.1	2.4
Delay (s)	122.4	22.7		1463.6	59.3		52.1	48.7	194.4	69.0	72.2	54.3
Level of Service	F	C		F	E		D	D	F	E	E	D
Approach Delay (s)		28.8			301.5			141.1			66.7	
Approach LOS		C			F			F			E	

Intersection Summary			
HCM Average Control Delay	178.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	128.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	D
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3527		3433	3521		1770	1863	1583	1681	1714	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3527		3433	3521		1770	1863	1583	1681	1714	1583
Volume (vph)	221	2238	51	512	2452	86	156	71	435	347	177	198
Peak-hour factor, PHF	0.94	0.94	0.94	0.91	0.91	0.91	0.86	0.86	0.86	0.93	0.93	0.93
Adj. Flow (vph)	235	2381	54	563	2695	95	181	83	506	373	190	213
Lane Group Flow (vph)	235	2435	0	563	2790	0	181	83	506	222	234	213
Turn Type	Prot			Prot			Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.0	73.0		4.0	73.0		19.0	19.0	19.0	19.0	19.0	19.0
Effective Green, g (s)	4.0	73.0		4.0	73.0		19.0	19.0	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.03	0.56		0.03	0.56		0.15	0.15	0.15	0.15	0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	105	1965		105	1962		257	270	230	244	249	230
v/s Ratio Prot	0.07	0.69		c0.16	c0.79		0.10	0.04		0.13	c0.14	
v/s Ratio Perm									c0.32			0.13
v/c Ratio	2.24	1.24		5.36	1.42		0.70	0.31	2.20	0.91	0.94	0.93
Uniform Delay, d1	63.5	29.0		63.5	29.0		53.3	50.1	56.0	55.2	55.4	55.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	586.6	112.2		1983.7	193.0		8.5	0.6	554.0	34.0	40.3	39.2
Delay (s)	650.1	141.2		2047.2	222.0		61.8	50.8	610.0	89.2	95.7	94.5
Level of Service	F	F		F	F		E	D	F	F	F	F
Approach Delay (s)		186.0			528.4			420.8			93.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	355.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	131.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	121.4%	ICU Level of Service	H
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3533		1681	1675		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3533		1681	1675		1770	1863	1583
Volume (vph)	149	1047	588	62	1474	18	537	25	29	13	22	233
Peak-hour factor, PHF	0.71	0.71	0.71	0.89	0.89	0.89	0.81	0.81	0.81	0.83	0.83	0.83
Adj. Flow (vph)	210	1475	828	70	1656	20	663	31	36	16	27	281
Lane Group Flow (vph)	210	1475	828	70	1676	0	369	361	0	16	27	281
Turn Type	Prot		Perm	Prot			Split			Split		pt+ov
Protected Phases	7	4		3	8		2	2		6	6	6 7
Permitted Phases			4									
Actuated Green, G (s)	4.0	27.7	27.7	3.2	26.9		16.0	16.0		14.3	14.3	22.3
Effective Green, g (s)	4.0	27.7	27.7	3.2	26.9		16.0	16.0		14.3	14.3	22.3
Actuated g/C Ratio	0.05	0.36	0.36	0.04	0.35		0.21	0.21		0.19	0.19	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	92	1270	568	73	1231		348	347		328	345	457
v/s Ratio Prot	c0.12	0.42		0.04	0.47		c0.22	0.22		0.01	0.01	c0.18
v/s Ratio Perm			c0.52									
v/c Ratio	2.28	1.16	1.46	0.96	1.36		1.06	1.04		0.05	0.08	0.61
Uniform Delay, d1	36.6	24.8	24.8	36.9	25.2		30.6	30.6		25.9	26.0	23.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	610.1	81.7	215.6	90.1	168.0		65.1	59.2		0.1	0.1	2.5
Delay (s)	646.7	106.5	240.4	127.1	193.2		95.7	89.8		25.9	26.1	26.2
Level of Service	F	F	F	F	F		F	F		C	C	C
Approach Delay (s)		195.7			190.5			92.8			26.2	
Approach LOS		F			F			F			C	

Intersection Summary			
HCM Average Control Delay	169.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	E
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3533		1681	1673		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3533		1681	1673		1770	1863	1583
Volume (vph)	246	2058	716	31	1914	23	630	32	39	52	41	486
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	265	2213	770	35	2175	26	663	34	41	56	44	523
Lane Group Flow (vph)	265	2213	770	35	2201	0	372	366	0	56	44	523
Turn Type	Prot		Perm	Prot			Split			Split		pt+ov
Protected Phases	7	4		3	8		2	2		6	6	6 7
Permitted Phases			4									
Actuated Green, G (s)	4.0	29.2	29.2	2.4	27.6		16.0	16.0		16.0	16.0	24.0
Effective Green, g (s)	4.0	29.2	29.2	2.4	27.6		16.0	16.0		16.0	16.0	24.0
Actuated g/C Ratio	0.05	0.37	0.37	0.03	0.35		0.20	0.20		0.20	0.20	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	89	1298	581	53	1225		338	336		356	374	477
v/s Ratio Prot	c0.15	c0.63		0.02	0.62		c0.22	0.22		0.03	0.02	c0.33
v/s Ratio Perm			0.49									
v/c Ratio	2.98	1.70	1.33	0.66	1.80		1.10	1.09		0.16	0.12	1.10
Uniform Delay, d1	37.8	25.2	25.2	38.2	26.0		31.8	31.8		26.2	26.0	27.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	919.4	320.5	158.1	26.8	361.8		78.8	75.1		0.2	0.1	70.0
Delay (s)	957.2	345.7	183.3	64.9	387.8		110.6	106.9		26.4	26.2	97.8
Level of Service	F	F	F	E	F		F	F		C	C	F
Approach Delay (s)		357.1			382.8			108.8			86.3	
Approach LOS		F			F			F			F	

HCM Average Control Delay	314.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3516		1770	1765		1770	1689	
Flt Permitted	0.95	1.00		0.95	1.00		0.40	1.00		0.53	1.00	
Satd. Flow (perm)	1770	3480		1770	3516		736	1765		984	1689	
Volume (vph)	179	806	101	44	1061	49	133	103	55	46	92	150
Peak-hour factor, PHF	0.91	0.91	0.91	0.85	0.85	0.85	0.68	0.68	0.68	0.77	0.77	0.77
Adj. Flow (vph)	197	886	111	52	1248	58	196	151	81	60	119	195
Lane Group Flow (vph)	197	997	0	52	1306	0	196	232	0	60	314	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.0	27.8		2.3	26.1		16.0	16.0		16.0	16.0	
Effective Green, g (s)	4.0	27.8		2.3	26.1		16.0	16.0		16.0	16.0	
Actuated g/C Ratio	0.07	0.48		0.04	0.45		0.28	0.28		0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	122	1665		70	1579		203	486		271	465	
v/s Ratio Prot	c0.11	0.29		0.03	c0.37			0.13			0.19	
v/s Ratio Perm							c0.27			0.06		
v/c Ratio	1.61	0.60		0.74	0.83		0.97	0.48		0.22	0.68	
Uniform Delay, d1	27.0	11.1		27.6	14.0		20.8	17.6		16.2	18.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	311.1	0.6		34.2	3.7		52.8	0.7		0.4	3.9	
Delay (s)	338.2	11.7		61.8	17.7		73.6	18.3		16.7	22.6	
Level of Service	F	B		E	B		E	B		B	C	
Approach Delay (s)		65.5			19.4			43.6			21.6	
Approach LOS		E			B			D			C	

Intersection Summary			
HCM Average Control Delay	39.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	D
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3399		1770	3511		1770	1786		1770	1733	
Flt Permitted	0.95	1.00		0.95	1.00		0.25	1.00		0.25	1.00	
Satd. Flow (perm)	1770	3399		1770	3511		463	1786		463	1733	
Volume (vph)	481	1102	397	81	785	45	350	280	107	201	383	334
Peak-hour factor, PHF	0.94	0.94	0.94	0.93	0.93	0.93	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	512	1172	422	87	844	48	427	341	130	245	467	407
Lane Group Flow (vph)	512	1594	0	87	892	0	427	471	0	245	874	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.0	26.1		3.1	25.2		16.1	16.1		16.1	16.1	
Effective Green, g (s)	4.0	26.1		3.1	25.2		16.1	16.1		16.1	16.1	
Actuated g/C Ratio	0.07	0.46		0.05	0.44		0.28	0.28		0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	124	1548		96	1544		130	502		130	487	
v/s Ratio Prot	c0.29	c0.47		0.05	0.25			0.26			0.50	
v/s Ratio Perm							c0.92			0.53		
v/c Ratio	4.13	1.03		0.91	0.58		3.28	0.94		1.88	1.79	
Uniform Delay, d1	26.6	15.6		27.0	12.1		20.6	20.1		20.6	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1427.0	30.8		61.8	0.5		1047.6	25.3		425.7	365.8	
Delay (s)	1453.6	46.4		88.7	12.6		1068.2	45.4		446.3	386.4	
Level of Service	F	D		F	B		F	D		F	F	
Approach Delay (s)		388.5			19.3			531.8			399.5	
Approach LOS		F			B			F			F	

Intersection Summary			
HCM Average Control Delay	345.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.95		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	139.7%	ICU Level of Service	H
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3414		3433	3476		3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3414		3433	3476		3433	3539	1583	1770	3539	1583
Volume (vph)	302	586	181	57	605	81	289	265	54	90	152	234
Peak-hour factor, PHF	0.93	0.93	0.93	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86
Adj. Flow (vph)	325	630	195	72	766	103	340	312	64	105	177	272
Lane Group Flow (vph)	325	825	0	72	869	0	340	312	64	105	177	272
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.1	22.0		2.2	20.1		4.1	10.2	10.2	4.1	10.2	10.2
Effective Green, g (s)	4.1	22.0		2.2	20.1		4.1	10.2	10.2	4.1	10.2	10.2
Actuated g/C Ratio	0.08	0.40		0.04	0.37		0.08	0.19	0.19	0.08	0.19	0.19
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	1378		139	1282		258	662	296	133	662	296
v/s Ratio Prot	c0.09	0.24		0.02	c0.25		c0.10	0.09		0.06	0.05	
v/s Ratio Perm									0.04			c0.17
v/c Ratio	1.26	0.60		0.52	0.68		1.32	0.47	0.22	0.79	0.27	0.92
Uniform Delay, d1	25.2	12.8		25.6	14.5		25.2	19.7	18.8	24.8	19.0	21.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	144.3	0.7		3.2	1.4		167.7	0.5	0.4	26.0	0.2	31.6
Delay (s)	169.5	13.5		28.9	15.9		192.9	20.3	19.1	50.7	19.2	53.4
Level of Service	F	B		C	B		F	C	B	D	B	D
Approach Delay (s)		57.6			16.9			102.1			41.9	
Approach LOS		E			B			F			D	

Intersection Summary			
HCM Average Control Delay	53.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3476		3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3476		3433	3539	1583	1770	3539	1583
Volume (vph)	302	586	181	57	605	81	289	265	54	90	152	234
Peak-hour factor, PHF	0.93	0.93	0.93	0.79	0.79	0.79	0.85	0.85	0.85	0.86	0.86	0.86
Adj. Flow (vph)	325	630	195	72	766	103	340	312	64	105	177	272
Lane Group Flow (vph)	325	630	195	72	869	0	340	312	64	105	177	272
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.1	22.3	22.3	2.2	20.4		4.1	10.2	10.2	4.1	10.2	10.2
Effective Green, g (s)	4.1	22.3	22.3	2.2	20.4		4.1	10.2	10.2	4.1	10.2	10.2
Actuated g/C Ratio	0.07	0.41	0.41	0.04	0.37		0.07	0.19	0.19	0.07	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	257	1440	644	138	1294		257	659	295	182	659	295
v/s Ratio Prot	c0.09	0.18		0.02	c0.25		c0.10	0.09		0.06	0.05	
v/s Ratio Perm			0.12						0.04			c0.17
v/c Ratio	1.26	0.44	0.30	0.52	0.67		1.32	0.47	0.22	0.80	0.27	0.92
Uniform Delay, d1	25.3	11.7	11.0	25.8	14.4		25.3	19.9	18.9	24.9	19.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	146.3	0.2	0.3	3.5	1.4		169.9	0.5	0.4	27.3	0.2	32.6
Delay (s)	171.7	11.9	11.3	29.3	15.8		195.2	20.4	19.3	52.2	19.3	54.5
Level of Service	F	B	B	C	B		F	C	B	D	B	D
Approach Delay (s)		57.0			16.8			103.3			42.8	
Approach LOS		E			B			F			D	

Intersection Summary			
HCM Average Control Delay	53.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	11	8	3	41	3	8	0	261	23	3	326	2
Peak Hour Factor	0.69	0.69	0.69	0.68	0.68	0.68	0.77	0.77	0.77	0.70	0.70	0.70
Hourly flow rate (veh/h)	16	12	4	60	4	12	0	339	30	4	466	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	844	845	467	840	831	354	469			369		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	844	845	467	840	831	354	469			369		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	96	99	78	99	98	100			100		
cM capacity (veh/h)	275	299	596	274	304	690	1093			1190		

Direction, Lane #	EB	WB	NB	SB
Volume Total	32	76	369	473
Volume Left	16	60	0	4
Volume Right	4	12	30	3
cSH	306	304	1093	1190
Volume to Capacity	0.10	0.25	0.00	0.00
Queue Length (ft)	9	24	0	0
Control Delay (s)	18.1	20.8	0.0	0.1
Lane LOS	C	C		A
Approach Delay (s)	18.1	20.8	0.0	0.1
Approach LOS	C	C		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	3	10	1	16	2	252	24	12	247	1
Peak Hour Factor	0.38	0.38	0.38	0.84	0.84	0.84	0.84	0.84	0.84	0.89	0.89	0.89
Hourly flow rate (veh/h)	8	0	8	12	1	19	2	300	29	13	278	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	644	638	278	632	625	314	279			329		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	644	638	278	632	625	314	279			329		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	97	100	97	100			99		
cM capacity (veh/h)	371	389	761	385	396	726	1284			1231		

Direction, Lane #												
Volume Total	16	32	331	292								
Volume Left	8	12	2	13								
Volume Right	8	19	29	1								
cSH	499	534	1284	1231								
Volume to Capacity	0.03	0.06	0.00	0.01								
Queue Length (ft)	2	5	0	1								
Control Delay (s)	12.4	12.2	0.1	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.4	12.2	0.1	0.5								
Approach LOS	B	B										

Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			28.9%		ICU Level of Service				A			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	0	2	1	0	2	1	438	0	0	522	4
Peak Hour Factor	0.33	0.33	0.33	0.38	0.38	0.38	0.83	0.83	0.92	0.92	0.77	0.77
Hourly flow rate (veh/h)	6	0	6	3	0	5	1	528	0	0	678	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1216	1211	681	1217	1213	528	683			528		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1216	1211	681	1217	1213	528	683			528		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	99	98	100	99	100			100		
cM capacity (veh/h)	156	182	451	155	181	551	910			1039		

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	12	8	529	683
Volume Left	6	3	1	0
Volume Right	6	5	0	5
cSH	232	298	910	1039
Volume to Capacity	0.05	0.03	0.00	0.00
Queue Length (ft)	4	2	0	0
Control Delay (s)	21.4	17.4	0.0	0.0
Lane LOS	C	C	A	
Approach Delay (s)	21.4	17.4	0.0	0.0
Approach LOS	C	C		

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	46.0%	ICU Level of Service	A	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	1	0	1	1	3	828	1	1	652	5
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.92	0.92	0.92	0.57	0.57	0.57
Hourly flow rate (veh/h)	2	0	2	0	2	2	3	900	1	2	1144	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2062	2059	1148	2061	2063	901	1153			901		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2062	2059	1148	2061	2063	901	1153			901		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	99	100	96	99	99			100		
cM capacity (veh/h)	39	55	242	40	54	337	606			754		

Direction				
Volume Total	4	4	904	1154
Volume Left	2	0	3	2
Volume Right	2	2	1	9
cSH	67	93	606	754
Volume to Capacity	0.06	0.04	0.01	0.00
Queue Length (ft)	5	3	0	0
Control Delay (s)	62.3	45.3	0.2	0.1
Lane LOS	F	E	A	A
Approach Delay (s)	62.3	45.3	0.2	0.1
Approach LOS	F	E		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	72.6%	ICU Level of Service	C



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	173	1	1	114
Peak Hour Factor	0.92	0.92	0.89	0.89	0.82	0.82
Hourly flow rate (veh/h)	0	0	194	1	1	139
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	336	195			196	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	336	195			196	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	658	846			1377	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	196	140
Volume Left	0	0	1
Volume Right	0	1	0
cSH	1700	1700	1377
Volume to Capacity	0.00	0.12	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	1	0	826	1	3	212
Peak Hour Factor	0.25	0.25	0.79	0.79	0.87	0.87
Hourly flow rate (veh/h)	4	0	413	1	3	244
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	664	413			414	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	664	413			414	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	424	639			1145	

Direction, Lane #						
Volume Total	4	414	247			
Volume Left	4	0	3			
Volume Right	0	1	6			
cSH	424	1700	1145			
Volume to Capacity	0.01	0.24	0.00			
Queue Length (ft)	1	0	0			
Control Delay (s)	13.6	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	13.6	0.0	0.1			
Approach LOS	B					

Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			31.8%	ICU Level of Service		A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	3	0	4	0	146	1	2	90	0
Peak Hour Factor	0.92	0.92	0.92	0.58	0.58	0.58	0.94	0.94	0.94	0.66	0.66	0.66
Hourly flow rate (veh/h)	0	0	0	5	0	7	0	155	1	3	136	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	305	299	136	298	298	156	136			156		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	305	299	136	298	298	156	136			156		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	99	100			100		
cM capacity (veh/h)	641	612	912	653	612	890	1448			1424		

Direction, Lane #	EB	WB	NB	SB
Volume Total	0	12	156	139
Volume Left	0	5	0	3
Volume Right	0	7	1	0
cSH	1700	770	1448	1424
Volume to Capacity	0.00	0.02	0.00	0.00
Queue Length (ft)	0	1	0	0
Control Delay (s)	0.0	9.7	0.0	0.2
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.7	0.0	0.2
Approach LOS	A	A		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	8	0	3	0	210	4	4	250	0
Peak Hour Factor	0.92	0.92	0.92	0.55	0.55	0.55	0.84	0.84	0.84	0.89	0.89	0.89
Hourly flow rate (veh/h)	0	0	0	15	0	5	0	250	5	4	281	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	548	545	281	542	542	252	281			255		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	548	545	281	542	542	252	281			255		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	99	100			100		
cM capacity (veh/h)	443	444	758	450	446	786	1282			1310		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	20	255	285
Volume Left	0	15	0	4
Volume Right	0	5	5	0
cSH	1700	509	1282	1310
Volume to Capacity	0.00	0.04	0.00	0.00
Queue Length (ft)	0	3	0	0
Control Delay (s)	0.0	12.4	0.0	0.2
Lane LOS	A	B		A
Approach Delay (s)	0.0	12.4	0.0	0.2
Approach LOS	A	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A



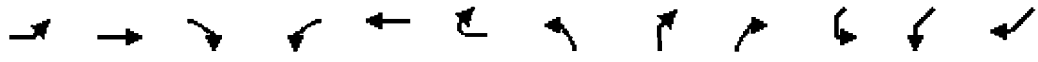
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1770	3539	1583	3433	1783	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1770	3539	1583	3433	1783	
Volume (vph)	239	1003	133	225	1020	156	120	528	279	213	318	125
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	263	1102	146	242	1097	168	138	607	321	237	348	139
Lane Group Flow (vph)	263	1102	146	242	1097	168	138	607	321	237	487	0
Turn Type	Prot		pt+ov	Prot		pt+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	8 1	5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	4.0	15.5	23.5	4.0	15.5	23.5	4.0	15.7	15.7	4.0	15.7	
Effective Green, g (s)	4.0	15.5	23.5	4.0	15.5	23.5	4.0	15.7	15.7	4.0	15.7	
Actuated g/C Ratio	0.07	0.28	0.43	0.07	0.28	0.43	0.07	0.28	0.28	0.07	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	249	1428	674	249	1428	674	128	1007	450	249	507	
v/s Ratio Prot	c0.08	c0.22	0.09	0.07	0.22	0.11	c0.08	0.17		0.07	c0.27	
v/s Ratio Perm									0.20			
v/c Ratio	1.06	0.77	0.22	0.97	0.77	0.25	1.08	0.60	0.71	0.95	0.96	
Uniform Delay, d1	25.6	18.2	10.0	25.5	18.2	10.2	25.6	17.1	17.7	25.5	19.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	72.6	2.7	0.2	48.9	2.5	0.2	102.0	1.0	5.3	43.6	30.0	
Delay (s)	98.2	20.9	10.2	74.4	20.7	10.4	127.6	18.1	23.0	69.1	49.5	
Level of Service	F	C	B	E	C	B	F	B	C	E	D	
Approach Delay (s)		33.3			28.2			33.8			55.9	
Approach LOS		C			C			C			E	

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	C
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1770	3539	1583	3433	1805	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.25	1.00	1.00	0.40	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	466	3539	1583	1463	1805	
Volume (vph)	235	1308	164	301	1072	84	161	437	369	398	540	140
Peak-hour factor, PHF	0.96	0.96	0.96	0.90	0.90	0.90	0.83	0.83	0.83	0.85	0.85	0.85
Adj. Flow (vph)	245	1362	171	334	1191	93	194	527	445	468	635	165
Lane Group Flow (vph)	245	1362	171	334	1191	93	194	527	445	468	800	0
Turn Type	Prot		Prot	Prot		Prot	Perm		Perm	Perm		
Protected Phases	7	4	4	3	8	8		2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	4.0	15.9	15.9	4.0	15.9	15.9	16.0	16.0	16.0	16.0	16.0	
Effective Green, g (s)	4.0	15.9	15.9	4.0	15.9	15.9	16.0	16.0	16.0	16.0	16.0	
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.33	0.33	0.33	0.33	0.33	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	287	1688	525	287	1688	525	156	1182	529	489	603	
v/s Ratio Prot	0.07	c0.27	0.11	c0.10	0.23	0.06		0.15			c0.44	
v/s Ratio Perm							0.42		0.28	0.32		
v/c Ratio	0.85	0.81	0.33	1.16	0.71	0.18	1.24	0.45	0.84	0.96	1.33	
Uniform Delay, d1	21.7	14.6	12.0	22.0	14.0	11.4	16.0	12.5	14.8	15.6	16.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	21.1	2.9	0.4	105.0	1.4	0.2	152.1	0.3	11.5	29.7	158.3	
Delay (s)	42.7	17.5	12.3	126.9	15.3	11.5	168.0	12.8	26.3	45.3	174.2	
Level of Service	D	B	B	F	B	B	F	B	C	D	F	
Approach Delay (s)		20.5			38.1			43.8			126.7	
Approach LOS		C			D			D			F	

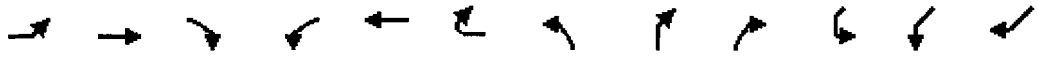
Intersection Summary			
HCM Average Control Delay	53.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	47.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	103.4%	ICU Level of Service	F
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NER2	SWL2	SWL	SWR
Lane Configurations												
Sign Control		Stop			Stop		Stop				Stop	
Volume (veh/h)	29	12	14	3	13	36	11	144	9	92	155	55
Peak Hour Factor	0.72	0.72	0.72	0.87	0.87	0.87	0.89	0.89	0.89	0.94	0.94	0.94
Hourly flow rate (veh/h)	40	17	19	3	15	41	12	162	10	98	165	59

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SW 1	SW 2
Volume Total (vph)	40	17	19	3	15	41	12	172	263	59
Volume Left (vph)	40	0	0	3	0	0	12	0	98	0
Volume Right (vph)	0	0	19	0	0	41	0	10	0	59
Hadj (s)	0.2	0.0	-0.6	0.2	0.0	-0.6	0.2	0.0	-0.1	-0.6
Departure Headway (s)	5.9	5.7	3.2	6.0	5.8	3.2	5.2	5.0	5.0	4.3
Degree Utilization, x	0.07	0.03	0.02	0.01	0.02	0.04	0.02	0.24	0.36	0.07
Capacity (veh/h)	563	583	1121	558	575	1121	669	705	707	813
Control Delay (s)	8.1	7.7	5.1	7.8	7.7	5.1	7.1	8.3	9.6	6.4
Approach Delay (s)	7.2			5.9			8.2		9.0	
Approach LOS	A			A			A		A	

Intersection Summary					
Delay	8.3				
HCM Level of Service	A				
Intersection Capacity Utilization	38.5%	ICU Level of Service		A	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	NBR2	SWL2	SWT	SWR
Lane Configurations													
Sign Control		Stop			Stop			Stop				Stop	
Volume (veh/h)	21	11	52	54	13	4	15	195	31	11	220	3	
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.89	0.89	0.89	0.93	0.93	0.93	
Hourly flow rate (veh/h)	27	14	67	61	15	4	17	219	35	12	237	3	

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2		NB 1	NB 2	SW 1	SW 2		
Volume Total (vph)	27	14	67	61	15	4	17	254	12	240		
Volume Left (vph)	27	0	0	61	0	0	17	0	12	0		
Volume Right (vph)	0	0	67	0	0	4	0	35	0	3		
Hadj (s)	0.2	0.0	-0.6	0.2	0.0	-0.6	0.2	0.0	0.2	0.0		
Departure Headway (s)	6.1	5.9	3.2	6.0	5.8	3.2	5.3	5.0	5.3	5.1		
Degree Utilization, x	0.05	0.02	0.06	0.10	0.02	0.00	0.02	0.35	0.02	0.34		
Capacity (veh/h)	542	560	1121	553	568	1121	657	699	652	687		
Control Delay (s)	8.2	7.8	5.2	8.5	7.8	5.0	7.2	9.5	7.2	9.5		
Approach Delay (s)	6.3			8.2			9.4		9.4			
Approach LOS	A			A			A		A			

Delay	8.8
HCM Level of Service	A
Intersection Capacity Utilization	49.0%
ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑	↱	↰	↦	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	3	22	8	43	48	32	24	467	17	6	347	24
Peak Hour Factor	0.64	0.64	0.64	0.83	0.83	0.83	0.85	0.85	0.85	0.91	0.91	0.91
Hourly flow rate (veh/h)	5	34	12	52	58	39	28	549	20	7	381	26

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	52	148	28	549	20	7	408
Volume Left (vph)	5	52	28	0	0	7	0
Volume Right (vph)	13	39	0	0	20	0	26
Hadj (s)	-0.1	-0.1	0.2	0.0	-0.6	0.2	0.0
Departure Headway (s)	6.6	6.4	5.8	5.6	3.2	6.0	5.8
Degree Utilization, x	0.10	0.26	0.05	0.86	0.02	0.01	0.65
Capacity (veh/h)	481	514	598	629	1121	574	601
Control Delay (s)	10.3	11.7	7.9	32.4	5.1	7.9	17.8
Approach Delay (s)	10.3	11.7	30.3			17.7	
Approach LOS	B	B	D			C	

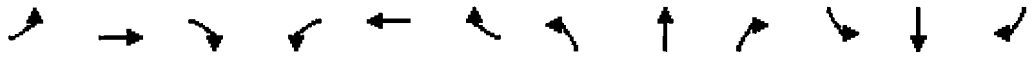
Intersection Summary				
Delay	22.9			
HCM Level of Service	C			
Intersection Capacity Utilization	50.5%	ICU Level of Service	A	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↑	↗	↖	↦	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	29	43	28	25	31	17	19	364	40	30	523	20
Peak Hour Factor	0.76	0.76	0.76	0.83	0.83	0.83	0.96	0.96	0.96	0.80	0.80	0.80
Hourly flow rate (veh/h)	38	57	37	30	37	20	20	379	42	38	654	25

Direction, Lane #	EB 1	EB 2	EB 3	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	132	88	20	379	42	38	679
Volume Left (vph)	38	30	20	0	0	38	0
Volume Right (vph)	37	20	0	0	42	0	25
Hadj (s)	-0.1	0.0	0.2	0.0	-0.6	0.2	0.0
Departure Headway (s)	6.7	6.9	6.3	6.1	3.2	6.0	5.7
Degree Utilization, x	0.24	0.17	0.03	0.64	0.04	0.06	1.08
Capacity (veh/h)	509	487	561	576	1121	588	634
Control Delay (s)	11.9	11.3	8.3	17.9	5.1	8.2	82.0
Approach Delay (s)	11.9	11.3	16.3			78.1	
Approach LOS	B	B	C			F	

Intersection Summary			
Delay		47.7	
HCM Level of Service		E	
Intersection Capacity Utilization	56.6%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	31	0	13	0	105	18	5	50	0
Peak Hour Factor	0.92	0.92	0.92	0.79	0.92	0.79	0.92	0.90	0.90	0.86	0.86	0.92
Hourly flow rate (veh/h)	0	0	0	39	0	16	0	117	20	6	58	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	213	206	58	196	196	127	58			137		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	213	206	58	196	196	127	58			137		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	95	100	98	100			100		
cM capacity (veh/h)	728	687	1008	760	696	924	1546			1447		

Direction, Lane #	EB	WB	NB	SB
Volume Total	0	56	137	64
Volume Left	0	39	0	6
Volume Right	0	16	20	0
cSH	1700	802	1546	1447
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length (ft)	0	6	0	0
Control Delay (s)	0.0	9.8	0.0	0.7
Lane LOS	A	A		A
Approach Delay (s)	0.0	9.8	0.0	0.7
Approach LOS	A	A		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	45	0	2	0	121	48	9	134	0
Peak Hour Factor	0.92	0.92	0.92	0.62	0.62	0.62	0.90	0.90	0.90	0.83	0.83	0.83
Hourly flow rate (veh/h)	0	0	0	73	0	3	0	134	53	11	161	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	347	371	161	344	344	161	161			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	347	371	161	344	344	161	161			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	88	100	100	100			99		
cM capacity (veh/h)	601	555	883	600	574	884	1417			1386		

Volume Total	0	76	188	172
Volume Left	0	73	0	11
Volume Right	0	3	53	0
cSH	1700	615	1417	1386
Volume to Capacity	0.00	0.12	0.00	0.01
Queue Length (ft)	0	10	0	1
Control Delay (s)	0.0	11.7	0.0	0.5
Lane LOS	A	B		A
Approach Delay (s)	0.0	11.7	0.0	0.5
Approach LOS	A	B		

Average Delay	2.2		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↑	↗		↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	50	6	16	25	19	15	11	851	15	2	535	23
Peak Hour Factor	0.78	0.78	0.78	0.87	0.87	0.87	0.92	0.92	0.92	0.90	0.90	0.90
Hourly flow rate (veh/h)	64	8	21	29	22	17	12	925	16	2	594	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1576	1564	594	1572	1573	925	620			941		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1576	1564	594	1572	1573	925	620			941		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	9	93	96	64	80	95	99			100		
cM capacity (veh/h)	70	110	505	80	108	326	960			728		

Direction, Lane #	EB 1	EB 2	EB 3	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	92	68	12	925	16	2	594	26
Volume Left	64	29	12	0	0	2	0	0
Volume Right	21	17	0	0	16	0	0	26
cSH	90	111	960	1700	1700	728	1700	1700
Volume to Capacity	1.02	0.61	0.01	0.54	0.01	0.00	0.35	0.02
Queue Length (ft)	150	76	1	0	0	0	0	0
Control Delay (s)	185.5	79.0	8.8	0.0	0.0	10.0	0.0	0.0
Lane LOS	F	F	A			A		
Approach Delay (s)	185.5	79.0	0.1			0.0		
Approach LOS	F	F						

Intersection Summary				
Average Delay	13.0			
Intersection Capacity Utilization	67.2%	ICU Level of Service		B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↑	↑	↑	↑	↑
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	56	13	11	7	8	6	12	640	10	7	679	45
Peak Hour Factor	0.77	0.77	0.77	0.66	0.66	0.66	0.92	0.92	0.92	0.94	0.94	0.94
Hourly flow rate (veh/h)	73	17	14	11	12	9	13	696	11	7	722	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1474	1470	722	1482	1507	696	770			707		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1474	1470	722	1482	1507	696	770			707		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	22	86	97	88	90	98	98			99		
cM capacity (veh/h)	93	124	427	88	148	442	844			892		

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	104	32	13	696	11	7	722	48
Volume Left	73	11	13	0	0	7	0	0
Volume Right	14	9	0	0	11	0	0	48
cSH	109	130	844	1700	1700	892	1700	1700
Volume to Capacity	0.95	0.24	0.02	0.41	0.01	0.01	0.42	0.03
Queue Length (ft)	148	23	1	0	0	1	0	0
Control Delay (s)	147.1	41.3	9.3	0.0	0.0	9.1	0.0	0.0
Lane LOS	F	E	A			A		
Approach Delay (s)	147.1	41.3	1.02			0.1		
Approach LOS	F	E						

Intersection Summary					
Average Delay	10.3				
Intersection Capacity Utilization	57.1%	ICU Level of Service		A	



Movement	EBL	EBR	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	64	66	11	47	75	17	13	345	52	7	294	69
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.82	0.82	0.82	0.86	0.86	0.86
Hourly flow rate (veh/h)	69	71	12	52	82	19	16	421	63	8	342	80

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	69	83	52	101	226	274	179	251
Volume Left (vph)	69	0	52	0	16	0	8	0
Volume Right (vph)	0	12	0	19	0	63	0	80
Hadj (s)	0.2	-0.1	0.2	-0.1	0.0	-0.1	0.0	-0.2
Departure Headway (s)	7.2	6.9	7.2	6.9	6.1	6.0	6.2	6.0
Degree Utilization, x	0.14	0.16	0.10	0.19	0.38	0.45	0.31	0.42
Capacity (veh/h)	461	480	460	482	571	587	559	581
Control Delay (s)	10.2	10.1	9.9	10.4	11.7	12.6	10.7	12.0
Approach Delay (s)	10.1		10.2		12.2		11.5	
Approach LOS	B		B		B		B	

Intersection Summary			
Delay	11.4		
HCM Level of Service	B		
Intersection Capacity Utilization	32.9%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	98	96	27	56	78	6	8	365	59	5	473	85
Peak Hour Factor	0.91	0.91	0.91	0.73	0.73	0.73	0.84	0.84	0.84	0.93	0.93	0.93
Hourly flow rate (veh/h)	108	105	30	77	107	8	10	435	70	5	509	91

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	108	135	77	115	227	288	260	346
Volume Left (vph)	108	0	77	0	10	0	5	0
Volume Right (vph)	0	30	0	8	0	70	0	91
Hadj (s)	0.2	-0.1	0.2	0.0	0.0	0.1	0.0	-0.1
Departure Headway (s)	7.9	7.6	8.0	7.8	7.0	6.8	6.9	6.7
Degree Utilization, x	0.24	0.29	0.17	0.25	0.44	0.55	0.49	0.64
Capacity (veh/h)	429	447	419	434	500	504	511	519
Control Delay (s)	12.2	12.4	11.5	12.2	14.1	16.5	15.2	19.8
Approach Delay (s)	12.3		11.9		15.5		17.8	
Approach LOS	B		B		C		C	

Delay	15.4
HCM Level of Service	C
Intersection Capacity Utilization	39.9%
ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕↑			↕↑	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	145	10	28	26	28	12	39	368	16	7	357	133
Peak Hour Factor	0.83	0.83	0.83	0.66	0.66	0.66	0.91	0.91	0.91	0.93	0.93	0.93
Hourly flow rate (veh/h)	175	12	34	39	42	18	43	404	18	8	384	143

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	220	100	245	220	199	335
Volume Left (vph)	175	39	43	0	8	0
Volume Right (vph)	34	18	0	18	0	143
Hadj (s)	0.1	0.0	0.1	0.0	0.0	-0.2
Departure Headway (s)	6.4	6.7	6.3	6.2	6.2	5.9
Degree Utilization, x	0.39	0.19	0.43	0.38	0.34	0.55
Capacity (veh/h)	525	488	552	558	561	580
Control Delay (s)	13.6	11.2	12.7	11.8	11.2	14.8
Approach Delay (s)	13.6	11.2	12.3		13.5	
Approach LOS	B	B	B		B	

Intersection Summary			
Delay	12.9		
HCM Level of Service	B		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔↑			↔↑	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	128	24	34	12	7	27	30	466	15	20	503	48
Peak Hour Factor	0.83	0.83	0.83	0.78	0.78	0.78	0.94	0.94	0.94	0.97	0.97	0.97
Hourly flow rate (veh/h)	154	29	41	15	9	35	32	496	16	21	519	49

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	224	59	280	264	280	309
Volume Left (vph)	154	15	32	0	21	0
Volume Right (vph)	41	35	0	16	0	49
Hadj (s)	0.1	-0.3	-0.1	0.0	0.0	-0.1
Departure Headway (s)	6.4	6.6	6.2	6.2	6.2	6.1
Degree Utilization, x	0.40	0.11	0.48	0.45	0.48	0.52
Capacity (veh/h)	529	487	563	567	567	579
Control Delay (s)	13.7	10.4	13.8	11.0	13.6	14.3
Approach Delay (s)	13.7	10.4	13.4		13.9	
Approach LOS	B	B	B		B	

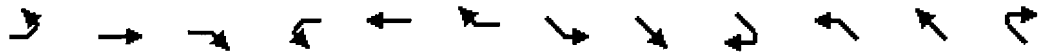
Intersection Summary				
Delay		13.5		
HCM Level of Service		B		
Intersection Capacity Utilization	45.3%		ICU Level of Service	A



Movement	WBL2	WBL	WBR	SEL	SET	SER	NWL	NWT	NWR	NEL	NER
Lane Configurations											
Sign Control		Stop			Free			Free		Stop	
Grade		0%			0%			0%		0%	
Volume (veh/h)	25	0	89	0	206	0	0	392	0	0	0
Peak Hour Factor	0.81	0.92	0.81	0.87	0.87	0.92	0.92	0.91	0.91	0.92	0.92
Hourly flow rate (veh/h)	31	0	110	0	237	0	0	431	0	0	0
Pedestrians											
Lane Width (ft)											
Walking Speed (ft/s)											
Percent Blockage											
Right turn flare (veh)											
Median type		None								None	
Median storage veh)											
Upstream signal (ft)					766						
pX, platoon unblocked											
vC, conflicting volume	668	668	431	431			237			777	668
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	668	668	431	431			237			777	668
tC, single (s)	7.1	6.5	6.2	4.1			4.1			7.1	6.5
tC, 2 stage (s)											
tF (s)	3.5	4.0	3.3	2.2			2.2			3.5	4.0
p0 queue free %	92	100	82	100			100			100	100
cM capacity (veh/h)	372	379	625	1129			1330			259	379

Direction, Lane	WB	SE	NW
Volume Total	141	237	431
Volume Left	31	0	0
Volume Right	110	0	0
cSH	544	1700	1700
Volume to Capacity	0.26	0.14	0.25
Queue Length (ft)	26	0	0
Control Delay (s)	13.9	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.9	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	37.8%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	66	0	131	0	247	0	0	112	0
Peak Hour Factor	0.92	0.92	0.92	0.81	0.92	0.81	0.87	0.87	0.92	0.92	0.91	0.91
Hourly flow rate (veh/h)	0	0	0	81	0	162	0	284	0	0	123	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)								762				
pX, platoon unblocked												
vC, conflicting volume	569	407	284	407	407	123	123			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	569	407	284	407	407	123	123			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	85	100	83	100			100		
cM capacity (veh/h)	358	533	755	555	533	928	1464			1278		

Direction, Lane #	EB 1	WB 1	WB 2	SE 1
Volume Total	243	264	123	
Volume Left	81	0	0	
Volume Right	162	0	0	
cSH	757	1700	1700	
Volume to Capacity	0.32	0.17	0.07	
Queue Length (ft)	35	0	0	
Control Delay (s)	12.0	0.0	0.0	
Lane LOS	B			
Approach Delay (s)	12.0	0.0	0.0	
Approach LOS	B			

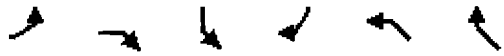
Intersection Summary				
Average Delay	4.5			
Intersection Capacity Utilization	36.1%	ICU Level of Service	A	



Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	67	62	68	78
Peak Hour Factor	0.92	0.92	0.90	0.90	0.87	0.87
Hourly flow rate (veh/h)	0	0	74	69	78	90
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	341	123	168			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	123	168			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	621	928	1410			

Direction, Lane #			
Volume Total	143	168	
Volume Left	74	0	
Volume Right	0	90	
cSH	1410	1700	
Volume to Capacity	0.05	0.10	
Queue Length (ft)	4	0	
Control Delay (s)	4.2	0.0	
Lane LOS	A		
Approach Delay (s)	4.2	0.0	
Approach LOS			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	24.0%	ICU Level of Service	A



Movement	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Sign Control	Free		Stop		Free	
Grade	0%		0%		0%	
Volume (veh/h)	103	194	0	0	62	31
Peak Hour Factor	0.78	0.78	0.92	0.92	0.73	0.73
Hourly flow rate (veh/h)	132	249	0	0	85	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	127		619	106		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127		619	106		
tC, single (s)	4.1		6.4	6.2		
tC, 2 stage (s)						
tF (s)	2.2		3.5	3.3		
p0 queue free %	91		100	100		
cM capacity (veh/h)	1459		411	948		

Volume Total	381	127
Volume Left	132	0
Volume Right	0	42
cSH	1459	1700
Volume to Capacity	0.09	0.07
Queue Length (ft)	7	0
Control Delay (s)	3.2	0.0
Lane LOS	A	
Approach Delay (s)	3.2	0.0
Approach LOS		

Average Delay	2.4		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	123	13	43	24	1	92
Peak Hour Factor	0.87	0.87	0.76	0.76	0.83	0.83
Hourly flow rate (veh/h)	141	15	57	32	1	111
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	186	72			88	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186	72			88	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	98			100	
cM capacity (veh/h)	803	990			1508	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	156	88	112
Volume Left	141	0	1
Volume Right	15	32	0
cSH	818	1700	1508
Volume to Capacity	0.19	0.05	0.00
Queue Length (ft)	18	0	0
Control Delay (s)	10.4	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	10.4	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	40	17	126	181	25	77
Peak Hour Factor	0.55	0.55	0.78	0.78	0.91	0.91
Hourly flow rate (veh/h)	73	31	162	232	27	85
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	417	278			394	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	417	278			394	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	96			98	
cM capacity (veh/h)	578	761			1165	

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	104	394	112
Volume Left	73	0	27
Volume Right	31	232	0
cSH	623	1700	1165
Volume to Capacity	0.17	0.23	0.02
Queue Length (ft)	15	0	2
Control Delay (s)	11.9	0.0	2.2
Lane LOS	B		A
Approach Delay (s)	11.9	0.0	2.2
Approach LOS	B		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	5	36	5	10	37	10	2	214	19	13	100	1
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.81	0.81	0.81	0.73	0.73	0.73
Hourly flow rate (veh/h)	7	53	7	15	54	15	2	264	23	18	137	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	68	84	290	156
Volume Left (vph)	7	15	2	18
Volume Right (vph)	7	15	23	1
Hadj (s)	0.0	0.0	0.0	0.1
Departure Headway (s)	5.0	4.9	4.4	4.6
Degree Utilization, x	0.09	0.11	0.36	0.20
Capacity (veh/h)	660	668	785	740
Control Delay (s)	8.5	8.6	9.9	8.8
Approach Delay (s)	8.5	8.6	9.9	8.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.3		
HCM Level of Service	A		
Intersection Capacity Utilization	27.6%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	12	70	7	29	65	20	15	157	34	35	156	9
Peak Hour Factor	0.82	0.82	0.82	0.86	0.86	0.86	0.82	0.82	0.82	0.85	0.85	0.85
Hourly flow rate (veh/h)	15	85	9	34	76	23	18	191	41	41	184	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	109	133	251	235
Volume Left (vph)	15	34	18	41
Volume Right (vph)	9	23	41	11
Hadj (s)	0.0	0.0	-0.1	0.0
Departure Headway (s)	5.2	5.2	4.8	4.9
Degree Utilization, X	0.16	0.19	0.33	0.32
Capacity (veh/h)	626	637	722	702
Control Delay (s)	9.2	9.4	10.1	10.1
Approach Delay (s)	9.2	9.4	10.1	10.1
Approach LOS	A	A	B	B

Intersection Summary			
Delay	9.8		
HCM Level of Service	A		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A



Movement	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	1.00		1.00	0.95		1.00	0.85	
Flt Protected	0.95	0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1663		1770	1858		1770	1773		1770	1583	
Flt Permitted	0.51	0.98		0.95	1.00		0.95	1.00		0.56	1.00	
Satd. Flow (perm)	942	1663		1770	1858		1770	1773		1048	1583	
Volume (vph)	166	59	87	63	534	10	11	285	135	46	72	46
Peak-hour factor, PHF	0.69	0.69	0.69	0.72	0.72	0.72	0.64	0.64	0.64	0.48	0.48	0.48
Adj. Flow (vph)	241	86	126	88	742	14	17	445	211	96	150	96
Lane Group Flow (vph)	241	212	0	88	756	0	17	656	0	96	246	0
Turn Type	Perm			Prot			Prot			custom		
Protected Phases		4		5	2		1	6				
Permitted Phases	4									8	8	
Actuated Green, G (s)	16.0	16.0		4.0	26.0		4.0	26.0		16.0	16.0	
Effective Green, g (s)	16.0	16.0		4.0	26.0		4.0	26.0		16.0	16.0	
Actuated g/C Ratio	0.28	0.28		0.07	0.45		0.07	0.45		0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	260	459		122	833		122	795		289	437	
v/s Ratio Prot		0.13		c0.05	c0.41		0.01	0.37				
v/s Ratio Perm	c0.26									0.09	0.16	
v/c Ratio	0.93	0.46		0.72	0.91		0.14	0.83		0.33	0.56	
Uniform Delay, d1	20.4	17.4		26.5	14.9		25.4	14.0		16.7	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	39.8	3.3		30.7	15.5		2.4	9.5		3.1	5.2	
Delay (s)	60.2	20.7		57.1	30.3		27.9	23.5		19.8	23.2	
Level of Service	E	C		E	C		C	C		B	C	
Approach Delay (s)		41.7			33.1			23.6		22.2		
Approach LOS		D			C			C		C		

Intersection Summary			
HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Cycle Length (s)	58.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	D

c Critical Lane Group



Movement	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	0.98		1.00	0.85	
Flt Protected	0.95	0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1642		1770	1854		1770	1832		1770	1583	
Flt Permitted	0.69	0.99		0.95	1.00		0.95	1.00		0.67	1.00	
Satd. Flow (perm)	1287	1642		1770	1854		1770	1832		1239	1583	
Volume (vph)	125	40	94	49	402	13	43	677	83	10	73	28
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.99	0.99	0.99
Adj. Flow (vph)	134	43	101	53	432	14	47	736	90	10	74	28
Lane Group Flow (vph)	134	144	0	53	446	0	47	826	0	10	102	0
Turn Type	Perm			Prot			Prot			custom		
Protected Phases		4		5	2		1	6				
Permitted Phases	4									8	8	
Actuated Green, G (s)	11.6	11.6		2.0	29.8		2.0	29.8		11.6	11.6	
Effective Green, g (s)	11.6	11.6		2.0	29.8		2.0	29.8		11.6	11.6	
Actuated g/C Ratio	0.21	0.21		0.04	0.54		0.04	0.54		0.21	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	269	344		64	997		64	985		259	331	
v/s Ratio Prot		0.09		c0.03	0.24		0.03	c0.45				
v/s Ratio Perm	c0.10									0.01	0.06	
v/c Ratio	0.50	0.42		0.83	0.45		0.73	0.84		0.04	0.31	
Uniform Delay, d1	19.3	19.0		26.5	7.8		26.4	10.8		17.5	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.8		56.0	0.3		35.0	6.4		0.1	0.5	
Delay (s)	20.8	19.8		82.5	8.1		61.4	17.1		17.5	19.0	
Level of Service	C	B		F	A		E	B		B	B	
Approach Delay (s)		20.3			16.0			19.5		18.9		
Approach LOS		C			B			B		B		

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	B
c Critical Lane Group			



Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	1583		1770	3539	1583	1770	3539	1583	1770	1770	1583
Flt Permitted	0.69	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.69	0.95	1.00
Satd. Flow (perm)	1293	1583		1770	3539	1583	1770	3539	1583	1277	1770	1583
Volume (vph)	35	69	24	4	517	69	78	872	34	117	75	102
Peak-hour factor, PHF	0.84	0.84	0.84	0.86	0.86	0.86	0.86	0.86	0.86	0.77	0.77	0.77
Adj. Flow (vph)	42	82	29	5	601	80	91	1014	40	152	97	132
Lane Group Flow (vph)	42	111	0	5	601	80	91	1014	40	152	97	132
Turn Type	custom			Prot		Perm	Prot		Perm	Perm		Perm
Protected Phases				5	2		1	6			8	
Permitted Phases	4	4				2			6	8		8
Actuated Green, G (s)	16.0	16.0		4.0	16.0	16.0	4.0	16.0	16.0	16.0	16.0	16.0
Effective Green, g (s)	16.0	16.0		4.0	16.0	16.0	4.0	16.0	16.0	16.0	16.0	16.0
Actuated g/C Ratio	0.33	0.33		0.08	0.33	0.33	0.08	0.33	0.33	0.33	0.33	0.33
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	431	528		148	1180	528	148	1180	528	426	590	528
v/s Ratio Prot				0.00	c0.17		c0.05	c0.29			0.05	
v/s Ratio Perm	0.03	0.07				0.05			0.03	c0.12		0.08
v/c Ratio	0.10	0.21		0.03	0.51	0.15	0.61	0.86	0.08	0.36	0.16	0.25
Uniform Delay, d1	11.0	11.5		20.2	12.8	11.2	21.3	14.9	10.9	12.1	11.3	11.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.9		0.4	1.6	0.6	17.6	8.2	0.3	2.3	0.6	1.1
Delay (s)	11.5	12.4		20.6	14.4	11.8	38.9	23.2	11.2	14.4	11.9	12.8
Level of Service	B	B		C	B	B	D	C	B	B	B	B
Approach Delay (s)	12.1				14.2			24.0			13.2	
Approach LOS	B				B			C			B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Cycle Length (s)	48.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	A

c Critical Lane Group



Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	1583		1770	3539	1583	1770	3539	1583	1770	1770	1583
Flt Permitted	0.72	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.69	0.95	1.00
Satd. Flow (perm)	1346	1583		1770	3539	1583	1770	3539	1583	1288	1770	1583
Volume (vph)	63	77	4	35	804	93	84	603	31	78	46	103
Peak-hour factor, PHF	0.80	0.80	0.80	0.84	0.84	0.84	0.88	0.88	0.88	0.86	0.86	0.86
Adj. Flow (vph)	66	96	5	42	957	111	95	685	35	91	53	120
Lane Group Flow (vph)	66	101	0	42	957	111	95	685	35	91	53	120
Turn Type	custom			Prot		Perm	Prot		Perm	Perm		Perm
Protected Phases				5	2		1	6			8	
Permitted Phases	4	4				2			6	8		8
Actuated Green, G (s)	10.1	10.1		2.1	29.8	29.8	3.1	30.8	30.8	10.1	10.1	10.1
Effective Green, g (s)	10.1	10.1		2.1	29.8	29.8	3.1	30.8	30.8	10.1	10.1	10.1
Actuated g/C Ratio	0.18	0.18		0.04	0.54	0.54	0.06	0.56	0.56	0.18	0.18	0.18
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	291		68	1917	858	100	1982	885	237	325	291
v/s Ratio Prot				0.02	c0.27		c0.05	0.19			0.03	
v/s Ratio Perm	0.05	0.06				0.07			0.02	0.07		c0.08
v/c Ratio	0.27	0.35		0.62	0.50	0.13	0.95	0.35	0.04	0.38	0.16	0.41
Uniform Delay, d1	19.3	19.6		26.1	7.9	6.2	25.9	6.6	5.4	19.7	18.9	19.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.7		15.5	0.2	0.1	73.6	0.1	0.0	1.0	0.2	1.0
Delay (s)	19.9	20.3		41.6	8.1	6.3	99.5	6.7	5.5	20.8	19.1	20.8
Level of Service	B	C		D	A	A	F	A	A	C	B	C
Approach Delay (s)	20.1				9.2			17.5			20.4	
Approach LOS	C				A			B			C	

HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0				4.0	4.0
Lane Util. Factor		0.91			0.91	1.00				1.00	0.95
Frt		1.00			1.00	0.85				0.88	0.85
Flt Protected		0.99			1.00	1.00				0.99	1.00
Satd. Flow (prot)		5020			5085	1583				1624	1504
Flt Permitted		0.71			1.00	1.00				0.99	1.00
Satd. Flow (perm)		3602			5085	1583				1624	1504
Volume (vph)	197	560	0	0	1010	291	0	0	47	0	388
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	212	602	0	0	1148	331	0	0	49	0	404
Lane Group Flow (vph)	0	814	0	0	1148	331	0	0	0	241	212
Turn Type	Perm					Perm			Perm		Perm
Protected Phases		4			8					2	
Permitted Phases	4					8			2		2
Actuated Green, G (s)		15.5			15.5	15.5				7.6	7.6
Effective Green, g (s)		15.5			15.5	15.5				7.6	7.6
Actuated g/C Ratio		0.50			0.50	0.50				0.24	0.24
Clearance Time (s)		4.0			4.0	4.0				4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0				3.0	3.0
Lane Grp Cap (vph)		1795			2534	789				397	368
v/s Ratio Prot					0.23						
v/s Ratio Perm		c0.23				0.21				c0.15	0.14
v/c Ratio		1.20dl			0.45	0.42				0.61	0.58
Uniform Delay, d1		5.1			5.1	4.9				10.4	10.3
Progression Factor		1.00			1.00	1.00				1.00	1.00
Incremental Delay, d2		0.2			0.1	0.4				2.6	2.2
Delay (s)		5.2			5.2	5.3				13.0	12.5
Level of Service		A			A	A				B	B
Approach Delay (s)		5.2			5.2		0.0			12.8	
Approach LOS		A			A		A			B	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	31.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	A

dl - Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NET	NER
Lane Configurations		↰↑↑↑			↑↑↑	↱				↑↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0				4.0	4.0
Lane Util. Factor		0.91			0.91	1.00				1.00	0.95
Frt		1.00			1.00	0.85				0.88	0.85
Flt Protected		1.00			1.00	1.00				0.99	1.00
Satd. Flow (prot)		5063			5085	1583				1620	1504
Flt Permitted		0.79			1.00	1.00				0.99	1.00
Satd. Flow (perm)		4033			5085	1583				1620	1504
Volume (vph)	65	687	0	0	1176	265	0	0	102	1	924
Peak-hour factor, PHF	0.99	0.99	0.99	0.97	0.97	0.97	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	66	694	0	0	1212	273	0	0	106	1	962
Lane Group Flow (vph)	0	760	0	0	1212	273	0	0	0	572	497
Turn Type	Perm					Perm			Perm		Perm
Protected Phases		4			8					2	
Permitted Phases	4					8			2		2
Actuated Green, G (s)		18.6			18.6	18.6				16.1	16.1
Effective Green, g (s)		18.6			18.6	18.6				16.1	16.1
Actuated g/C Ratio		0.44			0.44	0.44				0.38	0.38
Clearance Time (s)		4.0			4.0	4.0				4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0				3.0	3.0
Lane Grp Cap (vph)		1757			2215	690				611	567
v/s Ratio Prot					c0.24						
v/s Ratio Perm		0.19				0.17				c0.35	0.33
v/c Ratio		0.43			0.55	0.40				0.94	0.88
Uniform Delay, d1		8.4			8.9	8.2				12.8	12.4
Progression Factor		1.00			1.00	1.00				1.00	1.00
Incremental Delay, d2		0.2			0.3	0.4				21.8	14.2
Delay (s)		8.6			9.2	8.6				34.6	26.6
Level of Service		A			A	A				C	C
Approach Delay (s)		8.6			9.1		0.0			30.9	
Approach LOS		A			A		A			C	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	42.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	C
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	3	5	427	4	12	677
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	3	5	464	4	13	736
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1228	234			468	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1228	234			468	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	168	768			1089	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	3	5	309	159	13	736
Volume Left	3	0	0	0	13	0
Volume Right	0	5	0	4	0	0
cSH	168	768	1700	1700	1089	1700
Volume to Capacity	0.02	0.01	0.18	0.09	0.01	0.43
Queue Length (ft)	1	1	0	0	1	0
Control Delay (s)	26.8	9.7	0.0	0.0	8.3	0.0
Lane LOS	D	A			A	
Approach Delay (s)	16.1		0.0		0.1	
Approach LOS	C					

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	48.7%	ICU Level of Service		A



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	20	16	758	11	1	489
Peak Hour Factor	0.69	0.69	0.98	0.98	0.91	0.91
Hourly flow rate (veh/h)	29	23	773	11	1	537
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1319	392			785	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1319	392			785	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	80	96			100	
cM capacity (veh/h)	148	607			830	

Direction	WB		NB		SB	
Volume Total	29	23	516	269	1	537
Volume Left	29	0	0	0	1	0
Volume Right	0	23	0	11	0	0
cSH	148	607	1700	1700	830	1700
Volume to Capacity	0.20	0.04	0.30	0.16	0.00	0.32
Queue Length (ft)	17	3	0	0	0	0
Control Delay (s)	35.1	11.2	0.0	0.0	9.3	0.0
Lane LOS	E	B			A	
Approach Delay (s)	23.4		0.0		0.0	
Approach LOS	C					

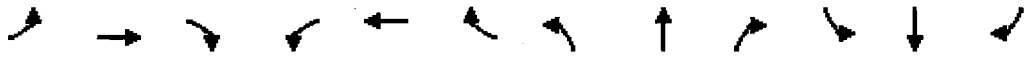
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	38.3%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	6	14	10	0	0	0	8	225	0	0	167	12
Peak Hour Factor	0.83	0.83	0.83	0.25	0.92	0.92	0.68	0.68	0.68	0.86	0.86	0.86
Hourly flow rate (veh/h)	7	17	12	0	0	0	12	331	0	0	194	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	36	0	343	208
Volume Left (vph)	7	0	12	0
Volume Right (vph)	12	0	0	14
Hadj (s)	-0.1	0.0	0.0	0.0
Departure Headway (s)	4.9	5.1	4.2	4.3
Degree Utilization, x	0.05	0.00	0.40	0.25
Capacity (veh/h)	663	644	836	811
Control Delay (s)	8.2	8.1	10.1	8.7
Approach Delay (s)	8.2	0.0	10.1	8.7
Approach LOS	A	A	B	A

Intersection Summary			
Delay	9.5		
HCM Level of Service	A		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	3	1	11	1	0	0	21	219	0	0	238	21
Peak Hour Factor	0.75	0.75	0.75	0.25	0.25	0.25	0.91	0.91	0.91	0.80	0.80	0.80
Hourly flow rate (veh/h)	4	1	15	4	0	0	23	241	0	0	298	26

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	20	4	264	324
Volume Left (vph)	4	4	23	0
Volume Right (vph)	15	0	0	26
Hadj (s)	-0.4	0.2	0.1	0.0
Departure Headway (s)	4.7	5.4	4.3	4.2
Degree Utilization, x	0.03	0.01	0.32	0.38
Capacity (veh/h)	680	603	817	838
Control Delay (s)	7.9	8.4	9.3	9.7
Approach Delay (s)	7.9	8.4	9.3	9.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.5		
HCM Level of Service	A		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A



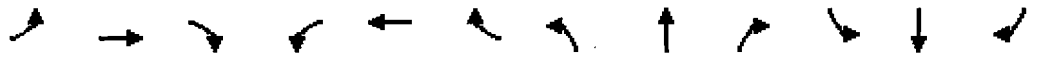
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3487		1770	1757		1770	1744	
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.70	1.00	
Satd. Flow (perm)	1770	3525		1770	3487		1307	1757		1305	1744	
Volume (vph)	50	995	27	30	893	97	23	43	126	82	45	33
Peak-hour factor, PHF	0.91	0.91	0.91	0.94	0.94	0.94	0.79	0.79	0.79	0.91	0.91	0.91
Adj. Flow (vph)	55	1093	30	32	950	103	29	54	33	90	49	36
Lane Group Flow (vph)	55	1123	0	32	1053	0	29	87	0	90	85	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	1.2	16.8		1.2	16.8		8.3	8.3		8.3	8.3	
Effective Green, g (s)	1.2	16.8		1.2	16.8		8.3	8.3		8.3	8.3	
Actuated g/C Ratio	0.03	0.44		0.03	0.44		0.22	0.22		0.22	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	55	1546		55	1530		283	381		283	378	
v/s Ratio Prot	c0.03	c0.32		0.02	0.30			0.05			0.05	
v/s Ratio Perm							0.02			c0.07		
v/c Ratio	1.00	0.73		0.58	0.69		0.10	0.23		0.32	0.22	
Uniform Delay, d1	18.5	8.9		18.3	8.6		12.0	12.4		12.6	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	121.4	1.7		14.7	1.3		0.2	0.3		0.7	0.3	
Delay (s)	139.9	10.6		33.0	10.0		12.2	12.7		13.3	12.7	
Level of Service	F	B		C	A		B	B		B	B	
Approach Delay (s)		16.6			10.6			12.5			13.0	
Approach LOS		B			B			B			B	

HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	38.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
c Critical Lane Group			



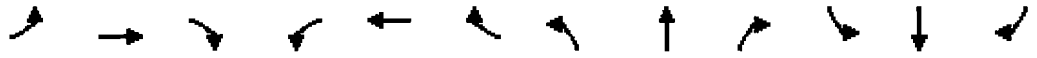
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.94		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3483		1770	1748		1770	1738	
Flt Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.60	1.00	
Satd. Flow (perm)	1770	3526		1770	3483		1228	1748		1114	1738	
Volume (vph)	103	1371	35	37	1247	149	37	102	71	130	76	61
Peak-hour factor, PHF	0.95	0.95	0.95	0.93	0.93	0.93	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	108	1443	37	40	1341	160	42	115	80	146	85	69
Lane Group Flow (vph)	108	1480	0	40	1501	0	42	195	0	146	154	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	3.0	24.7		1.4	23.1		10.8	10.8		10.8	10.8	
Effective Green, g (s)	3.0	24.7		1.4	23.1		10.8	10.8		10.8	10.8	
Actuated g/C Ratio	0.06	0.51		0.03	0.47		0.22	0.22		0.22	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	109	1781		51	1645		271	386		246	384	
v/s Ratio Prot	c0.06	0.42		0.02	c0.43			0.11			0.09	
v/s Ratio Perm							0.03			c0.13		
v/c Ratio	0.99	0.83		0.78	0.91		0.15	0.51		0.59	0.40	
Uniform Delay, d1	22.9	10.3		23.6	12.0		15.4	16.7		17.1	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	83.1	3.5		53.8	8.1		0.3	1.0		3.8	0.7	
Delay (s)	106.0	13.8		77.4	20.1		15.6	17.7		20.9	17.0	
Level of Service	F	B		E	C		B	B		C	B	
Approach Delay (s)		20.1			21.5			17.4			18.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3528		1770	3498		1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	1770	3528		1770	3498		1278	1863	1583	1272	1863	1583
Volume (vph)	89	1104	24	52	1078	92	51	106	41	100	89	100
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.81	0.81	0.81
Adj. Flow (vph)	98	1213	26	57	1185	101	55	115	45	123	110	123
Lane Group Flow (vph)	98	1239	0	57	1286	0	55	115	45	123	110	123
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2		2	6		6
Actuated Green, G (s)	4.2	28.8		2.1	26.7		10.2	10.2	10.2	10.2	10.2	10.2
Effective Green, g (s)	4.2	28.8		2.1	26.7		10.2	10.2	10.2	10.2	10.2	10.2
Actuated g/C Ratio	0.08	0.54		0.04	0.50		0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	140	1913		70	1759		245	358	304	244	358	304
v/s Ratio Prot	c0.06	0.35		0.03	c0.37			0.06			0.06	
v/s Ratio Perm							0.04		0.03	c0.10		0.08
v/c Ratio	0.70	0.65		0.81	0.73		0.22	0.32	0.15	0.50	0.31	0.40
Uniform Delay, d1	26.8	8.6		25.3	10.4		18.1	18.5	17.8	19.2	18.4	18.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.6	0.8		49.3	1.6		0.5	0.5	0.2	1.6	0.5	0.9
Delay (s)	38.5	9.3		74.6	12.0		18.6	19.0	18.1	20.8	18.9	19.7
Level of Service	D	A		E	B		B	B	B	C	B	B
Approach Delay (s)		11.5			14.6			18.7			19.8	
Approach LOS		B			B			B			B	

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	B
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3523		1770	3504		1770	3333		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.64	1.00	1.00
Satd. Flow (perm)	1770	3523		1770	3504		1246	3333		1186	1863	1583
Volume (vph)	123	1378	41	69	1193	84	72	104	66	113	126	159
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.93	0.93	0.93	0.91	0.91	0.91
Adj. Flow (vph)	132	1417	44	78	1356	95	77	112	71	124	138	175
Lane Group Flow (vph)	132	1461	0	78	1451	0	77	183	0	124	138	175
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	4.2	31.3		3.0	30.1		10.8	10.8		10.8	10.8	10.8
Effective Green, g (s)	4.2	31.3		3.0	30.1		10.8	10.8		10.8	10.8	10.8
Actuated g/C Ratio	0.07	0.55		0.05	0.53		0.19	0.19		0.19	0.19	0.19
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	130	1931		93	1847		236	630		224	352	299
v/s Ratio Prot	c0.07	c0.41		0.04	0.41			0.05			0.07	
v/s Ratio Perm							0.06			0.10		c0.11
v/c Ratio	1.02	0.76		0.84	0.79		0.33	0.29		0.55	0.39	0.59
Uniform Delay, d1	26.4	10.0		26.8	10.9		20.0	19.9		21.0	20.3	21.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	83.1	1.7		45.2	2.3		0.8	0.3		2.9	0.7	2.9
Delay (s)	109.5	11.7		72.0	13.2		20.8	20.1		23.9	21.0	24.0
Level of Service	F	B		E	B		C	C		C	C	C
Approach Delay (s)		19.8			16.2			20.3			23.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	C
c Critical Lane Group			



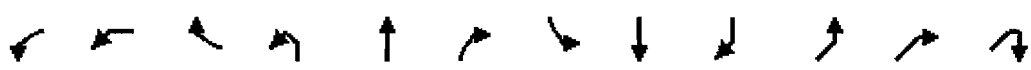
Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.88		1.00	1.00		1.00	1.00		1.00	0.97	
Frt	1.00	0.85		1.00	0.98		1.00	0.91		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	2787		1770	1818		1770	1698		1770	3417	
Flt Permitted	0.95	1.00		0.67	1.00		0.71	1.00		0.95	0.96	
Satd. Flow (perm)	1770	2787		1243	1818		1319	1698		1770	3417	
Volume (vph)	54	340	36	55	61	12	24	45	65	16	456	34
Peak-hour factor, PHF	0.85	0.85	0.85	0.97	0.97	0.97	0.78	0.78	0.78	0.83	0.83	0.83
Adj. Flow (vph)	64	400	42	57	63	12	31	58	83	19	549	41
Lane Group Flow (vph)	64	442	0	57	75	0	31	141	0	19	590	0
Turn Type	Prot			Perm			Perm			Prot		
Protected Phases	7	4			2			6		3	8	
Permitted Phases				2			6					
Actuated Green, G (s)	1.2	11.8		7.4	7.4		7.4	7.4		0.5	11.1	
Effective Green, g (s)	1.2	11.8		7.4	7.4		7.4	7.4		0.5	11.1	
Actuated g/C Ratio	0.04	0.37		0.23	0.23		0.23	0.23		0.02	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	67	1037		290	424		308	396		28	1196	
v/s Ratio Prot	c0.04	0.16			0.04			c0.08		0.01	c0.17	
v/s Ratio Perm				0.05			0.02					
v/c Ratio	0.96	0.43		0.20	0.18		0.10	0.36		0.68	0.49	
Uniform Delay, d1	15.2	7.4		9.8	9.7		9.5	10.2		15.5	8.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	93.5	0.3		0.3	0.2		0.1	0.6		49.7	0.3	
Delay (s)	108.7	7.7		10.1	9.9		9.7	10.7		65.2	8.4	
Level of Service	F	A		B	A		A	B		E	A	
Approach Delay (s)	20.5				10.0			10.5			10.2	
Approach LOS	C				A			B			B	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	31.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.94		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3476		1770	3500		1770	1754		1770	1718	
Flt Permitted	0.95	1.00		0.95	1.00		0.45	1.00		0.69	1.00	
Satd. Flow (perm)	1770	3476		1770	3500		847	1754		1278	1718	
Volume (vph)	100	777	105	16	585	47	57	58	37	74	104	111
Peak-hour factor, PHF	0.87	0.87	0.87	0.80	0.80	0.80	0.86	0.86	0.86	0.79	0.79	0.79
Adj. Flow (vph)	115	893	121	20	731	59	66	67	43	94	132	141
Lane Group Flow (vph)	115	1014	0	20	790	0	66	110	0	94	273	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.2	23.1		0.6	19.5		10.3	10.3		10.3	10.3	
Effective Green, g (s)	4.2	23.1		0.6	19.5		10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.09	0.50		0.01	0.42		0.22	0.22		0.22	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	162	1746		23	1484		190	393		286	385	
v/s Ratio Prot	c0.06	c0.29		0.01	0.23			0.06			c0.16	
v/s Ratio Perm							0.08			0.07		
v/c Ratio	0.71	0.58		0.87	0.53		0.35	0.28		0.33	0.71	
Uniform Delay, d1	20.3	8.0		22.7	9.9		15.0	14.8		15.0	16.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.3	0.5		127.6	0.4		1.1	0.4		0.7	5.9	
Delay (s)	33.6	8.5		150.2	10.2		16.1	15.2		15.6	22.4	
Level of Service	C	A		F	B		B	B		B	C	
Approach Delay (s)		11.1			13.7			15.5			20.6	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	B
c Critical Lane Group			



Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	24	31	83	5	234	17	39	87	14	29	24	8
Peak Hour Factor	0.86	0.86	0.86	0.76	0.76	0.76	0.80	0.80	0.80	0.69	0.69	0.69
Hourly flow rate (veh/h)	28	36	97	7	308	22	49	109	18	42	35	12

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	NE 1	NE 2
Volume Total (vph)	46	115	314	22	175	59	29
Volume Left (vph)	28	0	7	0	49	42	0
Volume Right (vph)	0	97	0	22	18	0	12
Hadj (s)	0.2	-0.5	0.0	-0.6	0.0	0.2	-0.2
Departure Headway (s)	6.1	5.5	5.4	4.8	5.7	6.2	5.8
Degree Utilization, x	0.08	0.17	0.47	0.03	0.28	0.10	0.05
Capacity (veh/h)	545	608	644	713	607	531	564
Control Delay (s)	8.4	8.4	12.0	6.8	10.8	8.7	7.9
Approach Delay (s)	8.4		11.7		10.8	8.5	
Approach LOS	A		B		B	A	

Intersection Summary				
Delay	10.4			
HCM Level of Service	B			
Intersection Capacity Utilization	47.6%	ICU Level of Service	A	



Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NBL2	NBR	NBR2
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	39	31	104	14	269	24	113	399	37	23	64	17
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.88	0.88	0.88	0.90	0.90	0.90
Hourly flow rate (veh/h)	44	35	117	15	296	26	128	453	42	26	71	19

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	NB 1	NB 2
Volume Total (vph)	61	134	311	26	624	61	54	
Volume Left (vph)	44	0	15	0	128	26	0	
Volume Right (vph)	0	117	0	26	42	0	19	
Hadj (s)	0.2	-0.5	0.0	-0.6	0.0	0.1	-0.2	
Departure Headway (s)	7.5	6.8	6.4	5.8	6.1	7.6	7.3	
Degree Utilization, x	0.13	0.25	0.55	0.04	1.06	0.13	0.11	
Capacity (veh/h)	459	506	543	602	584	450	466	
Control Delay (s)	10.4	10.9	15.8	7.8	78.6	10.5	10.0	
Approach Delay (s)	10.8		15.2		78.6	10.3		
Approach LOS	B		C		F	B		

Intersection Summary			
Delay	45.2		
HCM Level of Service	E		
Intersection Capacity Utilization	72.9%	ICU Level of Service	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	106	10	3	164	6	13	11	7	5	19	30
Peak Hour Factor	0.66	0.66	0.66	0.83	0.83	0.83	0.78	0.78	0.78	0.75	0.75	0.75
Hourly flow rate (veh/h)	9	161	15	4	198	7	17	14	9	7	25	40
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	205			176			447	398	168	411	402	201
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	205			176			447	398	168	411	402	201
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			96	97	99	99	95	95
cM capacity (veh/h)	1367			1401			475	534	876	581	532	840

Direction, Lane #	EB		NE	SW
Volume Total	185	208	40	72
Volume Left	9	4	17	7
Volume Right	15	7	9	40
cSH	1367	1401	554	668
Volume to Capacity	0.01	0.00	0.07	0.11
Queue Length (ft)	1	0	6	9
Control Delay (s)	0.4	0.2	12.0	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.2	12.0	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	35	153	10	9	76	8	17	17	14	3	19	18
Peak Hour Factor	0.99	0.99	0.99	0.78	0.78	0.78	0.86	0.86	0.86	0.83	0.83	0.83
Hourly flow rate (veh/h)	35	155	10	12	97	10	20	20	16	4	23	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	108			165			389	361	160	382	361	103
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108			165			389	361	160	382	361	103
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			96	96	98	99	96	98
cM capacity (veh/h)	1483			1414			526	548	886	536	548	952

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	200	119	36	48
Volume Left	35	12	20	4
Volume Right	10	10	16	22
cSH	1483	1414	607	676
Volume to Capacity	0.02	0.01	0.09	0.07
Queue Length (ft)	2	1	8	6
Control Delay (s)	1.5	0.8	11.5	10.7
Lane LOS	A	A	B	B
Approach Delay (s)	1.5	0.8	11.5	10.7
Approach LOS			B	B

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A

Appendix B-2

- **General Plan Buildout**

Hesperia GP Update
1: Highway 138 & Summit Valley Rd AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.25	1.00
Satd. Flow (perm)	3433	5085	5085	1583	466	2787
Volume (vph)	257	390	3583	57	40	1975
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	279	424	3895	62	43	2147
RTOR Reduction (vph)	0	0	0	11	0	247
Lane Group Flow (vph)	279	424	3895	51	43	1900
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	52.0	125.0	69.0	69.0	16.0	52.0
Effective Green, g (s)	52.0	125.0	69.0	69.0	16.0	52.0
Actuated g/C Ratio	0.35	0.84	0.46	0.46	0.11	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1198	4266	2355	733	50	973
v/s Ratio Prot	0.08	0.08	c0.77			c0.77
v/s Ratio Perm				0.04	c0.09	
v/c Ratio	0.23	0.10	1.65	0.07	0.86	1.95
Uniform Delay, d1	34.4	2.1	40.0	22.2	65.4	48.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	296.2	0.0	76.1	432.3
Delay (s)	34.5	2.1	336.2	22.2	141.5	480.8
Level of Service	C	A	F	C	F	F
Approach Delay (s)		15.0	331.3		474.1	
Approach LOS		B	F		F	

Intersection Summary			
HCM Average Control Delay	344.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	149.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	145.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.97	0.95				1.00		1.00
Frt		0.93		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	1.00				0.95		1.00
Satd. Flow (prot)		3283		3433	3539				1770		1583
Flt Permitted		1.00		0.95	1.00				0.95		1.00
Satd. Flow (perm)		3283		3433	3539				1770		1583
Volume (vph)	0	251	235	1886	259	0	0	0	25	0	266
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	273	255	2050	282	0	0	0	27	0	289
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	223
Lane Group Flow (vph)	0	518	0	2050	282	0	0	0	27	0	66
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		14.2		39.7	39.7				14.2		14.2
Effective Green, g (s)		14.2		39.7	39.7				14.2		14.2
Actuated g/C Ratio		0.23		0.64	0.64				0.23		0.23
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		753		2202	2270				406		363
v/s Ratio Prot		0.16		c0.60	0.08						
v/s Ratio Perm									0.02		0.18
v/c Ratio		0.69		0.93	0.12				0.07		0.18
Uniform Delay, d1		21.8		9.9	4.3				18.7		19.2
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		2.6		7.8	0.0				0.1		0.2
Delay (s)		24.4		17.7	4.4				18.7		19.4
Level of Service		C		B	A				B		B
Approach Delay (s)		24.4			16.1		0.0			19.4	
Approach LOS		C			B		A			B	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave — AM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		
Lane Util. Factor	0.97		1.00		
Frt	1.00		0.86		
Flt Protected	0.95		1.00		
Satd. Flow (prot)	3433		1611		
Flt Permitted	0.95		1.00		
Satd. Flow (perm)	3433		1611		
Volume (vph)	380	0	225	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	413	0	245	0	0
RTOR Reduction (vph)	0	0	173	0	0
Lane Group Flow (vph)	413	0	72	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	8.0		6.6		
Effective Green, g (s)	8.0		6.6		
Actuated g/C Ratio	0.35		0.29		
Clearance Time (s)	4.0		4.0		
Vehicle Extension (s)	3.0		3.0		
Lane Grp Cap (vph)	1215		470		
v/s Ratio Prot	c0.12				
v/s Ratio Perm			0.15		
v/c Ratio	0.34		0.15		
Uniform Delay, d1	5.4		5.9		
Progression Factor	1.00		1.00		
Incremental Delay, d2	0.2		0.2		
Delay (s)	5.5		6.1		
Level of Service	A		A		
Approach Delay (s)	5.5	6.1		0.0	
Approach LOS	A	A		A	

Intersection Summary			
HCM Average Control Delay	5.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	22.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
9: Ranchero Rd & Caliente Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	238	741	314	634	141	1206	96	56	238	557	140	66
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	259	805	341	689	153	1311	104	61	259	605	152	72
RTOR Reduction (vph)	0	0	206	0	0	296	0	0	237	0	0	60
Lane Group Flow (vph)	259	805	135	689	153	1015	104	61	22	605	152	12
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.0	37.5	37.5	25.0	50.5	50.5	4.8	8.5	8.5	13.0	16.7	16.7
Effective Green, g (s)	12.0	37.5	37.5	25.0	50.5	50.5	4.8	8.5	8.5	13.0	16.7	16.7
Actuated g/C Ratio	0.12	0.38	0.38	0.25	0.50	0.50	0.05	0.08	0.08	0.13	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	212	1907	594	858	2568	799	165	158	237	446	311	264
v/s Ratio Prot	c0.15	0.16		0.20	0.03		0.03	0.03		c0.18	0.08	
v/s Ratio Perm			0.22			0.83			0.09			0.05
v/c Ratio	1.22	0.42	0.23	0.80	0.06	1.27	0.63	0.39	0.09	1.36	0.49	0.05
Uniform Delay, d1	44.0	23.2	21.3	35.2	12.6	24.8	46.7	43.3	42.2	43.5	37.8	35.0
Progression Factor	1.00	1.00	1.00	1.06	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	134.5	0.2	0.2	4.2	0.0	129.4	7.6	7.0	0.8	174.5	5.4	0.3
Delay (s)	178.5	23.4	21.5	41.7	12.7	154.4	54.3	50.3	43.0	218.0	43.2	35.3
Level of Service	F	C	C	D	B	F	D	D	D	F	D	D
Approach Delay (s)		51.5			108.3			46.8			170.1	
Approach LOS		D			F			D			F	

Intersection Summary			
HCM Average Control Delay	96.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		0.99	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4755	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4755	1362	3433	5085				1770		2787
Volume (vph)	0	855	680	324	875	0	0	0	232	0	1106
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	929	739	352	951	0	0	0	252	0	1202
RTOR Reduction (vph)	0	8	498	0	0	0	0	0	0	0	50
Lane Group Flow (vph)	0	991	171	352	951	0	0	0	252	0	1152
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		25.6	25.6	13.2	42.8				49.2		49.2
Effective Green, g (s)		25.6	25.6	13.2	42.8				49.2		49.2
Actuated g/C Ratio		0.26	0.26	0.13	0.43				0.49		0.49
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1217	349	453	2176				871		1371
v/s Ratio Prot		0.21		c0.10	0.19						
v/s Ratio Perm			0.49						0.14		0.43
v/c Ratio		0.81	0.49	0.78	0.44				0.29		0.84
Uniform Delay, d1		35.0	31.7	42.0	20.1				15.0		22.0
Progression Factor		0.64	4.43	1.08	0.46				1.00		1.00
Incremental Delay, d2		2.8	0.7	7.5	0.1				0.8		6.3
Delay (s)		25.3	141.0	53.0	9.3				15.9		28.3
Level of Service		C	F	D	A				B		C
Approach Delay (s)		71.7			21.2		0.0			26.2	
Approach LOS		E			C		A			C	

Intersection Summary			
HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	582	505	0	0	1073	839	0	0	126	0	229
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	633	549	0	0	1166	912	0	0	137	0	249
RTOR Reduction (vph)	0	0	0	0	0	247	0	0	0	0	206
Lane Group Flow (vph)	633	549	0	0	1166	665	0	0	137	0	43
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	21.3	74.7			49.4	49.4			17.3		17.3
Effective Green, g (s)	21.3	74.7			49.4	49.4			17.3		17.3
Actuated g/C Ratio	0.21	0.75			0.49	0.49			0.17		0.17
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	731	3798			2512	782			594		274
v/s Ratio Prot	c0.18	0.11			0.23						
v/s Ratio Perm						0.58			0.04		0.16
v/c Ratio	0.87	0.14			0.46	0.85			0.23		0.16
Uniform Delay, d1	38.0	3.6			16.6	22.1			35.6		35.2
Progression Factor	0.53	2.33			0.63	0.67			1.00		1.00
Incremental Delay, d2	7.9	0.0			0.1	4.9			0.9		1.2
Delay (s)	27.9	8.4			10.5	19.6			36.5		36.4
Level of Service	C	A			B	B			D		D
Approach Delay (s)		18.9			14.5		0.0			36.4	
Approach LOS		B			B		A			D	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00		0.91	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085		3433	5085	1583		4825	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085		3433	5085	1583		4825	
Volume (vph)	136	375	223	798	1151	0	375	68	255	0	914	473
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	408	242	867	1251	0	408	74	277	0	993	514
RTOR Reduction (vph)	0	0	185	0	0	0	0	0	148	0	93	0
Lane Group Flow (vph)	148	408	57	867	1251	0	408	74	129	0	1414	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	7.8	13.7	13.7	27.6	33.5		12.0	46.7	46.7		30.7	
Effective Green, g (s)	7.8	13.7	13.7	27.6	33.5		12.0	46.7	46.7		30.7	
Actuated g/C Ratio	0.08	0.14	0.14	0.28	0.34		0.12	0.47	0.47		0.31	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	268	697	217	948	1703		412	2375	739		1481	
v/s Ratio Prot	0.04	0.08		c0.25	0.25		c0.12	0.01			c0.31	
v/s Ratio Perm			0.15						0.17			
v/c Ratio	0.55	0.59	0.26	0.91	0.73		0.99	0.03	0.18		0.95	
Uniform Delay, d1	44.4	40.5	38.6	35.1	29.3		43.9	14.4	15.5		34.0	
Progression Factor	0.62	0.55	0.53	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.4	1.2	0.6	13.0	1.7		41.6	0.0	0.5		14.9	
Delay (s)	29.9	23.5	21.2	48.1	31.0		85.6	14.4	16.0		48.8	
Level of Service	C	C	C	D	C		F	B	B		D	
Approach Delay (s)		24.0			38.0			53.2			48.8	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
13: Ranchero Rd & Escondido Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5017		1770	4965		1770	3470		1770	3446	
Flt Permitted	0.18	1.00		0.31	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	340	5017		578	4965		1770	3470		1770	3446	
Volume (vph)	27	682	67	20	1347	251	120	215	32	163	186	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	741	73	22	1464	273	130	234	35	177	202	43
RTOR Reduction (vph)	0	18	0	0	41	0	0	22	0	0	33	0
Lane Group Flow (vph)	29	796	0	22	1696	0	130	247	0	177	212	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	21.9	21.9		21.9	21.9		6.3	9.0		6.5	9.2	
Effective Green, g (s)	21.9	21.9		21.9	21.9		6.3	9.0		6.5	9.2	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.13	0.18		0.13	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	2224		256	2201		226	632		233	642	
v/s Ratio Prot		0.16			c0.35		0.07	c0.08		c0.10	0.07	
v/s Ratio Perm	0.09			0.04								
v/c Ratio	0.19	0.36		0.09	0.77		0.58	0.39		0.76	0.33	
Uniform Delay, d1	8.4	9.1		8.0	11.6		20.3	17.8		20.7	17.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.1		0.1	1.7		3.5	0.4		13.3	0.3	
Delay (s)	9.0	9.2		8.1	13.4		23.8	18.2		34.0	17.7	
Level of Service	A	A		A	B		C	B		C	B	
Approach Delay (s)		9.2			13.3			20.0			24.5	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	49.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
14: Ranchero Rd & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5012		1770	3506		1770	3464	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5012		1770	3506		1770	3464	
Volume (vph)	58	738	158	38	1306	140	146	357	24	59	403	66
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	802	172	41	1420	152	159	388	26	64	438	72
RTOR Reduction (vph)	0	0	110	0	19	0	0	7	0	0	21	0
Lane Group Flow (vph)	63	802	62	41	1553	0	159	407	0	64	489	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	2.2	22.6	22.6	1.8	22.2		7.1	18.6		3.3	14.8	
Effective Green, g (s)	2.2	22.6	22.6	1.8	22.2		7.1	18.6		3.3	14.8	
Actuated g/C Ratio	0.04	0.36	0.36	0.03	0.36		0.11	0.30		0.05	0.24	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	63	1845	574	51	1786		202	1047		94	823	
v/s Ratio Prot	c0.04	0.16		0.02	c0.31		c0.09	c0.12		0.04	c0.15	
v/s Ratio Perm			0.11									
v/c Ratio	1.00	0.43	0.11	0.80	0.87		0.79	0.39		0.68	0.59	
Uniform Delay, d1	30.0	15.0	13.2	30.1	18.7		26.9	17.3		29.0	21.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	113.4	0.2	0.1	59.0	4.8		18.1	0.2		18.4	1.2	
Delay (s)	143.4	15.2	13.3	89.1	23.5		44.9	17.6		47.4	22.2	
Level of Service	F	B	B	F	C		D	B		D	C	
Approach Delay (s)		22.7			25.2			25.2			25.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	24.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.83				
Actuated Cycle Length (s)	62.3	Sum of lost time (s)		20.0	
Intersection Capacity Utilization	66.3%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
15: Ranchero Rd & I Avenue — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.95		1.00	1.00		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4822		1770	3525		1770	4915		1770	3376	
Flt Permitted	0.95	1.00		0.95	1.00		0.19	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4822		1770	3525		353	4915		1770	3376	
Volume (vph)	359	307	162	228	426	12	306	591	170	29	391	173
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	390	334	176	248	463	13	333	642	185	32	425	188
RTOR Reduction (vph)	0	102	0	0	2	0	0	51	0	0	56	0
Lane Group Flow (vph)	390	408	0	248	474	0	333	776	0	32	557	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	21.0	19.6		16.0	14.6		36.1	25.0		7.1	17.1	
Effective Green, g (s)	21.0	19.6		16.0	14.6		36.1	25.0		7.1	17.1	
Actuated g/C Ratio	0.25	0.23		0.19	0.17		0.43	0.30		0.08	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	444	1129		338	615		406	1468		150	690	
v/s Ratio Prot	c0.22	0.11		0.14	c0.14		c0.15	0.17		0.02	0.18	
v/s Ratio Perm							c0.21					
v/c Ratio	0.88	0.36		0.73	0.77		0.82	0.53		0.21	0.81	
Uniform Delay, d1	30.1	26.8		31.8	32.9		18.5	24.4		35.7	31.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	17.6	0.2		8.0	5.8		12.5	0.3		0.7	6.9	
Delay (s)	47.7	27.0		39.9	38.7		30.9	24.8		36.4	38.6	
Level of Service	D	C		D	D		C	C		D	D	
Approach Delay (s)		36.0			39.1			26.6			38.5	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	33.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	83.7	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	78.7%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

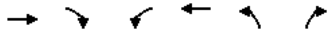
Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.99		1.00	1.00	0.97	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1761		1770	5085	3430	
Flt Permitted	0.96		0.41	1.00	1.00	
Satd. Flow (perm)	1761		771	5085	3430	
Volume (vph)	93	8	9	560	458	119
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	9	10	609	498	129
RTOR Reduction (vph)	8	0	0	0	28	0
Lane Group Flow (vph)	102	0	10	609	599	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	7.8		38.5	38.5	38.5	
Effective Green, g (s)	7.8		38.5	38.5	38.5	
Actuated g/C Ratio	0.14		0.71	0.71	0.71	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	253		547	3605	2432	
v/s Ratio Prot				0.12	c0.18	
v/s Ratio Perm	0.06		0.01			
v/c Ratio	0.40		0.02	0.17	0.25	
Uniform Delay, d1	21.1		2.3	2.6	2.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.1		0.0	0.0	0.1	
Delay (s)	22.2		2.3	2.6	2.8	
Level of Service	C		A	A	A	
Approach Delay (s)	22.2			2.6	2.8	
Approach LOS	C			A	A	

Intersection Summary				
HCM Average Control Delay	4.3	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.29			
Actuated Cycle Length (s)	54.3	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	28.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
17: Joshua St & Caliente Rd AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.92		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3258		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3258		1770	3539	1770	1583
Volume (vph)	185	208	664	116	46	293
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	226	722	126	50	318
RTOR Reduction (vph)	188	0	0	0	0	274
Lane Group Flow (vph)	239	0	722	126	50	44
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	9.8		28.6	42.4	8.2	8.2
Effective Green, g (s)	9.8		28.6	42.4	8.2	8.2
Actuated g/C Ratio	0.17		0.49	0.72	0.14	0.14
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	545		864	2561	248	222
v/s Ratio Prot	c0.13		c0.41	0.04	0.03	
v/s Ratio Perm						0.20
v/c Ratio	0.44		0.84	0.05	0.20	0.20
Uniform Delay, d1	21.9		13.0	2.3	22.3	22.3
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6		7.0	0.0	0.4	0.4
Delay (s)	22.5		20.0	2.3	22.7	22.7
Level of Service	C		C	A	C	C
Approach Delay (s)	22.5			17.4	22.7	
Approach LOS	C			B	C	

Intersection Summary				
HCM Average Control Delay	19.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
18: Joshua St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	4979		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	4979		1770	5085	1583
Volume (vph)	333	297	309	217	650	366	128	143	23	162	689	186
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	362	323	336	236	707	398	139	155	25	176	749	202
RTOR Reduction (vph)	0	0	218	0	0	302	0	20	0	0	0	148
Lane Group Flow (vph)	362	323	118	236	707	96	139	160	0	176	749	54
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.0	15.3	15.3	12.7	16.0	16.0	4.5	13.5		8.8	17.8	17.8
Effective Green, g (s)	12.0	15.3	15.3	12.7	16.0	16.0	4.5	13.5		8.8	17.8	17.8
Actuated g/C Ratio	0.18	0.23	0.23	0.19	0.24	0.24	0.07	0.20		0.13	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	621	817	365	339	854	382	233	1014		235	1365	425
v/s Ratio Prot	0.11	0.09		c0.13	0.20		0.04	0.04		c0.10	c0.15	
v/s Ratio Perm			0.21			0.25						0.13
v/c Ratio	0.58	0.40	0.32	0.70	0.83	0.25	0.60	0.16		0.75	0.55	0.13
Uniform Delay, d1	24.9	21.6	21.2	25.0	23.8	20.3	30.0	21.7		27.7	20.8	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	0.3	0.5	6.1	6.6	0.3	4.1	0.1		12.3	0.5	0.1
Delay (s)	26.3	21.9	21.7	31.1	30.5	20.7	34.1	21.8		40.0	21.3	18.5
Level of Service	C	C	C	C	C	C	C	C		D	C	B
Approach Delay (s)		23.4			27.7			27.2			23.7	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	25.3	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.70				
Actuated Cycle Length (s)	66.3	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	57.8%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
19: Muscatel St & Escondido Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.92		1.00	0.93		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3255		1770	3299		1770	3526		3433	3427	
Flt Permitted	0.29	1.00		0.37	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	540	3255		688	3299		1770	3526		3433	3427	
Volume (vph)	76	230	264	38	481	397	269	559	15	130	360	97
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	250	287	41	523	432	292	608	16	141	391	105
RTOR Reduction (vph)	0	206	0	0	253	0	0	4	0	0	46	0
Lane Group Flow (vph)	83	331	0	41	702	0	292	620	0	141	450	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	13.8	13.8		13.8	13.8		10.5	19.2		3.8	12.5	
Effective Green, g (s)	13.8	13.8		13.8	13.8		10.5	19.2		3.8	12.5	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.22	0.39		0.08	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	920		195	933		381	1387		267	878	
v/s Ratio Prot		0.16			c0.29		c0.17	0.18		0.04	c0.14	
v/s Ratio Perm	0.15			0.06								
v/c Ratio	0.54	0.36		0.21	0.75		0.77	0.45		0.53	0.51	
Uniform Delay, d1	14.8	14.0		13.3	15.9		18.0	10.9		21.6	15.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.2		0.5	3.5		8.9	0.2		1.9	0.5	
Delay (s)	18.7	14.2		13.9	19.4		26.9	11.1		23.5	16.0	
Level of Service	B	B		B	B		C	B		C	B	
Approach Delay (s)		14.8			19.2			16.2			17.7	
Approach LOS		B			B			B			B	

Intersection Summary					
HCM Average Control Delay	17.2	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	48.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	71.5%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. AM Peak Hour

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3322	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3322	
Volume (vph)	356	566	447	165	496	343
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	387	615	486	179	539	373
RTOR Reduction (vph)	0	357	0	0	113	0
Lane Group Flow (vph)	387	258	486	179	799	0
Turn Type		Perm	Prot			
Protected Phases	8		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	27.5	27.5	21.6	64.5	38.9	
Effective Green, g (s)	27.5	27.5	21.6	64.5	38.9	
Actuated g/C Ratio	0.28	0.28	0.22	0.64	0.39	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	487	435	742	2283	1292	
v/s Ratio Prot	0.22		c0.14	0.05	c0.27	
v/s Ratio Perm		0.39				
v/c Ratio	0.79	0.59	0.65	0.08	0.62	
Uniform Delay, d1	33.6	31.4	35.8	6.6	24.6	
Progression Factor	1.00	1.00	0.45	0.55	1.00	
Incremental Delay, d2	8.7	2.2	1.9	0.1	2.2	
Delay (s)	42.3	33.6	18.0	3.7	26.8	
Level of Service	D	C	B	A	C	
Approach Delay (s)	37.0			14.1	26.8	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	27.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.40	1.00	1.00	0.17	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	742	5085	2787	310	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	254	1122	295	19	574	179	137	167	38	239	542	231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	1220	321	21	624	195	149	182	41	260	589	251
RTOR Reduction (vph)	0	0	291	0	0	106	0	0	24	0	0	131
Lane Group Flow (vph)	276	1220	30	21	624	89	149	182	17	260	589	120
Turn Type	Perm		Over	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4	5		8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	25.1	25.1	5.2	25.1	25.1	25.1	5.2	11.9	11.9	6.2	12.9	12.9
Effective Green, g (s)	25.1	25.1	5.2	25.1	25.1	25.1	5.2	11.9	11.9	6.2	12.9	12.9
Actuated g/C Ratio	0.45	0.45	0.09	0.45	0.45	0.45	0.09	0.22	0.22	0.11	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	337	2312	263	141	2312	720	323	1096	341	386	1188	370
v/s Ratio Prot		0.24	c0.12		0.12		0.04	0.04		0.08	0.12	
v/s Ratio Perm	c0.37			0.07		0.12			0.03			0.16
v/c Ratio	0.82	0.53	0.11	0.15	0.27	0.12	0.46	0.17	0.05	0.67	0.50	0.32
Uniform Delay, d1	13.1	10.8	22.9	8.8	9.4	8.7	23.7	17.6	17.2	23.5	18.3	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.3	0.2	0.2	0.5	0.1	0.1	1.0	0.1	0.1	4.6	0.3	0.5
Delay (s)	27.4	11.0	23.1	9.3	9.4	8.8	24.7	17.7	17.2	28.1	18.7	18.0
Level of Service	C	B	C	A	A	A	C	B	B	C	B	B
Approach Delay (s)		15.6			9.3			20.5			20.8	
Approach LOS		B			A			C			C	

Intersection Summary				
HCM Average Control Delay	16.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	52.9%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5054		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5054		3433	5085	1583
Volume (vph)	323	1028	554	94	608	706	231	1346	57	788	2337	223
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	351	1117	602	102	661	767	251	1463	62	857	2540	242
RTOR Reduction (vph)	0	0	197	0	0	558	0	4	0	0	0	103
Lane Group Flow (vph)	351	1117	405	102	661	209	251	1521	0	857	2540	139
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	17.0	25.0	25.0	7.9	15.9	15.9	6.0	29.9		21.2	45.1	45.1
Effective Green, g (s)	17.0	25.0	25.0	7.9	15.9	15.9	6.0	29.9		21.2	45.1	45.1
Actuated g/C Ratio	0.17	0.25	0.25	0.08	0.16	0.16	0.06	0.30		0.21	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	301	1271	697	140	809	443	206	1511		728	2293	714
v/s Ratio Prot	c0.20	0.22		0.06	0.13		0.07	c0.30		0.25	c0.50	
v/s Ratio Perm			0.22			0.28						0.15
v/c Ratio	1.17	0.88	0.58	0.73	0.82	0.47	1.22	1.01		1.18	1.11	0.20
Uniform Delay, d1	41.5	36.0	32.9	45.0	40.6	38.2	47.0	35.0		39.4	27.4	16.5
Progression Factor	1.00	1.00	1.00	0.85	0.84	1.09	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	104.7	7.2	1.2	17.0	6.3	0.8	134.0	24.7		93.7	55.5	0.6
Delay (s)	146.2	43.2	34.1	55.4	40.3	42.6	181.0	59.8		133.1	83.0	17.1
Level of Service	F	D	C	E	D	D	F	E		F	F	B
Approach Delay (s)		58.1			42.5			76.9			90.4	
Approach LOS		E			D			E			F	

Intersection Summary					
HCM Average Control Delay	72.2	HCM Level of Service		E	
HCM Volume to Capacity ratio	1.20				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	94.7%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
23: Eucalyptus St & Maple Ave AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4851		3433	4977		3433	3539	1583	1770	3467	
Flt Permitted	0.30	1.00		0.95	1.00		0.95	1.00	1.00	0.62	1.00	
Satd. Flow (perm)	556	4851		3433	4977		3433	3539	1583	1150	3467	
Volume (vph)	30	572	254	121	758	125	349	198	83	27	265	41
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	622	276	132	824	136	379	215	90	29	288	45
RTOR Reduction (vph)	0	136	0	0	39	0	0	0	58	0	21	0
Lane Group Flow (vph)	33	762	0	132	921	0	379	215	32	29	312	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	13.4	13.4		3.0	20.4		8.1	19.1	19.1	13.8	12.4	
Effective Green, g (s)	13.4	13.4		3.0	20.4		8.1	19.1	19.1	13.8	12.4	
Actuated g/C Ratio	0.25	0.25		0.06	0.39		0.15	0.36	0.36	0.26	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	141	1229		195	1919		526	1278	572	316	813	
v/s Ratio Prot		c0.19		0.04	c0.19		c0.11	0.06		0.00	c0.10	
v/s Ratio Perm	0.06								0.06	0.02		
v/c Ratio	0.23	0.62		0.68	0.48		0.72	0.17	0.06	0.09	0.38	
Uniform Delay, d1	15.7	17.5		24.5	12.3		21.3	11.5	11.0	14.7	17.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	1.0		9.0	0.2		4.8	0.1	0.0	0.1	0.3	
Delay (s)	16.5	18.5		33.4	12.4		26.1	11.6	11.1	14.8	17.3	
Level of Service	B	B		C	B		C	B	B	B	B	
Approach Delay (s)		18.4			15.0			19.6			17.1	
Approach LOS		B			B			B			B	

Intersection Summary					
HCM Average Control Delay	17.3	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.62				
Actuated Cycle Length (s)	52.9	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	52.7%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
24: Main St. & Mesa Linda AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4867		1770	5085	1770	1583
Flt Permitted	1.00		0.31	1.00	0.95	1.00
Satd. Flow (perm)	4867		577	5085	1770	1583
Volume (vph)	543	217	131	893	1	100
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	590	236	142	971	1	109
RTOR Reduction (vph)	125	0	0	0	0	69
Lane Group Flow (vph)	701	0	142	971	1	40
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	23.5		23.5	23.5	18.5	18.5
Effective Green, g (s)	23.5		23.5	23.5	18.5	18.5
Actuated g/C Ratio	0.47		0.47	0.47	0.37	0.37
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2287		271	2390	655	586
v/s Ratio Prot	0.17			0.19	0.00	
v/s Ratio Perm			c0.25			0.07
v/c Ratio	0.31		0.52	0.41	0.00	0.07
Uniform Delay, d1	8.2		9.3	8.7	9.9	10.2
Progression Factor	1.71		0.73	0.75	1.00	1.00
Incremental Delay, d2	0.0		1.5	0.1	0.0	0.2
Delay (s)	14.0		8.3	6.6	9.9	10.4
Level of Service	B		A	A	A	B
Approach Delay (s)	14.0			6.8	10.4	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
25: Main St. & Cataba Rd AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	162	828	1637	76	109	162
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	900	1779	83	118	176
RTOR Reduction (vph)	0	0	0	43	0	124
Lane Group Flow (vph)	176	900	1779	40	118	52
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	10.1	62.5	48.4	48.4	29.5	29.5
Effective Green, g (s)	10.1	62.5	48.4	48.4	29.5	29.5
Actuated g/C Ratio	0.10	0.62	0.48	0.48	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	347	3178	2461	766	522	467
v/s Ratio Prot	c0.05	0.18	c0.35		0.07	
v/s Ratio Perm				0.05		0.11
v/c Ratio	0.51	0.28	0.72	0.05	0.23	0.11
Uniform Delay, d1	42.6	8.5	20.5	13.7	26.6	25.7
Progression Factor	1.04	1.19	0.69	1.13	1.00	1.00
Incremental Delay, d2	1.2	0.0	0.9	0.0	1.0	0.5
Delay (s)	45.7	10.3	15.1	15.4	27.6	26.2
Level of Service	D	B	B	B	C	C
Approach Delay (s)		16.0	15.2		26.8	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
26: Main St. & I-15 SB Ramp

AM Peak Hour

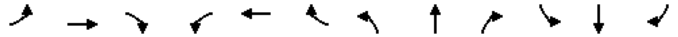


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		1.00			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5071			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5071			5085	1583			1770	1583	1504
Volume (vph)	0	842	17	0	1068	489	0	0	284	0	809
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	915	18	0	1161	532	0	0	309	0	879
RTOR Reduction (vph)	0	3	0	0	0	286	0	0	0	8	8
Lane Group Flow (vph)	0	930	0	0	1161	246	0	0	309	431	432
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		23.1			23.1	23.1			18.9	18.9	18.9
Effective Green, g (s)		23.1			23.1	23.1			18.9	18.9	18.9
Actuated g/C Ratio		0.46			0.46	0.46			0.38	0.38	0.38
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		2343			2349	731			669	598	569
v/s Ratio Prot		0.18			0.23				0.17	0.28	
v/s Ratio Perm						0.34					0.29
v/c Ratio		0.40			0.49	0.34			0.46	0.72	0.76
Uniform Delay, d1		8.9			9.4	8.6			11.7	13.3	13.6
Progression Factor		0.81			1.03	9.44			1.00	1.00	1.00
Incremental Delay, d2		0.1			0.1	0.1			0.5	7.3	9.2
Delay (s)		7.3			9.7	81.0			12.2	20.6	22.8
Level of Service		A			A	F			B	C	C
Approach Delay (s)		7.3			32.1		0.0			19.2	
Approach LOS		A			C		A			B	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	129	1225	359	560	1457	90	559	270	478	221	674	129
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	1332	390	609	1584	98	608	293	520	240	733	140
RTOR Reduction (vph)	0	0	233	0	0	59	0	0	233	0	0	96
Lane Group Flow (vph)	140	1332	157	609	1584	39	608	293	287	240	733	44
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	24.0	24.0	17.0	36.0	36.0	16.0	24.4	24.4	8.0	16.4	16.4
Effective Green, g (s)	5.0	24.0	24.0	17.0	36.0	36.0	16.0	24.4	24.4	8.0	16.4	16.4
Actuated g/C Ratio	0.06	0.27	0.27	0.19	0.40	0.40	0.18	0.27	0.27	0.09	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	192	1365	425	653	2048	637	614	1388	432	307	933	290
v/s Ratio Prot	0.04	c0.26		c0.18	0.31		c0.18	0.06		0.07	0.14	
v/s Ratio Perm			0.25			0.06			0.33			0.09
v/c Ratio	0.73	0.98	0.37	0.93	0.77	0.06	0.99	0.21	0.66	0.78	0.79	0.15
Uniform Delay, d1	41.5	32.4	26.6	35.6	23.2	16.4	36.6	25.1	28.9	39.8	34.8	30.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.0	18.7	0.5	20.3	1.9	0.0	33.7	0.1	3.8	12.2	4.4	0.2
Delay (s)	54.5	51.1	27.1	55.9	25.0	16.4	70.3	25.2	32.7	52.0	39.2	30.9
Level of Service	D	D	C	E	C	B	E	C	C	D	D	C
Approach Delay (s)		46.3			32.9			47.2			40.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	22	1276	267	113	1246	188	456	815	196	126	470	13
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	1387	290	123	1354	204	496	886	213	137	511	14
RTOR Reduction (vph)	0	0	190	0	0	117	0	0	145	0	0	11
Lane Group Flow (vph)	24	1387	100	123	1354	87	496	886	68	137	511	3
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.4	34.6	34.6	10.5	42.7	42.7	17.8	31.7	31.7	7.2	21.1	21.1
Effective Green, g (s)	2.4	34.6	34.6	10.5	42.7	42.7	17.8	31.7	31.7	7.2	21.1	21.1
Actuated g/C Ratio	0.02	0.35	0.35	0.10	0.43	0.43	0.18	0.32	0.32	0.07	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	42	1759	548	186	2171	676	611	1122	502	247	747	334
v/s Ratio Prot	0.01	c0.27		0.07	c0.27		c0.14	c0.25		0.04	0.14	
v/s Ratio Perm			0.18			0.13			0.13			0.01
v/c Ratio	0.57	0.79	0.18	0.66	0.62	0.13	0.81	0.79	0.13	0.55	0.68	0.01
Uniform Delay, d1	48.3	29.4	22.8	43.0	22.4	17.4	39.5	31.1	24.4	44.9	36.4	31.2
Progression Factor	1.00	1.00	1.00	0.80	0.70	0.49	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.4	2.4	0.2	7.7	0.5	0.1	8.1	5.7	0.6	2.7	5.0	0.0
Delay (s)	65.7	31.8	23.0	42.2	16.1	8.6	47.6	36.8	24.9	47.5	41.4	31.2
Level of Service	E	C	C	D	B	A	D	D	C	D	D	C
Approach Delay (s)		30.8			17.1			38.6			42.5	
Approach LOS		C			B			D			D	

Intersection Summary					
HCM Average Control Delay	30.3	HCM Level of Service	C		
HCM Volume to Capacity ratio	0.77				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	70.4%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
29: Bear Valley Rd & I Avenue — AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	1583	277	167	1528	260	294
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1721	301	182	1661	283	320
RTOR Reduction (vph)	0	163	0	0	0	258
Lane Group Flow (vph)	1721	138	182	1661	283	62
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	24.5	24.5	6.5	35.0	10.4	10.4
Effective Green, g (s)	24.5	24.5	6.5	35.0	10.4	10.4
Actuated g/C Ratio	0.46	0.46	0.12	0.66	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2333	726	418	3333	669	308
v/s Ratio Prot	c0.34		0.05	c0.33	0.08	
v/s Ratio Perm		0.19				0.20
v/c Ratio	0.74	0.19	0.44	0.50	0.42	0.20
Uniform Delay, d1	11.8	8.6	21.7	4.7	18.9	18.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	0.7	0.1	0.4	0.3
Delay (s)	13.1	8.7	22.5	4.8	19.3	18.3
Level of Service	B	A	C	A	B	B
Approach Delay (s)	12.4			6.6	18.8	
Approach LOS	B			A	B	

Intersection Summary					
HCM Average Control Delay	10.9	HCM Level of Service	B		
HCM Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B		
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
30: Main St. & 3rd Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	99	1470	116	213	2081	88	260	549	69	296	306	100
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	1598	126	232	2262	96	283	597	75	322	333	109
RTOR Reduction (vph)	0	0	39	0	0	21	0	0	63	0	0	63
Lane Group Flow (vph)	108	1598	87	232	2262	75	283	597	12	322	333	46
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	81.3	81.3	12.7	89.0	89.0	23.0	24.0	24.0	15.9	16.9	16.9
Effective Green, g (s)	5.0	81.3	81.3	12.7	89.0	89.0	23.0	24.0	24.0	15.9	16.9	16.9
Actuated g/C Ratio	0.03	0.54	0.54	0.08	0.59	0.59	0.15	0.16	0.16	0.11	0.11	0.11
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	115	1919	859	291	2101	940	272	567	446	364	399	178
v/s Ratio Prot	0.03	0.45		c0.07	c0.64		c0.16	c0.17		0.09	0.09	
v/s Ratio Perm			0.08			0.06			0.03			0.07
v/c Ratio	0.94	0.83	0.10	0.80	1.08	0.08	1.04	1.05	0.03	0.88	0.83	0.26
Uniform Delay, d1	72.3	28.6	16.6	67.3	30.5	13.0	63.5	63.0	53.1	66.1	65.1	60.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	64.2	3.3	0.1	14.0	43.9	0.0	65.5	52.5	0.0	21.6	14.0	0.8
Delay (s)	136.5	31.9	16.7	81.4	74.4	13.0	129.0	115.4	53.1	87.7	79.1	61.5
Level of Service	F	C	B	F	E	B	F	F	D	F	E	E
Approach Delay (s)		37.0			72.7			114.5			80.2	
Approach LOS		D			E			F			F	

Intersection Summary				
HCM Average Control Delay	69.5	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.05			
Actuated Cycle Length (s)	149.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	97.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
31: Main St. & C Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1650	1504	1770	1695	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1650	1504	1770	1695	1504
Volume (vph)	70	853	521	158	1374	96	448	79	247	62	33	56
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	927	566	172	1493	104	487	86	268	67	36	61
RTOR Reduction (vph)	0	0	312	0	0	47	0	28	159	0	12	41
Lane Group Flow (vph)	76	927	254	172	1493	57	487	128	39	67	38	6
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.8	44.8	44.8	10.3	50.3	50.3	15.9	19.8	19.8	9.1	13.0	13.0
Effective Green, g (s)	4.8	44.8	44.8	10.3	50.3	50.3	15.9	19.8	19.8	9.1	13.0	13.0
Actuated g/C Ratio	0.05	0.45	0.45	0.10	0.50	0.50	0.16	0.20	0.20	0.09	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	85	1585	1249	354	1780	796	546	327	298	161	220	196
v/s Ratio Prot	c0.04	0.26		0.05	c0.42		c0.14	0.09		c0.04	0.03	
v/s Ratio Perm			0.20			0.07			0.13			0.03
v/c Ratio	0.89	0.58	0.20	0.49	0.84	0.07	0.89	0.39	0.13	0.42	0.17	0.03
Uniform Delay, d1	47.3	20.6	16.8	42.3	21.4	12.8	41.2	34.9	33.0	42.9	38.7	38.0
Progression Factor	1.00	1.00	1.00	1.15	0.76	0.53	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	63.3	0.6	0.1	0.8	2.9	0.0	16.7	3.5	0.9	1.7	0.4	0.1
Delay (s)	110.6	21.2	16.8	49.6	19.1	6.8	57.9	38.4	33.9	44.7	39.1	38.1
Level of Service	F	C	B	D	B	A	E	D	C	D	D	D
Approach Delay (s)		24.0			21.4			48.6			41.1	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM Average Control Delay	28.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	71.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
32: Main St. & E Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	1770	3520		1770	3517		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.49	1.00		0.46	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	1770	3520		909	3517		856	3539	1583
Volume (vph)	166	958	79	20	966	36	283	458	20	30	163	168
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	180	1041	86	22	1050	39	308	498	22	33	177	183
RTOR Reduction (vph)	0	0	42	0	2	0	0	3	0	0	0	155
Lane Group Flow (vph)	180	1041	44	22	1087	0	308	517	0	33	177	28
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	16.5	51.1	51.1	3.2	37.8		33.7	27.3		17.8	15.4	15.4
Effective Green, g (s)	16.5	51.1	51.1	3.2	37.8		33.7	27.3		17.8	15.4	15.4
Actuated g/C Ratio	0.16	0.51	0.51	0.03	0.38		0.34	0.27		0.18	0.15	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	292	1808	1424	57	1331		429	960		174	545	244
v/s Ratio Prot	0.10	c0.29		0.01	c0.31		c0.10	0.15		0.00	0.05	
v/s Ratio Perm			0.03				c0.14			0.03		0.12
v/c Ratio	0.62	0.58	0.03	0.39	0.82		0.72	0.54		0.19	0.32	0.12
Uniform Delay, d1	38.8	16.9	12.1	47.4	28.0		26.8	31.0		34.4	37.7	36.4
Progression Factor	0.72	0.59	0.51	1.24	0.50		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	0.4	0.0	3.8	3.6		5.7	2.2		0.5	1.6	1.0
Delay (s)	31.4	10.3	6.2	62.5	17.5		32.4	33.1		35.0	39.3	37.4
Level of Service	C	B	A	E	B		C	C		C	D	D
Approach Delay (s)		12.9			18.4			32.9			38.0	
Approach LOS		B			B			C			D	

Intersection Summary					
HCM Average Control Delay	21.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.71				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	70.6%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
33: Main St. & I Avenue

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	365	3539	1583
Volume (vph)	42	851	323	112	647	92	342	738	102	58	251	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	925	351	122	703	100	372	802	111	63	273	2
RTOR Reduction (vph)	0	0	236	0	0	61	0	0	71	0	0	2
Lane Group Flow (vph)	46	925	115	122	703	39	372	802	40	63	273	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	3.5	32.8	32.8	9.5	38.8	38.8	21.3	36.4	36.4	25.7	20.4	20.4
Effective Green, g (s)	3.5	32.8	32.8	9.5	38.8	38.8	21.3	36.4	36.4	25.7	20.4	20.4
Actuated g/C Ratio	0.04	0.33	0.33	0.10	0.39	0.39	0.21	0.36	0.36	0.26	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	120	1161	519	326	1373	614	731	1288	576	168	722	323
v/s Ratio Prot	0.01	c0.26		0.04	c0.20		c0.11	c0.23		0.02	0.08	
v/s Ratio Perm			0.22			0.06			0.07	0.08		0.00
v/c Ratio	0.38	0.80	0.22	0.37	0.51	0.06	0.51	0.62	0.07	0.38	0.38	0.00
Uniform Delay, d1	47.2	30.6	24.4	42.5	23.4	19.2	34.7	26.2	20.8	42.1	34.3	31.7
Progression Factor	1.14	0.48	0.85	0.70	0.42	0.07	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	3.5	0.2	0.7	0.3	0.0	0.6	2.3	0.2	1.4	1.5	0.0
Delay (s)	55.5	18.1	21.0	30.3	10.2	1.3	35.3	28.4	21.0	43.5	35.8	31.7
Level of Service	E	B	C	C	B	A	D	C	C	D	D	C
Approach Delay (s)		20.2			11.9			29.8			37.2	
Approach LOS		C			B			C			D	

Intersection Summary					
HCM Average Control Delay	22.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	63.9%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		0.91		1.00	0.91	
Frt	1.00	0.99		1.00	1.00	0.85		0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1770	3504		1770	3539	1583		5046		1770	5064	
Flt Permitted	0.69	1.00		0.59	1.00	1.00		1.00		0.95	1.00	
Satd. Flow (perm)	1286	3504		1093	3539	1583		5046		1770	5064	
Volume (vph)	32	230	17	41	90	45	0	428	23	117	940	28
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	250	18	45	98	49	0	465	25	127	1022	30
RTOR Reduction (vph)	0	12	0	0	0	38	0	11	0	0	4	0
Lane Group Flow (vph)	35	256	0	45	98	11	0	479	0	127	1048	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	8.1	8.1		8.1	8.1	8.1		14.0		3.6	21.6	
Effective Green, g (s)	8.1	8.1		8.1	8.1	8.1		14.0		3.6	21.6	
Actuated g/C Ratio	0.21	0.21		0.21	0.21	0.21		0.37		0.10	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	276	753		235	760	340		1874		169	2901	
v/s Ratio Prot		c0.08			0.03			0.10		c0.07	c0.21	
v/s Ratio Perm	0.03			0.04		0.03						
v/c Ratio	0.13	0.34		0.19	0.13	0.03		0.26		0.75	0.36	
Uniform Delay, d1	11.9	12.5		12.1	12.0	11.7		8.2		16.6	4.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.4	0.1	0.0		0.1		17.0	0.1	
Delay (s)	12.2	12.8		12.5	12.0	11.7		8.3		33.7	4.4	
Level of Service	B	B		B	B	B		A		C	A	
Approach Delay (s)		12.7			12.1			8.3			7.6	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay	8.9	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	37.7	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	45.7%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
35: Smoketree & Hwy 395 AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.10	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	177	5085	5085	1583
Volume (vph)	323	106	25	1405	2774	146
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	351	115	27	1527	3015	159
RTOR Reduction (vph)	0	1	0	0	0	51
Lane Group Flow (vph)	351	114	27	1527	3015	108
Turn Type		custom	Perm			Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	11.6	11.6	42.0	42.0	42.0	42.0
Effective Green, g (s)	11.6	11.6	42.0	42.0	42.0	42.0
Actuated g/C Ratio	0.19	0.19	0.68	0.68	0.68	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	646	298	121	3467	3467	1079
v/s Ratio Prot				0.30	c0.59	
v/s Ratio Perm	0.10	0.07	0.15			0.10
v/c Ratio	0.54	0.38	0.22	0.44	0.87	0.10
Uniform Delay, d1	22.6	21.9	3.7	4.5	7.7	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.8	0.9	0.1	2.6	0.0
Delay (s)	23.5	22.7	4.6	4.5	10.2	3.4
Level of Service	C	C	A	A	B	A
Approach Delay (s)	23.3			4.5	9.9	
Approach LOS	C			A	A	

Intersection Summary				
HCM Average Control Delay	9.5	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	61.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	69.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
36: Mojave St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5082		3433	4955		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.53	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5082		3433	4955		980	5085	2787
Volume (vph)	188	889	619	185	1140	5	614	271	56	5	459	436
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	204	966	673	201	1239	5	667	295	61	5	499	474
RTOR Reduction (vph)	0	0	495	0	1	0	0	33	0	0	0	248
Lane Group Flow (vph)	204	966	178	201	1243	0	667	323	0	5	499	226
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	9.0	26.4	26.4	15.1	32.5		23.0	46.5		19.5	19.5	19.5
Effective Green, g (s)	9.0	26.4	26.4	15.1	32.5		23.0	46.5		19.5	19.5	19.5
Actuated g/C Ratio	0.09	0.26	0.26	0.15	0.32		0.23	0.46		0.20	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	309	1342	736	267	1652		790	2304		191	992	543
v/s Ratio Prot	0.06	0.19		0.11	c0.24		c0.19	0.07			0.10	
v/s Ratio Perm			0.24							0.01		0.17
v/c Ratio	0.66	0.72	0.24	0.75	0.75		0.84	0.14		0.03	0.50	0.42
Uniform Delay, d1	44.0	33.4	28.9	40.7	30.2		36.8	15.3		32.6	35.9	35.3
Progression Factor	0.81	0.50	0.70	1.00	1.00		1.00	1.00		0.90	0.85	0.78
Incremental Delay, d2	4.7	1.7	0.2	11.4	2.0		8.2	0.1		0.2	1.7	2.2
Delay (s)	40.3	18.3	20.5	52.0	32.1		45.0	15.4		29.4	32.3	29.6
Level of Service	D	B	C	D	C		D	B		C	C	C
Approach Delay (s)		21.5			34.9			34.7			31.0	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	29.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
37: Live Oak & Escondido Ave — AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	0.96	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1726	1504	5085	1583	3433	5085
Flt Permitted	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1726	1504	5085	1583	3433	5085
Volume (vph)	232	497	270	104	247	902
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	252	540	293	113	268	980
RTOR Reduction (vph)	25	307	0	87	0	0
Lane Group Flow (vph)	315	145	293	26	268	980
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	11.8	11.8	8.5	8.5	4.4	16.9
Effective Green, g (s)	11.8	11.8	8.5	8.5	4.4	16.9
Actuated g/C Ratio	0.32	0.32	0.23	0.23	0.12	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	555	484	1178	367	412	2342
v/s Ratio Prot			0.06		c0.08	c0.19
v/s Ratio Perm	0.20	0.30		0.07		
v/c Ratio	0.57	0.30	0.25	0.07	0.65	0.42
Uniform Delay, d1	10.3	9.3	11.5	11.0	15.4	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	0.1	0.1	3.7	0.1
Delay (s)	11.7	9.7	11.6	11.1	19.1	6.7
Level of Service	B	A	B	B	B	A
Approach Delay (s)	10.5		11.5			9.4
Approach LOS	B		B			A

Intersection Summary				
HCM Average Control Delay	10.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	47.1%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
38: Mojave & I-15 SB Ramps — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	1391	395	788	1148	0	0	0	368	0	543
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1512	429	857	1248	0	0	0	400	0	590
RTOR Reduction (vph)	0	0	305	0	0	0	0	0	0	0	40
Lane Group Flow (vph)	0	1512	124	857	1248	0	0	0	400	0	550
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		29.0	29.0	25.0	58.0				34.0		34.0
Effective Green, g (s)		29.0	29.0	25.0	58.0				34.0		34.0
Actuated g/C Ratio		0.29	0.29	0.25	0.58				0.34		0.34
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1475	459	858	2949				1167		538
v/s Ratio Prot		c0.30		c0.25	0.25						
v/s Ratio Perm			0.27						0.12		0.37
v/c Ratio		1.03	0.27	1.00	0.42				0.34		1.02
Uniform Delay, d1		35.5	27.4	37.5	11.7				24.7		33.0
Progression Factor		1.00	1.00	0.70	0.11				1.00		1.00
Incremental Delay, d2		30.0	0.3	21.7	0.1				0.8		44.4
Delay (s)		65.5	27.7	48.1	1.4				25.5		77.4
Level of Service		E	C	D	A				C		E
Approach Delay (s)		57.2			20.4		0.0			56.4	
Approach LOS		E			C		A			E	

Intersection Summary			
HCM Average Control Delay	41.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	582	1177	0	0	1772	418	0	0	163	0	519
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	633	1279	0	0	1926	454	0	0	177	0	564
RTOR Reduction (vph)	0	0	0	0	0	253	0	0	0	0	133
Lane Group Flow (vph)	633	1279	0	0	1926	201	0	0	177	0	431
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	22.9	70.3			43.4	43.4			21.7		21.7
Effective Green, g (s)	22.9	70.3			43.4	43.4			21.7		21.7
Actuated g/C Ratio	0.23	0.70			0.43	0.43			0.22		0.22
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	786	3575			2207	687			384		605
v/s Ratio Prot	c0.18	0.25			c0.38						
v/s Ratio Perm						0.29			0.10		0.20
v/c Ratio	0.81	0.36			0.87	0.29			0.46		0.71
Uniform Delay, d1	36.4	5.9			25.8	18.3			34.1		36.3
Progression Factor	0.36	0.59			0.63	0.89			1.00		1.00
Incremental Delay, d2	2.8	0.0			2.8	0.2			3.9		7.0
Delay (s)	15.8	3.5			19.1	16.4			38.0		43.2
Level of Service	B	A			B	B			D		D
Approach Delay (s)		7.6			18.6		0.0			42.0	
Approach LOS		A			B		A			D	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3538		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.34	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	632	5085	1583	1770	3538		3433	3539	1583
Volume (vph)	116	731	116	3	878	144	97	694	2	149	471	91
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	795	126	3	954	157	105	754	2	162	512	99
RTOR Reduction (vph)	0	0	75	0	0	114	0	0	0	0	0	71
Lane Group Flow (vph)	126	795	51	3	954	43	105	756	0	162	512	28
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	2.8	21.5	21.5	14.7	14.7	14.7	4.9	16.2		3.5	14.8	14.8
Effective Green, g (s)	2.8	21.5	21.5	14.7	14.7	14.7	4.9	16.2		3.5	14.8	14.8
Actuated g/C Ratio	0.05	0.40	0.40	0.28	0.28	0.28	0.09	0.30		0.07	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	181	2055	640	175	1405	437	163	1077		226	985	440
v/s Ratio Prot	c0.04	0.16			c0.19		c0.06	c0.21		0.05	0.14	
v/s Ratio Perm			0.08	0.00		0.10						0.06
v/c Ratio	0.70	0.39	0.08	0.02	0.68	0.10	0.64	0.70		0.72	0.52	0.06
Uniform Delay, d1	24.8	11.2	9.8	14.0	17.1	14.3	23.3	16.4		24.4	16.2	14.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.0	0.1	0.1	0.0	1.3	0.1	8.4	2.1		10.3	0.5	0.1
Delay (s)	35.8	11.3	9.8	14.0	18.5	14.4	31.7	18.5		34.7	16.7	14.2
Level of Service	D	B	A	B	B	B	C	B		C	B	B
Approach Delay (s)		14.1			17.9			20.1			20.1	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM Average Control Delay	17.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	53.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3438	
Volume (vph)	114	1700	196	310	1464	42	166	881	282	239	506	120
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	1848	213	337	1591	46	180	958	307	260	550	130
RTOR Reduction (vph)	0	0	34	0	0	8	0	0	90	0	23	0
Lane Group Flow (vph)	124	1848	179	337	1591	38	180	958	217	260	657	0
Turn Type	Prot		pt+ov	Prot		pt+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	8 1	5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	5.0	33.0	44.0	9.0	37.0	48.0	7.0	25.0	25.0	7.0	25.0	
Effective Green, g (s)	5.0	33.0	44.0	9.0	37.0	48.0	7.0	25.0	25.0	7.0	25.0	
Actuated g/C Ratio	0.06	0.37	0.49	0.10	0.41	0.53	0.08	0.28	0.28	0.08	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1865	774	343	2091	844	267	983	440	267	955	
v/s Ratio Prot	0.04	c0.36	0.13	c0.10	c0.31	0.03	0.05	c0.27		c0.08	0.20	
v/s Ratio Perm									0.19			
v/c Ratio	0.65	0.99	0.23	0.98	0.76	0.05	0.67	0.97	0.49	0.97	0.69	
Uniform Delay, d1	41.6	28.4	13.3	40.4	22.7	10.0	40.4	32.2	27.2	41.4	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.4	18.6	0.2	43.6	1.7	0.0	6.6	22.5	0.9	47.5	2.1	
Delay (s)	49.0	47.0	13.4	84.0	24.4	10.1	47.0	54.7	28.1	88.9	31.1	
Level of Service	D	D	B	F	C	B	D	D	C	F	C	
Approach Delay (s)		43.8			34.2			48.1			47.1	
Approach LOS		D			C			D			D	

Intersection Summary				
HCM Average Control Delay	42.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	86.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
42: Lemon St & E Ave
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86			0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99			0.98	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3044	3066			3476	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.76			0.68	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3044	2351			2419	1583
Volume (vph)	95	774	226	29	983	37	338	228	87	92	159	167
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	841	246	32	1068	40	367	248	95	100	173	182
RTOR Reduction (vph)	0	0	163	0	0	28	0	35	0	0	0	140
Lane Group Flow (vph)	103	841	83	32	1068	12	245	430	0	0	273	42
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	3.7	18.6	18.6	1.8	16.7	16.7	6.2	22.8			12.6	12.6
Effective Green, g (s)	3.7	18.6	18.6	1.8	16.7	16.7	6.2	22.8			12.6	12.6
Actuated g/C Ratio	0.07	0.34	0.34	0.03	0.30	0.30	0.11	0.41			0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	119	1713	533	58	1538	479	342	1051			552	361
v/s Ratio Prot	c0.06	0.17		0.02	c0.21		c0.08	0.05				
v/s Ratio Perm			0.16			0.03		c0.13			0.11	0.11
v/c Ratio	0.87	0.49	0.16	0.55	0.69	0.03	0.72	0.41			0.49	0.12
Uniform Delay, d1	25.5	14.5	12.8	26.3	17.0	13.5	23.7	11.4			18.5	16.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	43.8	0.2	0.1	10.9	1.4	0.0	7.0	0.3			0.7	0.1
Delay (s)	69.3	14.8	12.9	37.2	18.4	13.6	30.6	11.7			19.2	17.0
Level of Service	E	B	B	D	B	B	C	B			B	B
Approach Delay (s)		19.1			18.7			18.2			18.3	
Approach LOS		B			B			B			B	

Intersection Summary					
HCM Average Control Delay	18.7	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	55.2	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	54.1%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
43: Lemon St & I Avenue
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5027		1770	5050		1770	3539	1583	1770	3484	
Flt Permitted	0.29	1.00		0.33	1.00		0.47	1.00	1.00	0.30	1.00	
Satd. Flow (perm)	536	5027		608	5050		873	3539	1583	564	3484	
Volume (vph)	17	695	57	135	944	46	92	724	83	13	412	48
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	755	62	147	1026	50	100	787	90	14	448	52
RTOR Reduction (vph)	0	24	0	0	13	0	0	0	56	0	21	0
Lane Group Flow (vph)	18	793	0	147	1063	0	100	787	34	14	479	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	13.9	13.9		13.9	13.9		13.2	13.2	13.2	13.2	13.2	
Effective Green, g (s)	13.9	13.9		13.9	13.9		13.2	13.2	13.2	13.2	13.2	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.38	0.38	0.38	0.38	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	212	1991		241	2000		328	1331	595	212	1310	
v/s Ratio Prot		0.16			0.21			c0.22			0.14	
v/s Ratio Perm	0.03			c0.24			0.11		0.06	0.02		
v/c Ratio	0.08	0.40		0.61	0.53		0.30	0.59	0.06	0.07	0.37	
Uniform Delay, d1	6.6	7.6		8.4	8.1		7.7	8.8	7.0	7.0	7.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1		4.3	0.3		0.5	0.7	0.0	0.1	0.2	
Delay (s)	6.8	7.7		12.8	8.4		8.2	9.5	7.0	7.1	8.1	
Level of Service	A	A		B	A		A	A	A	A	A	
Approach Delay (s)		7.7			8.9			9.1			8.1	
Approach LOS		A			A			A			A	

Intersection Summary					
HCM Average Control Delay	8.6	HCM Level of Service		A	
HCM Volume to Capacity ratio	0.60				
Actuated Cycle Length (s)	35.1	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	59.3%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	680	462	489	485	0	0	0	490	0	188
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	739	502	532	527	0	0	0	533	0	204
RTOR Reduction (vph)	0	0	369	0	0	0	0	0	0	0	160
Lane Group Flow (vph)	0	739	133	532	527	0	0	0	533	0	44
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		26.4	26.4	40.0	70.4				21.6		21.6
Effective Green, g (s)		26.4	26.4	40.0	70.4				21.6		21.6
Actuated g/C Ratio		0.26	0.26	0.40	0.70				0.22		0.22
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		895	380	708	2491				742		342
v/s Ratio Prot		0.22		c0.30	0.15						
v/s Ratio Perm			0.35						0.16		0.13
v/c Ratio		0.83	0.35	0.75	0.21				0.72		0.13
Uniform Delay, d1		34.6	29.8	25.7	5.1				36.4		31.6
Progression Factor		1.00	1.00	0.73	0.52				1.00		1.00
Incremental Delay, d2		6.3	0.6	4.0	0.0				5.9		0.8
Delay (s)		40.9	30.4	22.9	2.7				42.3		32.4
Level of Service		D	C	C	A				D		C
Approach Delay (s)		36.7			12.9		0.0			39.5	
Approach LOS		D			B		A			D	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	228	942	0	0	836	923	0	0	139	0	557
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	248	1024	0	0	909	1003	0	0	151	0	605
RTOR Reduction (vph)	0	0	0	0	0	314	0	0	0	0	245
Lane Group Flow (vph)	248	1024	0	0	909	689	0	0	151	0	360
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	16.7	72.2			51.5	51.5			19.8		19.8
Effective Green, g (s)	16.7	72.2			51.5	51.5			19.8		19.8
Actuated g/C Ratio	0.17	0.72			0.52	0.52			0.20		0.20
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	296	2555			1823	815			350		552
v/s Ratio Prot	c0.14	0.29			0.26						
v/s Ratio Perm						0.63			0.09		0.22
v/c Ratio	0.84	0.40			0.50	0.85			0.43		0.65
Uniform Delay, d1	40.3	5.4			15.8	20.8			35.2		36.9
Progression Factor	1.28	0.00			0.70	1.41			1.00		1.00
Incremental Delay, d2	12.5	0.1			0.2	6.0			3.8		5.9
Delay (s)	64.0	0.1			11.3	35.4			39.0		42.8
Level of Service	E	A			B	D			D		D
Approach Delay (s)		12.5			23.9		0.0			42.1	
Approach LOS		B			C		A			D	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	248	772	479	29	1093	13	533	109	37	8	180	128
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	270	839	521	32	1188	14	579	118	40	9	196	139
RTOR Reduction (vph)	0	0	312	0	0	10	0	0	25	0	0	15
Lane Group Flow (vph)	270	839	209	32	1188	4	579	118	15	9	196	124
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.2	40.1	40.1	5.1	31.0	31.0	22.6	38.0	38.0	0.8	16.2	30.4
Effective Green, g (s)	14.2	40.1	40.1	5.1	31.0	31.0	22.6	38.0	38.0	0.8	16.2	30.4
Actuated g/C Ratio	0.14	0.40	0.40	0.05	0.31	0.31	0.23	0.38	0.38	0.01	0.16	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	487	2039	635	90	1576	491	776	1932	602	14	824	481
v/s Ratio Prot	0.08	0.16		0.02	c0.23		c0.17	0.02		0.01	0.04	c0.04
v/s Ratio Perm			0.33			0.01			0.03			0.05
v/c Ratio	0.55	0.41	0.33	0.36	0.75	0.01	0.75	0.06	0.03	0.64	0.24	0.26
Uniform Delay, d1	40.0	21.5	20.7	45.9	31.1	23.9	36.0	19.7	19.4	49.5	36.5	26.3
Progression Factor	0.77	0.65	0.99	1.00	1.00	1.00	0.97	1.08	1.24	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	0.3	2.4	2.1	0.0	3.9	0.1	0.1	71.2	0.7	0.3
Delay (s)	32.1	14.2	20.8	48.3	33.2	23.9	38.9	21.3	24.2	120.7	37.2	26.6
Level of Service	C	B	C	D	C	C	D	C	C	F	D	C
Approach Delay (s)		19.3			33.4			35.3			35.1	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3498		3433	3369		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3498		3433	3369		1770	3539	1583	3433	3539	1583
Volume (vph)	40	548	46	65	513	242	25	1092	243	91	716	70
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	596	50	71	558	263	27	1187	264	99	778	76
RTOR Reduction (vph)	0	10	0	0	86	0	0	0	138	0	0	43
Lane Group Flow (vph)	43	636	0	71	735	0	27	1187	126	99	778	33
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	2.1	15.1		2.1	15.1		1.4	24.6	24.6	2.9	26.1	26.1
Effective Green, g (s)	2.1	15.1		2.1	15.1		1.4	24.6	24.6	2.9	26.1	26.1
Actuated g/C Ratio	0.03	0.25		0.03	0.25		0.02	0.41	0.41	0.05	0.43	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	61	870		119	838		41	1434	642	164	1522	681
v/s Ratio Prot	c0.02	0.18		0.02	c0.24		0.02	c0.34		c0.03	0.22	
v/s Ratio Perm									0.17			0.05
v/c Ratio	0.70	0.73		0.60	0.88		0.66	0.83	0.20	0.60	0.51	0.05
Uniform Delay, d1	29.0	20.9		28.9	21.9		29.4	16.2	11.7	28.3	12.6	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.9	3.2		7.8	10.3		32.2	4.1	0.2	6.1	0.3	0.0
Delay (s)	59.9	24.1		36.7	32.2		61.6	20.2	11.8	34.5	12.9	10.1
Level of Service	E	C		D	C		E	C	B	C	B	B
Approach Delay (s)		26.4			32.5			19.5			14.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
48: E Ave & I Avenue AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1841		1770	1857		1770	3446		1770	3453	
Flt Permitted	0.64	1.00		0.66	1.00		0.50	1.00		0.35	1.00	
Satd. Flow (perm)	1198	1841		1228	1857		935	3446		653	3453	
Volume (vph)	82	131	11	86	163	4	13	563	120	1	330	64
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	142	12	93	177	4	14	612	130	1	359	70
RTOR Reduction (vph)	0	9	0	0	2	0	0	32	0	0	29	0
Lane Group Flow (vph)	89	145	0	93	179	0	14	710	0	1	400	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.2	11.2		11.2	11.2		25.4	25.4		25.4	25.4	
Effective Green, g (s)	11.2	11.2		11.2	11.2		25.4	25.4		25.4	25.4	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.57	0.57		0.57	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	301	462		308	466		532	1963		372	1967	
v/s Ratio Prot		0.08			c0.10			c0.22			0.12	
v/s Ratio Perm	0.07			0.08			0.01			0.00		
v/c Ratio	0.30	0.31		0.30	0.38		0.03	0.36		0.00	0.20	
Uniform Delay, d1	13.5	13.6		13.5	13.8		4.2	5.2		4.1	4.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4		0.6	0.5		0.0	0.1		0.0	0.1	
Delay (s)	14.1	14.0		14.1	14.4		4.2	5.3		4.1	4.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.0			14.3			5.3			4.7	
Approach LOS		B			B			A			A	

Intersection Summary					
HCM Average Control Delay	7.8	HCM Level of Service		A	
HCM Volume to Capacity ratio	0.38				
Actuated Cycle Length (s)	44.6	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	42.8%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
49: Eucalyptus St & I Avenue AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3496		1770	3535		1770	3524		1770	3319	
Flt Permitted	0.95	1.00		0.46	1.00		0.95	1.00		0.48	1.00	
Satd. Flow (perm)	1770	3496		849	3535		1770	3524		891	3319	
Volume (vph)	429	446	40	65	490	4	183	428	13	14	329	233
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	466	485	43	71	533	4	199	465	14	15	358	253
RTOR Reduction (vph)	0	8	0	0	1	0	0	3	0	0	164	0
Lane Group Flow (vph)	466	520	0	71	536	0	199	476	0	15	447	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	21.5	40.3		14.8	14.8		10.1	28.0		13.9	13.9	
Effective Green, g (s)	21.5	40.3		14.8	14.8		10.1	28.0		13.9	13.9	
Actuated g/C Ratio	0.28	0.53		0.19	0.19		0.13	0.37		0.18	0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	499	1847		165	686		234	1293		162	605	
v/s Ratio Prot	c0.26	0.15			c0.15		c0.11	0.14			c0.18	
v/s Ratio Perm				0.08						0.02		
v/c Ratio	0.93	0.28		0.43	0.78		0.85	0.37		0.09	0.74	
Uniform Delay, d1	26.7	10.0		27.0	29.2		32.4	17.7		26.0	29.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	24.7	0.1		1.8	5.8		24.4	0.2		0.2	4.7	
Delay (s)	51.4	10.1		28.8	35.0		56.8	17.9		26.2	34.2	
Level of Service	D	B		C	C		E	B		C	C	
Approach Delay (s)		29.4			34.3			29.3			34.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	31.4	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.90				
Actuated Cycle Length (s)	76.3	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	77.5%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5061		3433	4859		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.34	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5061		3433	4859		627	3539	1583
Volume (vph)	125	384	960	594	1025	33	1385	520	219	8	677	122
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	417	1043	646	1114	36	1505	565	238	9	736	133
RTOR Reduction (vph)	0	0	923	0	2	0	0	51	0	0	0	90
Lane Group Flow (vph)	136	417	120	646	1148	0	1505	752	0	9	736	43
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	11.0	16.0	16.0	27.0	32.0		61.0	95.0		30.0	30.0	30.0
Effective Green, g (s)	11.0	16.0	16.0	27.0	32.0		61.0	95.0		30.0	30.0	30.0
Actuated g/C Ratio	0.07	0.11	0.11	0.18	0.21		0.41	0.63		0.20	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	130	542	297	618	1080		1396	3077		125	708	317
v/s Ratio Prot	0.08	0.08		c0.19	0.23		c0.44	0.17			c0.21	
v/s Ratio Perm			0.37							0.01		0.08
v/c Ratio	1.05	0.77	0.40	1.05	1.06		1.08	0.24		0.07	1.04	0.13
Uniform Delay, d1	69.5	65.2	62.6	61.5	59.0		44.5	11.9		48.7	60.0	49.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	91.8	6.5	0.9	48.6	45.6		48.1	0.0		0.2	44.5	0.2
Delay (s)	161.3	71.7	63.5	110.1	104.6		92.6	12.0		48.9	104.5	49.5
Level of Service	F	E	E	F	F		F	B		D	F	D
Approach Delay (s)		73.9			106.6			64.6			95.6	
Approach LOS		E			F			E			F	

Intersection Summary				
HCM Average Control Delay	82.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.35			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	99.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
55: Sultana St & E Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.97		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3269		1770	3421		1770	3526		1770	3395	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3269		1770	3421		1770	3526		1770	3395	
Volume (vph)	99	170	177	11	441	126	243	805	21	19	224	84
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	185	192	12	479	137	264	875	23	21	243	91
RTOR Reduction (vph)	0	132	0	0	40	0	0	2	0	0	62	0
Lane Group Flow (vph)	108	245	0	12	576	0	264	896	0	21	272	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.7	18.7		0.7	15.7		10.8	23.8		0.7	13.7	
Effective Green, g (s)	3.7	18.7		0.7	15.7		10.8	23.8		0.7	13.7	
Actuated g/C Ratio	0.06	0.31		0.01	0.26		0.18	0.40		0.01	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	109	1021		21	897		319	1401		21	776	
v/s Ratio Prot	c0.06	c0.12		0.01	c0.18		c0.15	c0.25		0.01	0.10	
v/s Ratio Perm												
v/c Ratio	0.99	0.24		0.57	0.64		0.83	0.64		1.00	0.35	
Uniform Delay, d1	28.1	15.3		29.5	19.6		23.7	14.6		29.6	19.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	83.1	0.1		32.5	1.6		16.0	1.0		196.4	0.3	
Delay (s)	111.2	15.4		61.9	21.2		39.6	15.6		226.0	19.6	
Level of Service	F	B		E	C		D	B		F	B	
Approach Delay (s)		36.8			22.0			21.0			31.9	
Approach LOS		D			C			C			C	

Intersection Summary				
HCM Average Control Delay	25.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	61.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
56: Sultana St & I Avenue — AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	312	216	459	1278	748	182
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	339	235	499	1389	813	198
RTOR Reduction (vph)	0	183	0	0	0	139
Lane Group Flow (vph)	339	52	499	1389	813	59
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	15.3	15.3	21.2	46.0	20.8	20.8
Effective Green, g (s)	15.3	15.3	21.2	46.0	20.8	20.8
Actuated g/C Ratio	0.22	0.22	0.31	0.66	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	391	349	541	2349	1062	475
v/s Ratio Prot			c0.28	0.39	c0.23	
v/s Ratio Perm	0.19	0.15				0.13
v/c Ratio	0.87	0.15	0.92	0.59	0.77	0.13
Uniform Delay, d1	26.0	21.8	23.3	6.4	22.0	17.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.9	0.2	21.4	1.1	5.3	0.5
Delay (s)	43.9	22.0	44.6	7.5	27.3	18.2
Level of Service	D	C	D	A	C	B
Approach Delay (s)	34.9			17.4	25.5	
Approach LOS	C			B	C	

Intersection Summary				
HCM Average Control Delay	22.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.85			
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
57: Joshua St & Hwy 395 — AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Volume (vph)	214	475	445	622	749	956
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	233	516	484	676	814	1039
RTOR Reduction (vph)	0	0	0	539	0	149
Lane Group Flow (vph)	233	516	484	137	814	890
Turn Type	Prot			Perm		Perm
Protected Phases	7		8		1	
Permitted Phases		4		8		1
Actuated Green, G (s)	6.0	25.0	15.0	15.0	41.0	41.0
Effective Green, g (s)	6.0	25.0	15.0	15.0	41.0	41.0
Actuated g/C Ratio	0.08	0.34	0.20	0.20	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	278	1196	717	321	1902	877
v/s Ratio Prot	c0.07		0.14		0.24	
v/s Ratio Perm		0.15		0.43		0.66
v/c Ratio	0.84	0.43	0.68	0.43	0.43	1.01
Uniform Delay, d1	33.5	19.0	27.2	25.7	9.6	16.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.3	0.3	2.5	0.9	0.2	34.0
Delay (s)	52.8	19.2	29.8	26.7	9.8	50.5
Level of Service	D	B	C	C	A	D
Approach Delay (s)		29.7	28.0		32.6	
Approach LOS		C	C		C	

Intersection Summary				
HCM Average Control Delay	30.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.37			
Actuated Cycle Length (s)	74.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	797	550	0	1437	703	0	0	137	0	919
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	866	598	0	1562	764	0	0	149	0	999
RTOR Reduction (vph)	0	0	413	0	0	527	0	0	0	0	10
Lane Group Flow (vph)	0	866	185	0	1562	237	0	0	149	0	989
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		31.0	31.0		31.0	31.0			61.0		61.0
Effective Green, g (s)		31.0	31.0		31.0	31.0			61.0		61.0
Actuated g/C Ratio		0.31	0.31		0.31	0.31			0.61		0.61
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		1576	491		1576	491			1080		966
v/s Ratio Prot		0.17			0.31						
v/s Ratio Perm			0.38			0.48			0.08		0.63
v/c Ratio		0.55	0.38		0.99	0.48			0.14		1.02
Uniform Delay, d1		28.7	27.0		34.4	28.0			8.3		19.5
Progression Factor		1.02	3.06		1.00	1.00			1.00		1.00
Incremental Delay, d2		0.4	0.5		20.5	0.7			0.3		35.2
Delay (s)		29.8	83.0		54.8	28.7			8.6		54.7
Level of Service		C	F		D	C			A		D
Approach Delay (s)		51.5			46.3		0.0			48.7	
Approach LOS		D			D		A			D	

Intersection Summary				
HCM Average Control Delay	48.4	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	79.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		0.91	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3099	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3099	1441	1770	3539				3433		1583
Volume (vph)	0	209	561	240	690	0	0	0	443	0	406
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	227	610	261	750	0	0	0	482	0	441
RTOR Reduction (vph)	0	259	259	0	0	0	0	0	0	0	92
Lane Group Flow (vph)	0	273	46	261	750	0	0	0	482	0	349
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		15.2	15.2	23.4	42.6				49.4		49.4
Effective Green, g (s)		15.2	15.2	23.4	42.6				49.4		49.4
Actuated g/C Ratio		0.15	0.15	0.23	0.43				0.49		0.49
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		471	219	414	1508				1696		782
v/s Ratio Prot		0.17		c0.15	0.21						
v/s Ratio Perm			0.21						0.14		0.28
v/c Ratio		0.58	0.21	0.63	0.50				0.28		0.45
Uniform Delay, d1		39.4	37.2	34.4	20.9				14.9		16.4
Progression Factor		1.00	1.00	0.54	0.35				1.00		1.00
Incremental Delay, d2		1.8	0.5	2.9	0.2				0.4		1.8
Delay (s)		41.3	37.6	21.5	7.7				15.3		18.3
Level of Service		D	D	C	A				B		B
Approach Delay (s)		39.9			11.2		0.0			16.7	
Approach LOS		D			B		A			B	

Intersection Summary				
HCM Average Control Delay	21.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	60.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	5	647	0	0	682	821	0	0	247	0	577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	703	0	0	741	892	0	0	268	0	627
RTOR Reduction (vph)	0	0	0	0	0	612	0	0	0	0	79
Lane Group Flow (vph)	5	703	0	0	741	280	0	0	268	0	548
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	0.8	36.2			31.4	31.4			55.8		55.8
Effective Green, g (s)	0.8	36.2			31.4	31.4			55.8		55.8
Actuated g/C Ratio	0.01	0.36			0.31	0.31			0.56		0.56
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	14	1281			1111	497			988		883
v/s Ratio Prot	0.00	c0.20			0.21						
v/s Ratio Perm						0.56			0.15		0.40
v/c Ratio	0.36	0.55			0.67	0.56			0.27		0.62
Uniform Delay, d1	49.3	25.4			29.8	28.6			11.5		14.9
Progression Factor	0.89	0.68			1.00	1.00			1.00		1.00
Incremental Delay, d2	14.2	0.5			1.5	1.5			0.7		3.3
Delay (s)	58.3	17.8			31.3	30.1			12.2		18.2
Level of Service	E	B			C	C			B		B
Approach Delay (s)		18.1			30.6		0.0			16.4	
Approach LOS		B			C		A			B	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395 — AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5068		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5068		3433	5085
Volume (vph)	269	257	1117	26	306	1480
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	279	1214	28	333	1609
RTOR Reduction (vph)	0	209	4	0	0	0
Lane Group Flow (vph)	292	70	1238	0	333	1609
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.5	12.5	16.8		8.5	29.3
Effective Green, g (s)	12.5	12.5	16.8		8.5	29.3
Actuated g/C Ratio	0.25	0.25	0.34		0.17	0.59
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	444	397	1710		586	2992
v/s Ratio Prot	0.17		c0.25		0.10	c0.32
v/s Ratio Perm		0.18				
v/c Ratio	0.66	0.18	0.72		0.57	0.54
Uniform Delay, d1	16.7	14.6	14.5		19.0	6.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.5	0.2	1.5		1.3	0.2
Delay (s)	20.2	14.8	16.0		20.2	6.4
Level of Service	C	B	B		C	A
Approach Delay (s)	17.6		16.0			8.7
Approach LOS	B		B			A

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	49.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.98		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3331		1770	3471		1770	3524		1770	3475	
Flt Permitted	0.59	1.00		0.57	1.00		0.36	1.00		0.33	1.00	
Satd. Flow (perm)	1105	3331		1053	3471		665	3524		619	3475	
Volume (vph)	37	171	110	37	205	30	289	726	21	7	610	85
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	186	120	40	223	33	314	789	23	8	663	92
RTOR Reduction (vph)	0	98	0	0	21	0	0	3	0	0	16	0
Lane Group Flow (vph)	40	208	0	40	235	0	314	809	0	8	739	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.5	8.5		8.5	8.5		30.0	30.0		30.0	30.0	
Effective Green, g (s)	8.5	8.5		8.5	8.5		30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.65	0.65		0.65	0.65	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	609		192	634		429	2274		399	2242	
v/s Ratio Prot		c0.09			0.07			0.23			0.22	
v/s Ratio Perm	0.04			0.04			c0.47			0.01		
v/c Ratio	0.20	0.34		0.21	0.37		0.73	0.36		0.02	0.33	
Uniform Delay, d1	16.1	16.6		16.1	16.7		5.5	3.8		3.0	3.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.3		0.5	0.4		6.3	0.1		0.0	0.1	
Delay (s)	16.6	16.9		16.7	17.0		11.9	3.9		3.0	3.8	
Level of Service	B	B		B	B		B	A		A	A	
Approach Delay (s)		16.9			17.0			6.1			3.8	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay	8.2	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
74: Main St. & Cottonwood Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5047		1770	5085	1583	1770	1863	1583	3433	3399	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5047		1770	5085	1583	1770	1863	1583	3433	3399	
Volume (vph)	79	1510	80	41	1153	488	120	150	39	178	213	76
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1641	87	45	1253	530	130	163	42	193	232	83
RTOR Reduction (vph)	0	5	0	0	0	281	0	0	35	0	37	0
Lane Group Flow (vph)	86	1723	0	45	1253	249	130	163	7	193	278	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	8.2	50.6		4.6	47.0	47.0	12.2	17.0	17.0	11.8	16.6	
Effective Green, g (s)	8.2	50.6		4.6	47.0	47.0	12.2	17.0	17.0	11.8	16.6	
Actuated g/C Ratio	0.08	0.51		0.05	0.47	0.47	0.12	0.17	0.17	0.12	0.17	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	145	2554		81	2390	744	216	317	269	405	564	
v/s Ratio Prot	0.05	c0.34		0.03	0.25		c0.07	0.09		0.06	c0.09	
v/s Ratio Perm						0.33			0.03			
v/c Ratio	0.59	0.67		0.56	0.52	0.33	0.60	0.51	0.03	0.48	0.49	
Uniform Delay, d1	44.3	18.5		46.7	18.6	16.7	41.6	37.7	34.6	41.2	37.9	
Progression Factor	1.37	0.20		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.5	0.5		8.0	0.2	0.3	4.7	5.9	0.2	0.9	3.1	
Delay (s)	65.1	4.2		54.7	18.8	16.9	46.3	43.6	34.8	42.1	40.9	
Level of Service	E	A		D	B	B	D	D	C	D	D	
Approach Delay (s)		7.1			19.2			43.5			41.4	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM Average Control Delay	18.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
75: Main St. & 7th Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	226	1442	165	13	1321	20	335	237	4	74	170	214
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	1567	179	14	1436	22	364	258	4	80	185	233
RTOR Reduction (vph)	0	0	80	0	0	12	0	0	3	0	0	148
Lane Group Flow (vph)	246	1567	99	14	1436	10	364	258	1	80	185	85
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	8.0	47.6	47.6	0.7	40.3	40.3	10.9	14.8	14.8	6.7	10.6	10.6
Effective Green, g (s)	8.0	47.6	47.6	0.7	40.3	40.3	10.9	14.8	14.8	6.7	10.6	10.6
Actuated g/C Ratio	0.09	0.55	0.55	0.01	0.47	0.47	0.13	0.17	0.17	0.08	0.12	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	320	1963	878	14	1662	744	436	610	273	138	437	344
v/s Ratio Prot	c0.07	0.44		0.01	c0.41		c0.11	0.07		0.05	0.05	
v/s Ratio Perm			0.11			0.01			0.00			0.08
v/c Ratio	0.77	0.80	0.11	1.00	0.86	0.01	0.83	0.42	0.00	0.58	0.42	0.25
Uniform Delay, d1	38.0	15.3	9.1	42.5	20.3	12.1	36.6	31.7	29.4	38.2	34.8	34.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	2.4	0.1	240.5	4.9	0.0	12.9	0.5	0.0	5.8	0.7	0.4
Delay (s)	48.6	17.6	9.1	283.1	25.2	12.2	49.5	32.2	29.4	44.0	35.4	34.4
Level of Service	D	B	A	F	C	B	D	C	C	D	D	C
Approach Delay (s)		20.7			27.5			42.2			36.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
76: Main St. & Peach Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5002		1770	4908		1770	3539	1583	1770	3411	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5002		1770	4908		1770	3539	1583	1770	3411	
Volume (vph)	63	473	58	183	605	183	52	135	295	23	115	37
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	514	63	199	658	199	57	147	321	25	125	40
RTOR Reduction (vph)	0	15	0	0	55	0	0	0	184	0	25	0
Lane Group Flow (vph)	68	562	0	199	802	0	57	147	137	25	140	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	5.9	20.2		17.5	31.8		9.5	42.6	42.6	3.7	36.8	
Effective Green, g (s)	5.9	20.2		17.5	31.8		9.5	42.6	42.6	3.7	36.8	
Actuated g/C Ratio	0.06	0.20		0.18	0.32		0.10	0.43	0.43	0.04	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	104	1010		310	1561		168	1508	674	65	1255	
v/s Ratio Prot	0.04	c0.12		c0.11	0.17		c0.03	0.04		0.01	0.05	
v/s Ratio Perm									0.20			
v/c Ratio	0.65	0.56		0.64	0.51		0.34	0.10	0.20	0.38	0.11	
Uniform Delay, d1	46.1	35.9		38.3	27.8		42.3	17.2	18.0	47.0	20.8	
Progression Factor	0.65	0.31		0.91	0.85		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.7	0.5		3.3	0.2		1.2	0.1	0.7	3.8	0.0	
Delay (s)	40.5	11.5		38.3	23.9		43.5	17.3	18.7	50.8	20.9	
Level of Service	D	B		D	C		D	B	B	D	C	
Approach Delay (s)		14.6			26.6			21.0			24.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
77: Danbury Ave & I Avenue — AM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.85	
Flt Protected	0.95	0.95		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3426		1770	3526		1770	3470		1770	2787	
Flt Permitted	0.52	0.95		0.48	1.00		0.95	1.00		0.58	1.00	
Satd. Flow (perm)	962	3426		890	3526		1770	3470		1078	2787	
Volume (vph)	43	253	12	5	784	19	36	384	58	112	332	8
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	275	13	5	852	21	39	417	63	122	361	9
RTOR Reduction (vph)	0	7	0	0	3	0	0	24	0	0	4	0
Lane Group Flow (vph)	47	281	0	5	870	0	39	456	0	122	366	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	10.5	10.5		14.7	14.7		1.2	19.9		10.5	10.5	
Effective Green, g (s)	10.5	10.5		14.7	14.7		1.2	19.9		10.5	10.5	
Actuated g/C Ratio	0.27	0.27		0.38	0.38		0.03	0.52		0.27	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	937		341	1350		55	1798		295	762	
v/s Ratio Prot		0.08			c0.25		c0.02	0.14				
v/s Ratio Perm	0.05			0.01						0.11	0.13	
v/c Ratio	0.18	0.30		0.01	0.64		0.71	0.25		0.41	0.48	
Uniform Delay, d1	10.7	11.0		7.4	9.7		18.4	5.1		11.4	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2		0.0	1.1		34.2	0.1		0.9	0.5	
Delay (s)	11.0	11.2		7.4	10.8		52.6	5.2		12.4	12.1	
Level of Service	B	B		A	B		D	A		B	B	
Approach Delay (s)		11.2			10.8			8.8		12.2		
Approach LOS		B			B			A		B		

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	38.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
78: Ranchero Rd & Danbury Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.97		1.00	0.97		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	4812		1770	4938		1770	3437		1770	3107	
Flt Permitted	0.95	1.00		0.95	1.00		0.20	1.00		0.48	1.00	
Satd. Flow (perm)	3433	4812		1770	4938		373	3437		886	3107	
Volume (vph)	320	306	171	78	563	135	415	361	86	38	121	530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	348	333	186	85	612	147	451	392	93	41	132	576
RTOR Reduction (vph)	0	130	0	0	54	0	0	27	0	0	245	0
Lane Group Flow (vph)	348	389	0	85	705	0	451	458	0	41	463	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	9.0	17.9		6.6	15.5		36.8	30.5		18.3	16.0	
Effective Green, g (s)	9.0	17.9		6.6	15.5		36.8	30.5		18.3	16.0	
Actuated g/C Ratio	0.12	0.24		0.09	0.21		0.50	0.42		0.25	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	422	1175		159	1044		507	1430		249	678	
v/s Ratio Prot	c0.10	0.11		0.05	c0.15		c0.20	0.14		0.01	c0.23	
v/s Ratio Perm							0.24			0.04		
v/c Ratio	0.82	0.33		0.53	0.68		0.89	0.32		0.16	1.01dr	
Uniform Delay, d1	31.4	22.8		31.9	26.6		16.7	14.4		21.1	26.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.3	0.2		3.4	1.7		17.2	0.1		0.3	2.9	
Delay (s)	43.7	22.9		35.3	28.3		33.9	14.5		21.4	29.2	
Level of Service	D	C		D	C		C	B		C	C	
Approach Delay (s)		31.3			29.0			23.9			28.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	73.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

Hesperia GP Update
1: Highway 138 & Summit Valley Rd PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.24	1.00
Satd. Flow (perm)	3433	5085	5085	1583	438	2787
Volume (vph)	1883	3359	1428	44	45	788
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2047	3651	1552	48	49	857
RTOR Reduction (vph)	0	0	0	23	0	263
Lane Group Flow (vph)	2047	3651	1552	25	49	594
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	80.0	125.0	41.0	41.0	17.0	80.0
Effective Green, g (s)	80.0	125.0	41.0	41.0	17.0	80.0
Actuated g/C Ratio	0.53	0.83	0.27	0.27	0.11	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1831	4238	1390	433	50	1486
v/s Ratio Prot	c0.60	0.72	c0.31			0.31
v/s Ratio Perm				0.03	c0.11	
v/c Ratio	1.12	0.86	1.12	0.06	0.98	0.40
Uniform Delay, d1	35.0	7.4	54.5	40.3	66.3	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	61.2	2.0	62.8	0.1	118.5	0.2
Delay (s)	96.2	9.4	117.3	40.3	184.9	20.9
Level of Service	F	A	F	D	F	C
Approach Delay (s)		40.6	115.0		29.8	
Approach LOS		D	F		C	

Intersection Summary			
HCM Average Control Delay	53.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.97	0.95				1.00		1.00
Frt		0.96		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	1.00				0.95		1.00
Satd. Flow (prot)		3412		3433	3539				1770		1583
Flt Permitted		1.00		0.95	1.00				0.95		1.00
Satd. Flow (perm)		3412		3433	3539				1770		1583
Volume (vph)	0	645	204	708	497	0	0	0	59	0	788
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	701	222	770	540	0	0	0	64	0	857
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	910	0	770	540	0	0	0	64	0	816
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		29.1		14.8	14.8				29.1		29.1
Effective Green, g (s)		29.1		14.8	14.8				29.1		29.1
Actuated g/C Ratio		0.56		0.29	0.29				0.56		0.56
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1913		979	1009				992		888
v/s Ratio Prot		0.27		c0.22	0.15						
v/s Ratio Perm									0.04		0.54
v/c Ratio		0.48		0.79	0.54				0.06		0.92
Uniform Delay, d1		6.8		17.1	15.6				5.2		10.3
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		0.2		4.2	0.5				0.0		14.2
Delay (s)		7.0		21.3	16.2				5.2		24.5
Level of Service		A		C	B				A		C
Approach Delay (s)		7.0			19.2		0.0			23.2	
Approach LOS		A			B		A			C	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	51.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave — PM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		
Lane Util. Factor	0.97		1.00		
Frt	1.00		0.86		
Flt Protected	0.95		1.00		
Satd. Flow (prot)	3433		1611		
Flt Permitted	0.95		1.00		
Satd. Flow (perm)	3433		1611		
Volume (vph)	3287	0	86	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3573	0	93	0	0
RTOR Reduction (vph)	0	0	89	0	0
Lane Group Flow (vph)	3573	0	4	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	126.0		5.5		
Effective Green, g (s)	126.0		5.5		
Actuated g/C Ratio	0.90		0.04		
Clearance Time (s)	4.0		4.0		
Vehicle Extension (s)	3.0		3.0		
Lane Grp Cap (vph)	3101		64		
v/s Ratio Prot	c1.04				
v/s Ratio Perm			0.06		
v/c Ratio	1.15		0.06		
Uniform Delay, d1	6.8		64.5		
Progression Factor	1.00		1.00		
Incremental Delay, d2	72.6		0.4		
Delay (s)	79.4		64.9		
Level of Service	E		E		
Approach Delay (s)	79.4	64.9		0.0	
Approach LOS	E	E		A	

Intersection Summary			
HCM Average Control Delay	79.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	139.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
9: Ranchero Rd & Caliente Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	167	314	221	641	1111	1421	430	215	854	1520	70	308
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	341	240	697	1208	1545	467	234	928	1652	76	335
RTOR Reduction (vph)	0	0	187	0	0	424	0	0	659	0	0	107
Lane Group Flow (vph)	182	341	53	697	1208	1121	467	234	269	1652	76	228
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.0	33.1	33.1	34.9	57.0	57.0	23.1	18.0	18.0	48.0	42.9	42.9
Effective Green, g (s)	11.0	33.1	33.1	34.9	57.0	57.0	23.1	18.0	18.0	48.0	42.9	42.9
Actuated g/C Ratio	0.07	0.22	0.22	0.23	0.38	0.38	0.15	0.12	0.12	0.32	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	130	1122	349	799	1932	602	529	224	334	1099	533	453
v/s Ratio Prot	c0.10	0.07		0.20	0.24		0.14	0.13		c0.48	0.04	
v/s Ratio Perm			0.15			0.98			0.33			0.21
v/c Ratio	1.40	0.30	0.15	0.87	0.63	1.86	0.88	1.04	0.81	1.50	0.14	0.50
Uniform Delay, d1	69.5	48.8	47.1	55.4	37.8	46.5	62.1	66.0	64.3	51.0	39.9	44.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	219.7	0.2	0.2	10.3	0.6	394.3	15.9	72.3	18.4	231.2	0.6	4.0
Delay (s)	289.2	49.0	47.3	65.7	38.5	440.8	78.0	138.3	82.7	282.2	40.4	48.6
Level of Service	F	D	D	E	D	F	E	F	F	F	D	D
Approach Delay (s)		105.8			224.1			89.3			235.4	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	187.9	HCM Level of Service	F
HCM Volume to Capacity ratio	2.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4806	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4806	1362	3433	5085				1770		2787
Volume (vph)	0	2337	351	214	1903	0	0	0	329	0	1271
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2540	382	233	2068	0	0	0	358	0	1382
RTOR Reduction (vph)	0	0	110	0	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	2540	272	233	2068	0	0	0	358	0	1377
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		62.0	62.0	8.0	74.0				58.0		58.0
Effective Green, g (s)		62.0	62.0	8.0	74.0				58.0		58.0
Actuated g/C Ratio		0.44	0.44	0.06	0.53				0.41		0.41
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		2128	603	196	2688				733		1155
v/s Ratio Prot		c0.53		c0.07	0.41						
v/s Ratio Perm			0.28						0.20		0.50
v/c Ratio		1.19	0.45	1.19	0.77				0.49		1.19
Uniform Delay, d1		39.0	27.2	66.0	26.2				30.1		41.0
Progression Factor		1.00	1.00	0.72	0.32				1.00		1.00
Incremental Delay, d2		92.1	0.5	104.1	0.6				2.3		95.4
Delay (s)		131.1	27.7	151.4	9.0				32.4		136.4
Level of Service		F	C	F	A				C		F
Approach Delay (s)		117.5			23.5		0.0			115.0	
Approach LOS		F			C		A			F	

Intersection Summary			
HCM Average Control Delay	85.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	1305	1361	0	0	1086	853	0	0	1031	0	902
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1418	1479	0	0	1180	927	0	0	1121	0	980
RTOR Reduction (vph)	0	0	0	0	0	508	0	0	0	0	14
Lane Group Flow (vph)	1418	1479	0	0	1180	419	0	0	1121	0	966
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	38.0	74.0			32.0	32.0			58.0		58.0
Effective Green, g (s)	38.0	74.0			32.0	32.0			58.0		58.0
Actuated g/C Ratio	0.27	0.53			0.23	0.23			0.41		0.41
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	932	2688			1162	362			1422		656
v/s Ratio Prot	c0.41	0.29			0.23						
v/s Ratio Perm						0.59			0.33		0.62
v/c Ratio	1.52	0.55			1.02	1.16			0.79		1.47
Uniform Delay, d1	51.0	21.9			54.0	54.0			35.7		41.0
Progression Factor	0.79	1.47			1.37	2.89			1.00		1.00
Incremental Delay, d2	235.2	0.0			12.2	73.6			4.5		220.8
Delay (s)	275.4	32.4			86.0	229.5			40.2		261.8
Level of Service	F	C			F	F			D		F
Approach Delay (s)		151.3			149.1		0.0			143.6	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	148.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00		0.91	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	3433	5085	1583	3433	4991		3433	5085	1583		4721	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (perm)	3433	5085	1583	3433	4991		3433	5085	1583		4721	
Volume (vph)	842	1103	318	393	547	77	1070	1032	736	0	390	356
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	915	1199	346	427	595	84	1163	1122	800	0	424	387
RTOR Reduction (vph)	0	0	225	0	13	0	0	0	195	0	119	0
Lane Group Flow (vph)	915	1199	121	427	666	0	1163	1122	605	0	692	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	37.0	36.1	36.1	18.9	18.0		47.0	73.0	73.0		22.0	
Effective Green, g (s)	37.0	36.1	36.1	18.9	18.0		47.0	73.0	73.0		22.0	
Actuated g/C Ratio	0.26	0.26	0.26	0.13	0.13		0.34	0.52	0.52		0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	907	1311	408	463	642		1153	2651	825		742	
v/s Ratio Prot	c0.27	0.24		0.12	c0.14		0.34	0.22			c0.17	
v/s Ratio Perm			0.22						0.51			
v/c Ratio	1.01	0.91	0.30	0.92	1.04		1.01	0.42	0.73		1.05dr	
Uniform Delay, d1	51.5	50.5	41.8	59.8	61.0		46.5	20.6	26.0		58.3	
Progression Factor	0.68	0.66	0.58	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	20.8	4.4	0.2	23.9	45.5		28.6	0.5	5.7		20.2	
Delay (s)	55.8	37.9	24.5	83.7	106.5		75.1	21.1	31.7		78.5	
Level of Service	E	D	C	F	F		E	C	C		E	
Approach Delay (s)		42.7			97.7			44.2			78.5	
Approach LOS		D			F			D			E	

Intersection Summary			
HCM Average Control Delay	55.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Hesperia GP Update
13: Ranchero Rd & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5039		1770	4945		1770	3492		1770	3480	
Flt Permitted	0.14	1.00		0.10	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	268	5039		187	4945		1770	3492		1770	3480	
Volume (vph)	57	1875	121	29	977	221	82	218	21	302	287	36
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	2038	132	32	1062	240	89	237	23	328	312	39
RTOR Reduction (vph)	0	8	0	0	38	0	0	9	0	0	11	0
Lane Group Flow (vph)	62	2162	0	32	1264	0	89	251	0	328	340	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	39.9	39.9		39.9	39.9		7.2	12.1		18.1	23.0	
Effective Green, g (s)	39.9	39.9		39.9	39.9		7.2	12.1		18.1	23.0	
Actuated g/C Ratio	0.49	0.49		0.49	0.49		0.09	0.15		0.22	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	130	2449		91	2403		155	515		390	975	
v/s Ratio Prot		c0.43			0.26		0.05	c0.07		c0.19	0.10	
v/s Ratio Perm	0.23			0.17								
v/c Ratio	0.48	0.88		0.35	0.53		0.57	0.49		0.84	0.35	
Uniform Delay, d1	14.1	19.0		13.1	14.6		36.0	32.2		30.6	23.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	4.2		2.3	0.2		5.1	0.7		15.0	0.2	
Delay (s)	16.9	23.1		15.4	14.8		41.0	32.9		45.6	23.8	
Level of Service	B	C		B	B		D	C		D	C	
Approach Delay (s)		23.0			14.8			35.0			34.3	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Hesperia GP Update
14: Ranchero Rd & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5061		1770	3503		1770	3459	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5061		1770	3503		1770	3459	
Volume (vph)	104	1845	268	22	1105	37	59	447	33	130	457	81
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	2005	291	24	1201	40	64	486	36	141	497	88
RTOR Reduction (vph)	0	0	159	0	4	0	0	7	0	0	19	0
Lane Group Flow (vph)	113	2005	132	24	1237	0	64	515	0	141	566	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.3	33.2	33.2	1.5	27.4		3.1	15.4		7.1	19.4	
Effective Green, g (s)	7.3	33.2	33.2	1.5	27.4		3.1	15.4		7.1	19.4	
Actuated g/C Ratio	0.10	0.45	0.45	0.02	0.37		0.04	0.21		0.10	0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	177	2306	718	36	1894		75	737		172	917	
v/s Ratio Prot	c0.06	c0.39		0.01	0.25		0.04	0.15		c0.08	c0.17	
v/s Ratio Perm			0.18									
v/c Ratio	0.64	0.87	0.18	0.67	0.65		0.85	0.70		0.82	0.62	
Uniform Delay, d1	31.7	18.0	11.9	35.6	19.0		34.8	26.8		32.4	23.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.4	3.8	0.1	38.0	0.8		57.0	2.9		25.3	1.2	
Delay (s)	39.0	21.8	12.0	73.6	19.8		91.8	29.7		57.7	24.9	
Level of Service	D	C	B	E	B		F	C		E	C	
Approach Delay (s)		21.5			20.8			36.4			31.3	
Approach LOS		C			C			D			C	

Intersection Summary					
HCM Average Control Delay	24.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.82				
Actuated Cycle Length (s)	73.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	72.9%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
15: Ranchero Rd & I Avenue — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.92		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4666		1770	3488		1770	4819		1770	3437	
Flt Permitted	0.95	1.00		0.95	1.00		0.15	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4666		1770	3488		285	4819		1770	3437	
Volume (vph)	73	318	389	257	283	30	261	515	276	19	676	161
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	346	423	279	308	33	284	560	300	21	735	175
RTOR Reduction (vph)	0	266	0	0	10	0	0	103	0	0	26	0
Lane Group Flow (vph)	79	503	0	279	331	0	284	757	0	21	884	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	6.6	14.1		13.6	21.1		36.2	26.1		6.4	22.4	
Effective Green, g (s)	6.6	14.1		13.6	21.1		36.2	26.1		6.4	22.4	
Actuated g/C Ratio	0.09	0.19		0.18	0.28		0.48	0.34		0.08	0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	863		316	966		332	1651		149	1010	
v/s Ratio Prot	0.04	c0.16		c0.16	0.10		c0.11	0.18		0.01	0.26	
v/s Ratio Perm							c0.29					
v/c Ratio	0.52	0.58		0.88	0.34		0.86	0.46		0.14	0.88	
Uniform Delay, d1	33.3	28.4		30.5	22.0		15.8	19.5		32.4	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.0		23.9	0.2		18.9	0.2		0.4	8.6	
Delay (s)	36.2	29.4		54.4	22.2		34.7	19.7		32.8	34.2	
Level of Service	D	C		D	C		C	B		C	C	
Approach Delay (s)		30.0			36.7			23.5			34.1	
Approach LOS		C			D			C			C	

Intersection Summary					
HCM Average Control Delay	30.1	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.91				
Actuated Cycle Length (s)	76.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	80.7%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1747		1770	5085	3471	
Flt Permitted	0.96		0.31	1.00	1.00	
Satd. Flow (perm)	1747		572	5085	3471	
Volume (vph)	108	23	14	592	709	105
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	25	15	643	771	114
RTOR Reduction (vph)	21	0	0	0	15	0
Lane Group Flow (vph)	121	0	15	643	870	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	8.1		36.7	36.7	36.7	
Effective Green, g (s)	8.1		36.7	36.7	36.7	
Actuated g/C Ratio	0.15		0.70	0.70	0.70	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	268		398	3534	2413	
v/s Ratio Prot				0.13	c0.25	
v/s Ratio Perm	0.08		0.03			
v/c Ratio	0.45		0.04	0.18	0.36	
Uniform Delay, d1	20.3		2.5	2.8	3.3	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.2		0.0	0.0	0.1	
Delay (s)	21.5		2.6	2.8	3.4	
Level of Service	C		A	A	A	
Approach Delay (s)	21.5			2.8	3.4	
Approach LOS	C			A	A	

Intersection Summary				
HCM Average Control Delay	4.7	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.40			
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	37.0%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
17: Joshua St & Caliente Rd PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.94		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3343		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3343		1770	3539	1770	1583
Volume (vph)	210	123	575	361	361	958
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	134	625	392	392	1041
RTOR Reduction (vph)	98	0	0	0	0	518
Lane Group Flow (vph)	264	0	625	392	392	523
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	11.7		32.0	47.7	29.8	29.8
Effective Green, g (s)	11.7		32.0	47.7	29.8	29.8
Actuated g/C Ratio	0.14		0.37	0.56	0.35	0.35
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	457		662	1974	617	552
v/s Ratio Prot	c0.11		c0.35	0.11	0.22	
v/s Ratio Perm						0.66
v/c Ratio	0.58		0.94	0.20	0.64	0.95
Uniform Delay, d1	34.6		25.9	9.4	23.3	27.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8		22.1	0.0	2.1	25.6
Delay (s)	36.3		48.0	9.4	25.5	52.7
Level of Service	D		D	A	C	D
Approach Delay (s)	36.3			33.1	45.2	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	39.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.30			
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	75.7%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
18: Joshua St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	4906		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	4906		1770	5085	1583
Volume (vph)	618	759	199	80	512	235	818	730	224	460	534	236
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	672	825	216	87	557	255	889	793	243	500	580	257
RTOR Reduction (vph)	0	0	153	0	0	210	0	51	0	0	0	206
Lane Group Flow (vph)	672	825	63	87	557	45	889	985	0	500	580	51
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.0	32.5	32.5	9.2	19.7	19.7	31.0	23.0		30.0	22.0	22.0
Effective Green, g (s)	22.0	32.5	32.5	9.2	19.7	19.7	31.0	23.0		30.0	22.0	22.0
Actuated g/C Ratio	0.20	0.29	0.29	0.08	0.18	0.18	0.28	0.21		0.27	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	682	1039	465	147	630	282	961	1019		480	1011	315
v/s Ratio Prot	c0.20	0.23		0.05	0.16		0.26	c0.21		c0.28	0.11	
v/s Ratio Perm			0.14			0.16						0.16
v/c Ratio	0.99	0.79	0.14	0.59	0.88	0.16	0.93	0.97		1.04	0.57	0.16
Uniform Delay, d1	44.2	36.0	28.8	48.9	44.4	38.5	38.7	43.5		40.4	40.1	36.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.5	4.3	0.1	6.3	13.9	0.3	14.2	20.4		52.3	0.8	0.2
Delay (s)	74.7	40.3	28.9	55.2	58.3	38.8	52.9	63.9		92.7	40.9	37.0
Level of Service	E	D	C	E	E	D	D	E		F	D	D
Approach Delay (s)		52.3			52.5			58.8			59.5	
Approach LOS		D			D			E			E	

Intersection Summary					
HCM Average Control Delay	56.1	HCM Level of Service		E	
HCM Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	110.7	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	89.7%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
19: Muscatel St & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.94		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3344		1770	3291		1770	3496		3433	3487	
Flt Permitted	0.31	1.00		0.19	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	577	3344		355	3291		1770	3496		3433	3487	
Volume (vph)	57	744	434	32	316	278	287	634	56	424	696	75
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	809	472	35	343	302	312	689	61	461	757	82
RTOR Reduction (vph)	0	140	0	0	196	0	0	11	0	0	14	0
Lane Group Flow (vph)	62	1141	0	35	449	0	312	739	0	461	825	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	21.0	21.0		21.0	21.0		11.0	16.8		10.0	15.8	
Effective Green, g (s)	21.0	21.0		21.0	21.0		11.0	16.8		10.0	15.8	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.18	0.28		0.17	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	1174		125	1156		326	982		574	921	
v/s Ratio Prot		c0.38			0.20		c0.18	0.21		0.13	c0.24	
v/s Ratio Perm	0.11			0.10								
v/c Ratio	0.31	0.97		0.28	0.39		0.96	0.75		0.80	0.90	
Uniform Delay, d1	14.1	19.1		14.0	14.6		24.2	19.6		24.0	21.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	19.7		1.2	0.2		38.1	3.3		8.0	11.2	
Delay (s)	15.0	38.8		15.2	14.8		62.3	22.9		31.9	32.4	
Level of Service	B	D		B	B		E	C		C	C	
Approach Delay (s)		37.7			14.8			34.5			32.2	
Approach LOS		D			B			C			C	

Intersection Summary					
HCM Average Control Delay	31.7	HCM Level of Service		C	
HCM Volume to Capacity ratio	1.00				
Actuated Cycle Length (s)	59.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	88.7%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

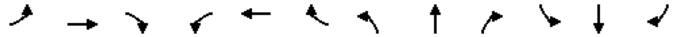
Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. PM Peak Hour



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3238	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3238	
Volume (vph)	498	625	786	416	293	384
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	541	679	854	452	318	417
RTOR Reduction (vph)	0	378	0	0	156	0
Lane Group Flow (vph)	541	301	854	452	579	0
Turn Type		Perm	Prot			
Protected Phases	8		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	47.2	47.2	38.7	84.8	42.1	
Effective Green, g (s)	47.2	47.2	38.7	84.8	42.1	
Actuated g/C Ratio	0.34	0.34	0.28	0.61	0.30	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	597	534	949	2144	974	
v/s Ratio Prot	0.31		c0.25	0.13	c0.23	
v/s Ratio Perm		0.43				
v/c Ratio	0.91	0.56	0.90	0.21	0.59	
Uniform Delay, d1	44.3	38.0	48.8	12.5	41.7	
Progression Factor	1.00	1.00	0.65	0.20	1.00	
Incremental Delay, d2	17.3	1.4	7.3	0.1	2.7	
Delay (s)	61.6	39.3	39.2	2.6	44.4	
Level of Service	E	D	D	A	D	
Approach Delay (s)	49.2			26.5	44.4	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	39.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	80.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.24	1.00	1.00	0.24	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	452	5085	2787	452	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	43	864	348	31	1133	313	583	755	50	103	133	232
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	939	378	34	1232	340	634	821	54	112	145	252
RTOR Reduction (vph)	0	0	289	0	0	192	0	0	30	0	0	9
Lane Group Flow (vph)	47	939	89	34	1232	148	634	821	24	112	145	243
Turn Type	Perm		Over	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4	5		8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	16.5	16.5	13.1	16.5	16.5	16.5	13.1	23.1	23.1	3.8	13.8	13.8
Effective Green, g (s)	16.5	16.5	13.1	16.5	16.5	16.5	13.1	23.1	23.1	3.8	13.8	13.8
Actuated g/C Ratio	0.30	0.30	0.24	0.30	0.30	0.30	0.24	0.42	0.42	0.07	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	135	1514	659	135	1514	471	812	2120	660	235	1267	394
v/s Ratio Prot		0.18	0.14		c0.24		c0.18	0.16		0.03	0.03	
v/s Ratio Perm	0.10			0.08		0.21			0.03			0.16
v/c Ratio	0.35	0.62	0.14	0.25	0.81	0.31	0.78	0.39	0.04	0.48	0.11	0.62
Uniform Delay, d1	15.2	16.8	16.7	14.8	18.0	15.1	19.8	11.2	9.6	24.8	16.1	18.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.8	0.1	1.0	3.5	0.4	4.9	0.1	0.0	1.5	0.0	2.9
Delay (s)	16.8	17.5	16.8	15.7	21.5	15.4	24.7	11.3	9.6	26.4	16.1	21.3
Level of Service	B	B	B	B	C	B	C	B	A	C	B	C
Approach Delay (s)		17.3			20.1			16.9			20.9	
Approach LOS		B			C			B			C	

Intersection Summary				
HCM Average Control Delay	18.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	62.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5041		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5041		3433	5085	1583
Volume (vph)	311	955	498	113	1297	927	611	3028	188	826	2087	314
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	338	1038	541	123	1410	1008	664	3291	204	898	2268	341
RTOR Reduction (vph)	0	0	288	0	0	354	0	5	0	0	0	116
Lane Group Flow (vph)	338	1038	253	123	1410	654	664	3490	0	898	2268	225
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	16.0	33.0	33.0	10.0	27.0	27.0	16.0	60.0		21.0	65.0	65.0
Effective Green, g (s)	16.0	33.0	33.0	10.0	27.0	27.0	16.0	60.0		21.0	65.0	65.0
Actuated g/C Ratio	0.11	0.24	0.24	0.07	0.19	0.19	0.11	0.43		0.15	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	202	1199	657	126	981	537	392	2160		515	2361	735
v/s Ratio Prot	c0.19	0.20		0.07	0.28		0.19	c0.69		c0.26	0.45	
v/s Ratio Perm			0.19			0.36						0.22
v/c Ratio	1.67	0.87	0.38	0.98	1.44	1.22	1.69	1.62		1.74	0.96	0.31
Uniform Delay, d1	62.0	51.4	45.0	64.9	56.5	56.5	62.0	40.0		59.5	36.3	23.4
Progression Factor	1.00	1.00	1.00	0.92	0.97	0.93	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	323.7	6.8	0.4	71.9	202.6	113.8	323.1	279.2		342.7	11.3	1.1
Delay (s)	385.7	58.1	45.3	131.8	257.4	166.6	385.1	319.2		402.2	47.6	24.5
Level of Service	F	E	D	F	F	F	F	F		F	D	C
Approach Delay (s)		112.3			215.3			329.7			136.1	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	215.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.70			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	141.9%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
23: Eucalyptus St & Maple Ave PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4912		3433	4991		3433	3539	1583	1770	3479	
Flt Permitted	0.27	1.00		0.95	1.00		0.95	1.00	1.00	0.40	1.00	
Satd. Flow (perm)	512	4912		3433	4991		3433	3539	1583	747	3479	
Volume (vph)	72	1045	308	172	805	114	214	487	182	165	373	48
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1136	335	187	875	124	233	529	198	179	405	52
RTOR Reduction (vph)	0	86	0	0	29	0	0	0	144	0	17	0
Lane Group Flow (vph)	78	1385	0	187	970	0	233	529	54	179	440	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	18.1	18.1		4.0	26.1		5.0	15.6	15.6	16.8	13.7	
Effective Green, g (s)	18.1	18.1		4.0	26.1		5.0	15.6	15.6	16.8	13.7	
Actuated g/C Ratio	0.32	0.32		0.07	0.46		0.09	0.27	0.27	0.30	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	163	1565		242	2293		302	972	435	277	839	
v/s Ratio Prot		c0.30		c0.05	0.20		c0.07	0.15		0.04	0.13	
v/s Ratio Perm	0.15								0.13	c0.16		
v/c Ratio	0.48	0.89		0.77	0.42		0.77	0.54	0.13	0.65	0.52	
Uniform Delay, d1	15.6	18.4		26.0	10.3		25.3	17.6	15.5	16.4	18.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	6.4		14.2	0.1		11.5	0.6	0.1	5.1	0.6	
Delay (s)	17.8	24.7		40.1	10.4		36.9	18.2	15.6	21.5	19.3	
Level of Service	B	C		D	B		D	B	B	C	B	
Approach Delay (s)		24.4			15.1			22.2			19.9	
Approach LOS		C			B			C			B	

Intersection Summary				
HCM Average Control Delay	20.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	67.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
24: Main St. & Mesa Linda PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5082		1770	5085	1770	1583
Flt Permitted	1.00		0.21	1.00	0.95	1.00
Satd. Flow (perm)	5082		386	5085	1770	1583
Volume (vph)	1027	5	164	994	42	415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1116	5	178	1080	46	451
RTOR Reduction (vph)	0	0	0	0	0	53
Lane Group Flow (vph)	1121	0	178	1080	46	398
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	38.1		38.1	38.1	23.9	23.9
Effective Green, g (s)	38.1		38.1	38.1	23.9	23.9
Actuated g/C Ratio	0.54		0.54	0.54	0.34	0.34
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2766		210	2768	604	540
v/s Ratio Prot	0.22			0.21	0.03	
v/s Ratio Perm			c0.46			0.28
v/c Ratio	0.41		0.85	0.39	0.08	0.74
Uniform Delay, d1	9.3		13.5	9.2	15.6	20.3
Progression Factor	1.26		0.29	0.11	1.00	1.00
Incremental Delay, d2	0.0		17.3	0.1	0.2	8.7
Delay (s)	11.7		21.3	1.0	15.8	29.0
Level of Service	B		C	A	B	C
Approach Delay (s)	11.7			3.9	27.7	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
25: Main St. & Cataba Rd PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	484	1927	1804	144	142	186
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	526	2095	1961	157	154	202
RTOR Reduction (vph)	0	0	0	83	0	166
Lane Group Flow (vph)	526	2095	1961	74	154	36
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	12.4	49.6	33.2	33.2	12.4	12.4
Effective Green, g (s)	12.4	49.6	33.2	33.2	12.4	12.4
Actuated g/C Ratio	0.18	0.71	0.47	0.47	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	608	3603	2412	751	314	280
v/s Ratio Prot	c0.15	0.41	c0.39		0.09	
v/s Ratio Perm				0.10		0.13
v/c Ratio	0.87	0.58	0.81	0.10	0.49	0.13
Uniform Delay, d1	28.0	5.1	15.7	10.2	26.0	24.2
Progression Factor	0.71	0.45	0.99	2.41	1.00	1.00
Incremental Delay, d2	11.9	0.2	1.6	0.0	5.4	0.9
Delay (s)	31.9	2.5	17.2	24.5	31.3	25.2
Level of Service	C	A	B	C	C	C
Approach Delay (s)		8.4	17.7		27.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
26: Main St. & I-15 SB Ramp

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		1.00			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5076			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5076			5085	1583			1770	1583	1504
Volume (vph)	0	2095	26	0	1406	988	0	0	456	0	953
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2277	28	0	1528	1074	0	0	496	0	1036
RTOR Reduction (vph)	0	1	0	0	0	526	0	0	0	9	9
Lane Group Flow (vph)	0	2304	0	0	1528	548	0	0	496	509	509
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		35.7			35.7	35.7			26.3	26.3	26.3
Effective Green, g (s)		35.7			35.7	35.7			26.3	26.3	26.3
Actuated g/C Ratio		0.51			0.51	0.51			0.38	0.38	0.38
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		2589			2593	807			665	595	565
v/s Ratio Prot		0.45			0.30				0.28	0.33	
v/s Ratio Perm						0.68					0.34
v/c Ratio		0.89			0.59	0.68			0.75	0.85	0.90
Uniform Delay, d1		15.4			12.0	12.9			19.0	20.1	20.6
Progression Factor		0.55			1.31	33.13			1.00	1.00	1.00
Incremental Delay, d2		3.6			0.0	0.2			4.6	14.6	19.9
Delay (s)		12.0			15.8	426.1			23.5	34.7	40.5
Level of Service		B			B	F			C	C	D
Approach Delay (s)		12.0			185.1		0.0			33.0	
Approach LOS		B			F		A			C	

Intersection Summary			
HCM Average Control Delay	87.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	333	1064	517	612	1834	389	279	1014	730	313	869	211
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	362	1157	562	665	1993	423	303	1102	793	340	945	229
RTOR Reduction (vph)	0	0	163	0	0	148	0	0	238	0	0	161
Lane Group Flow (vph)	362	1157	399	665	1993	275	303	1102	555	340	945	68
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.0	37.0	37.0	26.0	49.0	49.0	15.8	38.0	38.0	13.0	35.2	35.2
Effective Green, g (s)	14.0	37.0	37.0	26.0	49.0	49.0	15.8	38.0	38.0	13.0	35.2	35.2
Actuated g/C Ratio	0.11	0.28	0.28	0.20	0.38	0.38	0.12	0.29	0.29	0.10	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	370	1447	451	687	1917	597	417	1486	463	343	1377	429
v/s Ratio Prot	0.11	0.23		c0.19	0.39		0.09	0.22		c0.10	0.19	
v/s Ratio Perm			0.35			0.27			0.50			0.14
v/c Ratio	0.98	0.80	0.88	0.97	1.04	0.46	0.73	0.74	1.20	0.99	0.69	0.16
Uniform Delay, d1	57.8	43.1	44.5	51.6	40.5	30.5	55.0	41.6	46.0	58.4	42.5	36.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.6	3.2	18.3	26.3	31.7	0.6	6.2	2.0	108.3	46.1	1.4	0.2
Delay (s)	98.4	46.3	62.7	77.9	72.2	31.1	61.2	43.6	154.3	104.5	43.9	36.3
Level of Service	F	D	E	E	E	C	E	D	F	F	D	D
Approach Delay (s)		59.8			67.8			86.0			56.4	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM Average Control Delay	68.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	28	1817	578	190	1843	213	476	737	168	348	938	34
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	1975	628	207	2003	232	517	801	183	378	1020	37
RTOR Reduction (vph)	0	0	212	0	0	88	0	0	123	0	0	20
Lane Group Flow (vph)	30	1975	416	207	2003	144	517	801	60	378	1020	17
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.6	50.8	50.8	15.0	62.2	62.2	20.0	40.6	40.6	17.6	38.2	38.2
Effective Green, g (s)	3.6	50.8	50.8	15.0	62.2	62.2	20.0	40.6	40.6	17.6	38.2	38.2
Actuated g/C Ratio	0.03	0.36	0.36	0.11	0.44	0.44	0.14	0.29	0.29	0.13	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	46	1845	574	190	2259	703	490	1026	459	432	966	432
v/s Ratio Prot	0.02	0.39		c0.12	0.39		c0.15	0.23		0.11	c0.29	
v/s Ratio Perm			0.40			0.15			0.12			0.02
v/c Ratio	0.65	1.07	0.72	1.09	0.89	0.21	1.06	0.78	0.13	0.88	1.06	0.04
Uniform Delay, d1	67.6	44.6	38.6	62.5	35.7	23.8	60.0	45.6	36.7	60.1	50.9	37.4
Progression Factor	1.00	1.00	1.00	0.65	0.83	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	28.5	42.7	4.5	66.4	1.8	0.1	56.0	5.9	0.6	17.6	44.9	0.2
Delay (s)	96.1	87.3	43.1	107.1	31.4	24.1	116.0	51.5	37.3	77.7	95.8	37.6
Level of Service	F	F	D	F	C	C	F	D	D	E	F	D
Approach Delay (s)		76.9			37.1			72.0			89.5	
Approach LOS		E			D			E			F	

Intersection Summary			
HCM Average Control Delay	66.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
29: Bear Valley Rd & I Avenue

PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	2771	259	354	2078	522	277
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3012	282	385	2259	567	301
RTOR Reduction (vph)	0	91	0	0	0	183
Lane Group Flow (vph)	3012	191	385	2259	567	118
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	63.0	63.0	15.3	82.3	19.0	19.0
Effective Green, g (s)	63.0	63.0	15.3	82.3	19.0	19.0
Actuated g/C Ratio	0.58	0.58	0.14	0.75	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2931	912	481	3829	597	275
v/s Ratio Prot	c0.59		c0.11	0.44	0.17	
v/s Ratio Perm		0.18				0.19
v/c Ratio	1.03	0.21	0.80	0.59	0.95	0.43
Uniform Delay, d1	23.1	11.2	45.5	6.0	44.7	40.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.2	0.1	9.3	0.2	24.6	1.1
Delay (s)	47.3	11.3	54.8	6.2	69.3	41.4
Level of Service	D	B	D	A	E	D
Approach Delay (s)	44.2			13.3	59.6	
Approach LOS	D			B	E	

Intersection Summary			
HCM Average Control Delay	34.2	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	109.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
30: Main St. & 3rd Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	260	2576	201	310	2967	201	268	513	352	417	564	231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	2800	218	337	3225	218	291	558	383	453	613	251
RTOR Reduction (vph)	0	0	42	0	0	36	0	0	171	0	0	89
Lane Group Flow (vph)	283	2800	176	337	3225	182	291	558	212	453	613	162
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	76.0	76.0	10.0	77.0	77.0	15.0	21.0	21.0	17.0	23.0	23.0
Effective Green, g (s)	9.0	76.0	76.0	10.0	77.0	77.0	15.0	21.0	21.0	17.0	23.0	23.0
Actuated g/C Ratio	0.06	0.54	0.54	0.07	0.55	0.55	0.11	0.15	0.15	0.12	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	1921	859	245	1946	871	190	531	418	417	581	260
v/s Ratio Prot	0.08	c0.79		0.10	c0.91		c0.16	0.16		0.13	c0.17	
v/s Ratio Perm			0.14			0.14			0.14			0.16
v/c Ratio	1.28	1.46	0.20	1.38	1.66	0.21	1.53	1.05	0.51	1.09	1.06	0.62
Uniform Delay, d1	65.5	32.0	16.5	65.0	31.5	16.0	62.5	59.5	54.7	61.5	58.5	54.5
Progression Factor	1.03	1.06	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	152.5	208.4	0.1	192.6	298.1	0.1	263.9	53.1	4.4	69.3	52.7	4.6
Delay (s)	220.1	242.4	24.7	257.6	329.6	16.1	326.4	112.6	59.1	130.8	111.2	59.1
Level of Service	F	F	C	F	F	B	F	F	E	F	F	E
Approach Delay (s)		226.1			305.1			146.5			108.0	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	230.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	133.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
31: Main St. & C Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91	0.85	1.00	0.93	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1608	1504	1770	1654	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1608	1504	1770	1654	1504
Volume (vph)	119	2094	653	268	1947	114	645	49	214	227	114	320
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	2276	710	291	2116	124	701	53	233	247	124	348
RTOR Reduction (vph)	0	0	168	0	0	32	0	43	122	0	20	90
Lane Group Flow (vph)	129	2276	543	291	2116	92	701	92	29	247	200	162
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	73.0	73.0	10.0	74.0	74.0	23.0	13.0	13.0	28.0	18.0	18.0
Effective Green, g (s)	9.0	73.0	73.0	10.0	74.0	74.0	23.0	13.0	13.0	28.0	18.0	18.0
Actuated g/C Ratio	0.06	0.52	0.52	0.07	0.53	0.53	0.16	0.09	0.09	0.20	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	114	1845	1453	245	1871	837	564	149	140	354	213	193
v/s Ratio Prot	0.07	c0.64		0.08	c0.60		c0.20	0.08		0.14	0.13	
v/s Ratio Perm			0.25			0.08			0.10			0.17
v/c Ratio	1.13	1.23	0.37	1.19	1.13	0.11	1.24	0.62	0.21	0.70	0.94	0.84
Uniform Delay, d1	65.5	33.5	19.9	65.0	33.0	16.5	58.5	61.1	58.8	52.1	60.5	59.6
Progression Factor	1.00	1.00	1.00	0.66	0.33	0.16	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	124.0	110.0	0.2	101.4	62.4	0.0	123.7	17.8	3.4	5.9	44.2	26.7
Delay (s)	189.5	143.5	20.1	144.2	73.1	2.6	182.2	79.0	62.1	58.0	104.6	86.3
Level of Service	F	F	C	F	E	A	F	E	E	E	F	F
Approach Delay (s)		117.3			77.9			149.7			82.2	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	104.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
32: Main St. & E Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	1770	3537		1770	3443		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.15	1.00		0.58	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	1770	3537		272	3443		1080	3539	1583
Volume (vph)	306	1551	224	24	1511	7	212	211	47	57	564	322
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	333	1686	243	26	1642	8	230	229	51	62	613	350
RTOR Reduction (vph)	0	0	72	0	0	0	0	14	0	0	0	221
Lane Group Flow (vph)	333	1686	171	26	1650	0	230	266	0	62	613	129
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	26.6	84.0	84.0	3.6	61.0		40.4	32.4		27.4	23.4	23.4
Effective Green, g (s)	26.6	84.0	84.0	3.6	61.0		40.4	32.4		27.4	23.4	23.4
Actuated g/C Ratio	0.19	0.60	0.60	0.03	0.44		0.29	0.23		0.20	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	336	2123	1672	46	1541		218	797		231	592	265
v/s Ratio Prot	c0.19	0.48		0.01	c0.47		c0.10	0.08		0.01	0.17	
v/s Ratio Perm			0.09				0.21			0.04		0.22
v/c Ratio	0.99	0.79	0.10	0.57	1.07		1.06	0.33		0.27	1.04	0.49
Uniform Delay, d1	56.6	21.4	11.9	67.4	39.5		44.2	44.8		46.9	58.3	52.9
Progression Factor	0.67	0.25	0.04	1.14	0.61		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.7	0.2	0.0	10.2	41.0		76.2	1.1		0.6	46.5	6.3
Delay (s)	50.9	5.4	0.5	87.0	65.0		120.4	45.9		47.6	104.8	59.2
Level of Service	D	A	A	F	E		F	D		D	F	E
Approach Delay (s)		11.6			65.3			79.5			85.7	
Approach LOS		B			E			E			F	

Intersection Summary				
HCM Average Control Delay	48.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.10			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	99.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
33: Main St. & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	469	3539	1583
Volume (vph)	6	1481	429	156	1001	61	410	486	222	268	1102	9
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	1610	466	170	1088	66	446	528	241	291	1198	10
RTOR Reduction (vph)	0	0	155	0	0	30	0	0	110	0	0	5
Lane Group Flow (vph)	7	1610	311	170	1088	36	446	528	131	291	1198	5
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	0.8	57.0	57.0	9.2	65.4	65.4	16.0	37.7	37.7	61.8	41.8	41.8
Effective Green, g (s)	0.8	57.0	57.0	9.2	65.4	65.4	16.0	37.7	37.7	61.8	41.8	41.8
Actuated g/C Ratio	0.01	0.41	0.41	0.07	0.47	0.47	0.11	0.27	0.27	0.44	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	20	1441	645	226	1653	739	392	953	426	394	1057	473
v/s Ratio Prot	0.00	c0.45		0.05	c0.31		c0.13	0.15		c0.11	c0.34	
v/s Ratio Perm			0.29			0.04			0.15	0.22		0.01
v/c Ratio	0.35	1.12	0.48	0.75	0.66	0.05	1.14	0.55	0.31	0.74	1.13	0.01
Uniform Delay, d1	69.3	41.5	30.6	64.3	28.7	20.3	62.0	43.9	40.8	28.0	49.1	34.6
Progression Factor	1.07	0.54	0.31	0.80	0.68	0.61	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.8	60.5	0.4	12.5	0.9	0.0	88.5	2.3	1.9	7.1	72.1	0.0
Delay (s)	81.7	82.9	10.0	64.0	20.5	12.4	150.5	46.2	42.6	35.1	121.2	34.6
Level of Service	F	F	B	E	C	B	F	D	D	D	F	C
Approach Delay (s)		66.6			25.7			83.8			103.9	
Approach LOS		E			C			F			F	

Intersection Summary				
HCM Average Control Delay	70.3	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	100.9%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3539	1583	1770	5071		1770	5052	
Flt Permitted	0.52	1.00		0.65	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	962	3526		1208	3539	1583	1770	5071		1770	5052	
Volume (vph)	32	146	4	10	322	175	16	1212	24	113	446	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	159	4	11	350	190	17	1317	26	123	485	22
RTOR Reduction (vph)	0	3	0	0	0	151	0	3	0	0	7	0
Lane Group Flow (vph)	35	160	0	11	350	39	17	1340	0	123	500	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	10.3	10.3		10.3	10.3	10.3	0.7	21.5		5.8	26.6	
Effective Green, g (s)	10.3	10.3		10.3	10.3	10.3	0.7	21.5		5.8	26.6	
Actuated g/C Ratio	0.21	0.21		0.21	0.21	0.21	0.01	0.43		0.12	0.54	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	200	732		251	735	329	25	2198		207	2709	
v/s Ratio Prot		0.05			0.10		0.01	c0.26		c0.07	0.10	
v/s Ratio Perm	0.04			0.01		0.12						
v/c Ratio	0.17	0.22		0.04	0.48	0.12	0.68	0.61		0.59	0.18	
Uniform Delay, d1	16.2	16.3		15.7	17.3	16.0	24.3	10.8		20.8	5.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.2		0.1	0.5	0.2	56.0	0.5		4.5	0.0	
Delay (s)	16.6	16.5		15.8	17.8	16.1	80.3	11.3		25.3	6.0	
Level of Service	B	B		B	B	B	F	B		C	A	
Approach Delay (s)		16.5			17.2			12.2			9.7	
Approach LOS		B			B			B			A	

Intersection Summary					
HCM Average Control Delay	12.9	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.60				
Actuated Cycle Length (s)	49.6	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	55.8%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
35: Smoketree & Hwy 395 PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.04	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	70	5085	5085	1583
Volume (vph)	309	72	145	3773	2439	454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	336	78	158	4101	2651	493
RTOR Reduction (vph)	0	13	0	0	0	79
Lane Group Flow (vph)	336	65	158	4101	2651	414
Turn Type		custom	Perm			Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	16.0	16.0	126.0	126.0	126.0	126.0
Effective Green, g (s)	16.0	16.0	126.0	126.0	126.0	126.0
Actuated g/C Ratio	0.11	0.11	0.84	0.84	0.84	0.84
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	366	169	59	4271	4271	1330
v/s Ratio Prot				0.81	0.52	
v/s Ratio Perm	0.10	0.05	c2.26			0.31
v/c Ratio	0.92	0.38	2.68	0.96	0.62	0.31
Uniform Delay, d1	66.4	62.4	12.0	9.9	4.0	2.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.2	1.4	801.0	6.9	0.3	0.1
Delay (s)	93.5	63.8	813.0	16.8	4.3	2.7
Level of Service	F	E	F	B	A	A
Approach Delay (s)	87.9			46.3	4.1	
Approach LOS	F			D	A	

Intersection Summary					
HCM Average Control Delay	31.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	2.49				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	88.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
36: Mojave St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5075		3433	4967		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.19	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5075		3433	4967		355	5085	2787
Volume (vph)	787	1683	902	160	1201	16	1038	822	151	10	732	495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	855	1829	980	174	1305	17	1128	893	164	11	796	538
RTOR Reduction (vph)	0	0	414	0	1	0	0	19	0	0	0	448
Lane Group Flow (vph)	855	1829	566	174	1321	0	1128	1038	0	11	796	90
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	31.0	49.0	49.0	14.0	32.0		40.0	65.0		21.0	21.0	21.0
Effective Green, g (s)	31.0	49.0	49.0	14.0	32.0		40.0	65.0		21.0	21.0	21.0
Actuated g/C Ratio	0.22	0.35	0.35	0.10	0.23		0.29	0.46		0.15	0.15	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	760	1780	975	177	1160		981	2306		53	763	418
v/s Ratio Prot	c0.25	0.36		0.10	c0.26		c0.33	0.21			0.16	
v/s Ratio Perm			0.35							0.03		0.19
v/c Ratio	1.12	1.03	0.58	0.98	1.14		1.15	0.45		0.21	1.04	0.22
Uniform Delay, d1	54.5	45.5	37.1	62.9	54.0		50.0	25.4		52.2	59.5	52.3
Progression Factor	1.01	0.77	0.57	1.00	1.00		1.00	1.00		1.20	1.14	3.13
Incremental Delay, d2	61.0	18.5	0.2	62.3	73.4		79.4	0.6		6.1	39.2	0.8
Delay (s)	116.1	53.4	21.2	125.2	127.4		129.4	26.0		68.9	106.8	164.4
Level of Service	F	D	C	F	F		F	C		E	F	F
Approach Delay (s)		59.4			127.1			79.4			129.5	
Approach LOS		E			F			E			F	

Intersection Summary				
HCM Average Control Delay	87.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.16			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.1%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
37: Live Oak & Escondido Ave — PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1504	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1504	5085	1583	3433	5085
Volume (vph)	282	331	1353	482	502	1079
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	307	360	1471	524	546	1173
RTOR Reduction (vph)	0	274	0	341	0	0
Lane Group Flow (vph)	307	86	1471	183	546	1173
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	13.7	13.7	20.0	20.0	11.6	35.6
Effective Green, g (s)	13.7	13.7	20.0	20.0	11.6	35.6
Actuated g/C Ratio	0.24	0.24	0.35	0.35	0.20	0.62
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	423	360	1775	553	695	3159
v/s Ratio Prot			0.29		c0.16	0.23
v/s Ratio Perm	0.17	0.24		0.33		
v/c Ratio	0.73	0.24	0.83	0.33	0.79	0.37
Uniform Delay, d1	20.1	17.6	17.1	13.7	21.7	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.3	3.3	0.4	5.8	0.1
Delay (s)	26.2	17.9	20.4	14.1	27.5	5.4
Level of Service	C	B	C	B	C	A
Approach Delay (s)	21.7		18.8			12.4
Approach LOS	C		B			B

Intersection Summary				
HCM Average Control Delay	16.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	72.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
38: Mojave & I-15 SB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	2155	387	669	2084	0	0	0	492	0	849
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2342	421	727	2265	0	0	0	535	0	923
RTOR Reduction (vph)	0	0	139	0	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	2342	282	727	2265	0	0	0	535	0	922
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		48.0	48.0	21.0	73.0				59.0		59.0
Effective Green, g (s)		48.0	48.0	21.0	73.0				59.0		59.0
Actuated g/C Ratio		0.34	0.34	0.15	0.52				0.42		0.42
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1743	543	515	2651				1447		667
v/s Ratio Prot		c0.46		c0.21	0.45						
v/s Ratio Perm			0.27						0.16		0.58
v/c Ratio		1.34	0.52	1.41	0.85				0.37		1.38
Uniform Delay, d1		46.0	36.8	59.5	28.9				27.8		40.5
Progression Factor		1.00	1.00	0.73	0.78				1.00		1.00
Incremental Delay, d2		158.6	0.8	186.3	0.3				0.7		181.2
Delay (s)		204.6	37.6	229.6	22.9				28.5		221.7
Level of Service		F	D	F	C				C		F
Approach Delay (s)		179.1			73.2		0.0			150.8	
Approach LOS		F			E		A			F	

Intersection Summary			
HCM Average Control Delay	129.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	601	2045	0	0	2075	658	0	0	678	0	1327
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	653	2223	0	0	2255	715	0	0	737	0	1442
RTOR Reduction (vph)	0	0	0	0	0	245	0	0	0	0	3
Lane Group Flow (vph)	653	2223	0	0	2255	470	0	0	737	0	1439
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	21.0	74.0			49.0	49.0			58.0		58.0
Effective Green, g (s)	21.0	74.0			49.0	49.0			58.0		58.0
Actuated g/C Ratio	0.15	0.53			0.35	0.35			0.41		0.41
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	515	2688			1780	554			733		1155
v/s Ratio Prot	c0.19	0.44			0.44						
v/s Ratio Perm						0.45			0.42		0.52
v/c Ratio	1.27	0.83			1.27	0.85			1.01		1.25
Uniform Delay, d1	59.5	27.6			45.5	42.1			41.0		41.0
Progression Factor	1.09	0.28			0.79	0.72			1.00		1.00
Incremental Delay, d2	122.1	0.2			120.5	1.2			34.6		118.1
Delay (s)	186.9	7.9			156.3	31.5			75.6		159.1
Level of Service	F	A			F	C			E		F
Approach Delay (s)		48.6			126.3		0.0			130.8	
Approach LOS		D			F		A			F	

Intersection Summary			
HCM Average Control Delay	99.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3525		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.25	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	466	5085	1583	1770	3525		3433	3539	1583
Volume (vph)	189	1236	188	16	938	229	229	741	20	194	865	211
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	1343	204	17	1020	249	249	805	22	211	940	229
RTOR Reduction (vph)	0	0	130	0	0	192	0	3	0	0	0	157
Lane Group Flow (vph)	205	1343	74	17	1020	57	249	824	0	211	940	72
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	5.0	25.0	25.0	16.0	16.0	16.0	11.0	24.5		7.8	21.3	21.3
Effective Green, g (s)	5.0	25.0	25.0	16.0	16.0	16.0	11.0	24.5		7.8	21.3	21.3
Actuated g/C Ratio	0.07	0.36	0.36	0.23	0.23	0.23	0.16	0.35		0.11	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	248	1834	571	108	1174	365	281	1246		386	1088	487
v/s Ratio Prot	0.06	c0.26			c0.20		c0.14	c0.23		0.06	c0.27	
v/s Ratio Perm			0.13	0.04		0.16						0.14
v/c Ratio	0.83	0.73	0.13	0.16	0.87	0.16	0.89	0.66		0.55	0.86	0.15
Uniform Delay, d1	31.7	19.2	14.8	21.3	25.6	21.3	28.5	18.9		29.1	22.6	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	19.7	1.5	0.1	0.7	7.0	0.2	26.5	1.3		1.6	7.3	0.1
Delay (s)	51.4	20.8	15.0	22.0	32.7	21.5	55.1	20.2		30.7	29.9	17.6
Level of Service	D	C	B	C	C	C	E	C		C	C	B
Approach Delay (s)		23.7			30.4			28.3			28.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	27.2	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.93				
Actuated Cycle Length (s)	69.3	Sum of lost time (s)		20.0	
Intersection Capacity Utilization	77.1%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3486	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3486	
Volume (vph)	211	2055	257	322	1806	95	243	739	476	178	1126	125
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	2234	279	350	1963	103	264	803	517	193	1224	136
RTOR Reduction (vph)	0	0	4	0	0	21	0	0	101	0	6	0
Lane Group Flow (vph)	229	2234	275	350	1963	83	264	803	416	193	1354	0
Turn Type	Prot		pt+ov	Prot		pt+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	8 1	5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	10.0	54.0	67.0	12.0	56.0	70.0	9.0	48.0	48.0	10.0	49.0	
Effective Green, g (s)	10.0	54.0	67.0	12.0	56.0	70.0	9.0	48.0	48.0	10.0	49.0	
Actuated g/C Ratio	0.07	0.39	0.48	0.09	0.40	0.50	0.06	0.34	0.34	0.07	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	245	1961	758	294	2034	792	221	1213	543	245	1220	
v/s Ratio Prot	0.07	c0.44	0.18	c0.10	0.39	0.07	c0.08	0.23		0.06	c0.39	
v/s Ratio Perm									0.33			
v/c Ratio	0.93	1.14	0.36	1.19	0.97	0.10	1.19	0.66	0.77	0.79	1.11	
Uniform Delay, d1	64.7	43.0	23.0	64.0	41.0	18.5	65.5	39.1	41.0	64.0	45.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	39.7	69.4	0.3	114.4	12.7	0.1	123.1	1.4	6.4	15.3	61.5	
Delay (s)	104.4	112.4	23.3	178.4	53.7	18.5	188.6	40.5	47.4	79.3	107.0	
Level of Service	F	F	C	F	D	B	F	D	D	E	F	
Approach Delay (s)		102.7			70.3			67.4			103.5	
Approach LOS		F			E			E			F	

Intersection Summary					
HCM Average Control Delay	86.7	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.10				
Actuated Cycle Length (s)	140.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	104.3%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
42: Lemon St & E Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86			0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99			1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3044	3086			3533	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.64			0.93	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3044	2003			3288	1583
Volume (vph)	194	1332	431	135	1066	7	374	252	70	13	358	134
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	1448	468	147	1159	8	407	274	76	14	389	146
RTOR Reduction (vph)	0	0	239	0	0	6	0	20	0	0	0	113
Lane Group Flow (vph)	211	1448	229	147	1159	2	271	466	0	0	403	33
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	9.8	22.1	22.1	7.0	19.3	19.3	7.0	26.0			15.0	15.0
Effective Green, g (s)	9.8	22.1	22.1	7.0	19.3	19.3	7.0	26.0			15.0	15.0
Actuated g/C Ratio	0.15	0.33	0.33	0.10	0.29	0.29	0.10	0.39			0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	259	1675	521	185	1463	455	318	889			735	354
v/s Ratio Prot	c0.12	0.28		0.08	0.23		c0.09	0.06				
v/s Ratio Perm			0.30			0.01		c0.15			0.12	0.09
v/c Ratio	0.81	0.86	0.44	0.79	0.79	0.01	0.85	0.52			0.55	0.09
Uniform Delay, d1	27.8	21.1	17.6	29.3	22.1	17.1	29.5	15.8			23.1	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	17.6	4.9	0.6	20.5	3.0	0.0	19.2	0.6			0.8	0.1
Delay (s)	45.3	26.0	18.2	49.9	25.1	17.1	48.8	16.4			23.9	20.8
Level of Service	D	C	B	D	C	B	D	B			C	C
Approach Delay (s)		26.2			27.8			28.0			23.1	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	26.6	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.77				
Actuated Cycle Length (s)	67.1	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	66.9%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
43: Lemon St & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5006		1770	5059		1770	3539	1583	1770	3512	
Flt Permitted	0.26	1.00		0.26	1.00		0.28	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	487	5006		487	5059		521	3539	1583	790	3512	
Volume (vph)	76	1205	140	126	920	32	96	516	139	40	845	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	1310	152	137	1000	35	104	561	151	43	918	49
RTOR Reduction (vph)	0	30	0	0	9	0	0	0	7	0	10	0
Lane Group Flow (vph)	83	1432	0	137	1026	0	104	561	144	43	957	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	15.3	15.3		15.3	15.3		14.3	14.3	14.3	14.3	14.3	
Effective Green, g (s)	15.3	15.3		15.3	15.3		14.3	14.3	14.3	14.3	14.3	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.38	0.38	0.38	0.38	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	198	2037		198	2059		198	1346	602	300	1336	
v/s Ratio Prot		c0.29			0.20			0.16			c0.28	
v/s Ratio Perm	0.17			0.28			0.20		0.10	0.05		
v/c Ratio	0.42	0.70		0.69	0.50		0.53	0.42	0.24	0.14	0.72	
Uniform Delay, d1	8.0	9.3		9.2	8.3		9.0	8.6	7.9	7.6	9.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.1		10.0	0.2		2.5	0.2	0.2	0.2	1.9	
Delay (s)	9.4	10.4		19.2	8.5		11.5	8.8	8.1	7.9	11.8	
Level of Service	A	B		B	A		B	A	A	A	B	
Approach Delay (s)		10.3			9.7			9.0			11.6	
Approach LOS		B			A			A			B	

Intersection Summary					
HCM Average Control Delay	10.2	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	37.6	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	76.8%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	794	255	528	1125	0	0	0	814	0	268
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	863	277	574	1223	0	0	0	885	0	291
RTOR Reduction (vph)	0	0	165	0	0	0	0	0	0	0	65
Lane Group Flow (vph)	0	863	112	574	1223	0	0	0	885	0	226
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		38.3	38.3	48.1	90.4				41.6		41.6
Effective Green, g (s)		38.3	38.3	48.1	90.4				41.6		41.6
Actuated g/C Ratio		0.27	0.27	0.34	0.65				0.30		0.30
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		927	394	608	2285				1020		470
v/s Ratio Prot		c0.25		c0.32	0.35						
v/s Ratio Perm			0.19						0.26		0.18
v/c Ratio		0.93	0.28	0.94	0.54				0.87		0.48
Uniform Delay, d1		49.6	40.1	44.6	13.4				46.6		40.4
Progression Factor		1.00	1.00	0.62	0.16				1.00		1.00
Incremental Delay, d2		15.5	0.4	14.3	0.1				9.9		3.5
Delay (s)		65.1	40.5	41.9	2.3				56.5		43.9
Level of Service		E	D	D	A				E		D
Approach Delay (s)		59.1			14.9		0.0			53.4	
Approach LOS		E			B		A			D	

Intersection Summary			
HCM Average Control Delay	38.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	210	1398	0	0	1285	481	0	0	367	0	856
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	1520	0	0	1397	523	0	0	399	0	930
RTOR Reduction (vph)	0	0	0	0	0	196	0	0	0	0	42
Lane Group Flow (vph)	228	1520	0	0	1397	327	0	0	399	0	888
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	20.1	85.1			61.0	61.0			46.9		46.9
Effective Green, g (s)	20.1	85.1			61.0	61.0			46.9		46.9
Actuated g/C Ratio	0.14	0.61			0.44	0.44			0.33		0.33
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	254	2151			1542	690			593		934
v/s Ratio Prot	c0.13	0.43			c0.39						
v/s Ratio Perm						0.33			0.23		0.33
v/c Ratio	0.90	0.71			0.91	0.47			0.67		0.95
Uniform Delay, d1	58.9	18.9			36.8	28.1			40.0		45.4
Progression Factor	1.15	0.03			0.35	0.12			1.00		1.00
Incremental Delay, d2	16.1	0.5			6.5	0.4			6.0		19.7
Delay (s)	83.7	1.0			19.2	3.8			46.0		65.1
Level of Service	F	A			B	A			D		E
Approach Delay (s)		11.8			15.0		0.0			59.4	
Approach LOS		B			B		A			E	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	273	1289	691	167	845	2	693	358	82	9	450	228
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	1401	751	182	918	2	753	389	89	10	489	248
RTOR Reduction (vph)	0	0	410	0	0	2	0	0	53	0	0	17
Lane Group Flow (vph)	297	1401	341	182	918	0	753	389	36	10	489	231
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	35.8	48.2	48.2	18.0	30.4	30.4	37.7	57.0	57.0	0.8	20.1	55.9
Effective Green, g (s)	35.8	48.2	48.2	18.0	30.4	30.4	37.7	57.0	57.0	0.8	20.1	55.9
Actuated g/C Ratio	0.26	0.34	0.34	0.13	0.22	0.22	0.27	0.41	0.41	0.01	0.14	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	878	1751	545	228	1104	344	924	2070	645	10	730	677
v/s Ratio Prot	0.09	0.28		c0.10	0.18		c0.22	0.08		0.01	c0.10	c0.09
v/s Ratio Perm			0.47			0.00			0.06			0.06
v/c Ratio	0.34	0.80	0.63	0.80	0.83	0.00	0.81	0.19	0.06	1.00	0.67	0.34
Uniform Delay, d1	42.4	41.5	38.4	59.2	52.4	42.9	47.9	26.6	25.2	69.6	56.8	29.2
Progression Factor	1.04	0.88	1.03	1.00	1.00	1.00	0.64	0.58	1.17	1.00	1.00	1.00
Incremental Delay, d2	0.1	1.6	1.3	17.4	5.5	0.0	3.4	0.1	0.1	284.6	4.8	0.3
Delay (s)	44.2	38.0	40.7	76.7	57.8	42.9	34.3	15.5	29.6	354.2	61.7	29.6
Level of Service	D	D	D	E	E	D	C	B	C	F	E	C
Approach Delay (s)		39.6			60.9			28.0			54.9	
Approach LOS		D			E			C			D	

Intersection Summary			
HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3508		3433	3438		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3508		3433	3438		1770	3539	1583	3433	3539	1583
Volume (vph)	152	694	43	241	717	168	55	937	128	265	983	53
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	754	47	262	779	183	60	1018	139	288	1068	58
RTOR Reduction (vph)	0	5	0	0	23	0	0	0	94	0	0	36
Lane Group Flow (vph)	165	796	0	262	939	0	60	1018	45	288	1068	22
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	9.9	26.7		9.0	25.8		3.9	28.9	28.9	9.0	34.0	34.0
Effective Green, g (s)	9.9	26.7		9.0	25.8		3.9	28.9	28.9	9.0	34.0	34.0
Actuated g/C Ratio	0.11	0.30		0.10	0.29		0.04	0.32	0.32	0.10	0.38	0.38
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	196	1045		345	990		77	1141	511	345	1343	601
v/s Ratio Prot	c0.09	0.23		0.08	c0.28		0.03	c0.29		c0.08	0.30	
v/s Ratio Perm									0.09			0.04
v/c Ratio	0.84	0.76		0.76	0.95		0.78	0.89	0.09	0.83	0.80	0.04
Uniform Delay, d1	39.1	28.6		39.2	31.3		42.4	28.9	21.2	39.6	24.7	17.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.5	3.3		9.3	17.4		38.1	9.1	0.1	15.8	3.3	0.0
Delay (s)	65.6	31.9		48.5	48.6		80.5	37.9	21.2	55.4	28.1	17.5
Level of Service	E	C		D	D		F	D	C	E	C	B
Approach Delay (s)		37.6			48.6			38.1			33.2	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	39.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
48: E Ave & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1836		1770	1857		1770	3410		1770	3463	
Flt Permitted	0.63	1.00		0.51	1.00		0.26	1.00		0.40	1.00	
Satd. Flow (perm)	1174	1836		943	1857		487	3410		741	3463	
Volume (vph)	114	255	27	133	183	4	8	463	149	2	739	124
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	277	29	145	199	4	9	503	162	2	803	135
RTOR Reduction (vph)	0	12	0	0	2	0	0	65	0	0	28	0
Lane Group Flow (vph)	124	294	0	145	201	0	9	600	0	2	910	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.8	8.8		8.8	8.8		16.6	16.6		16.6	16.6	
Effective Green, g (s)	8.8	8.8		8.8	8.8		16.6	16.6		16.6	16.6	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.50	0.50		0.50	0.50	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	309	484		248	489		242	1695		368	1721	
v/s Ratio Prot		c0.17			0.11			0.20			c0.27	
v/s Ratio Perm	0.11			0.15			0.02			0.00		
v/c Ratio	0.40	0.61		0.58	0.41		0.04	0.35		0.01	0.53	
Uniform Delay, d1	10.1	10.8		10.7	10.2		4.3	5.1		4.2	5.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	2.2		3.5	0.6		0.1	0.1		0.0	0.3	
Delay (s)	11.0	13.0		14.2	10.7		4.4	5.3		4.2	6.0	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		12.4			12.2			5.2			6.0	
Approach LOS		B			B			A			A	

Intersection Summary					
HCM Average Control Delay	7.8	HCM Level of Service		A	
HCM Volume to Capacity ratio	0.58				
Actuated Cycle Length (s)	33.4	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	56.8%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
49: Eucalyptus St & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.99		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3416		1770	3504		1770	3477		1770	3336	
Flt Permitted	0.95	1.00		0.29	1.00		0.95	1.00		0.42	1.00	
Satd. Flow (perm)	1770	3416		544	3504		1770	3477		788	3336	
Volume (vph)	278	694	209	11	576	41	67	491	65	10	587	364
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	302	754	227	12	626	45	73	534	71	11	638	396
RTOR Reduction (vph)	0	40	0	0	8	0	0	15	0	0	139	0
Lane Group Flow (vph)	302	941	0	12	663	0	73	590	0	11	895	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	12.8	31.9		15.1	15.1		3.0	26.8		19.8	19.8	
Effective Green, g (s)	12.8	31.9		15.1	15.1		3.0	26.8		19.8	19.8	
Actuated g/C Ratio	0.19	0.48		0.23	0.23		0.04	0.40		0.30	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	340	1634		123	793		80	1397		234	990	
v/s Ratio Prot	c0.17	0.29			c0.19		c0.04	0.17			c0.31	
v/s Ratio Perm				0.02						0.01		
v/c Ratio	0.89	0.58		0.10	0.84		0.91	0.42		0.05	0.90	
Uniform Delay, d1	26.3	12.5		20.4	24.6		31.7	14.4		16.7	22.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	23.2	0.5		0.3	7.7		71.4	0.2		0.1	11.4	
Delay (s)	49.5	13.0		20.8	32.3		103.1	14.6		16.8	34.0	
Level of Service	D	B		C	C		F	B		B	C	
Approach Delay (s)		21.6			32.1			24.1			33.8	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	27.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.94				
Actuated Cycle Length (s)	66.7	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	77.6%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5055		3433	4723		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.17	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5055		3433	4723		309	3539	1583
Volume (vph)	297	1356	1528	429	719	29	1093	715	647	46	736	144
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	323	1474	1661	466	782	32	1188	777	703	50	800	157
RTOR Reduction (vph)	0	0	664	0	3	0	0	109	0	0	0	98
Lane Group Flow (vph)	323	1474	997	466	811	0	1188	1371	0	50	800	59
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	29.7	42.0	42.0	17.0	29.3		44.0	79.0		31.0	31.0	31.0
Effective Green, g (s)	29.7	42.0	42.0	17.0	29.3		44.0	79.0		31.0	31.0	31.0
Actuated g/C Ratio	0.20	0.28	0.28	0.11	0.20		0.29	0.53		0.21	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	350	1424	780	389	987		1007	2487		64	731	327
v/s Ratio Prot	0.18	0.29		c0.14	0.16		c0.35	0.31			c0.23	
v/s Ratio Perm			0.60							0.16		0.10
v/c Ratio	0.92	1.04	1.28	1.20	0.82		1.18	0.55		0.78	1.09	0.18
Uniform Delay, d1	59.0	54.0	54.0	66.5	57.8		53.0	23.7		56.3	59.5	49.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	29.2	33.4	135.1	111.5	5.6		91.3	0.3		45.0	62.0	0.3
Delay (s)	88.2	87.4	189.1	178.0	63.4		144.3	23.9		101.3	121.5	49.3
Level of Service	F	F	F	F	E		F	C		F	F	D
Approach Delay (s)		136.3			105.1			77.5			109.3	
Approach LOS		F			F			E			F	

Intersection Summary				
HCM Average Control Delay	109.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.46			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.3%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
55: Sultana St & E Ave — PM Peak Hour

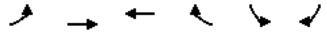
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3356		1770	3480		1770	3498		1770	3431	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3356		1770	3480		1770	3498		1770	3431	
Volume (vph)	156	604	319	32	357	45	247	427	36	146	748	191
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	657	347	35	388	49	268	464	39	159	813	208
RTOR Reduction (vph)	0	76	0	0	11	0	0	6	0	0	25	0
Lane Group Flow (vph)	170	928	0	35	426	0	268	497	0	159	996	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.0	25.9		2.2	17.1		14.5	32.5		10.2	28.2	
Effective Green, g (s)	11.0	25.9		2.2	17.1		14.5	32.5		10.2	28.2	
Actuated g/C Ratio	0.13	0.30		0.03	0.20		0.17	0.37		0.12	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	224	1001		45	686		296	1310		208	1115	
v/s Ratio Prot	c0.10	c0.30		0.02	0.13		c0.15	0.14		0.09	c0.30	
v/s Ratio Perm												
v/c Ratio	0.76	0.93		0.78	0.62		0.91	0.38		0.76	0.89	
Uniform Delay, d1	36.6	29.5		42.1	31.9		35.5	19.8		37.1	27.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.7	14.0		56.9	1.8		29.1	0.2		15.3	9.3	
Delay (s)	50.3	43.5		99.0	33.6		64.5	20.0		52.4	37.2	
Level of Service	D	D		F	C		E	B		D	D	
Approach Delay (s)		44.5			38.5			35.5			39.2	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM Average Control Delay	40.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	177	601	343	1033	1491	233
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	653	373	1123	1621	253
RTOR Reduction (vph)	0	275	0	0	0	118
Lane Group Flow (vph)	192	378	373	1123	1621	135
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	21.0	21.0	21.0	71.0	46.0	46.0
Effective Green, g (s)	21.0	21.0	21.0	71.0	46.0	46.0
Actuated g/C Ratio	0.21	0.21	0.21	0.71	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	332	372	2513	1628	728
v/s Ratio Prot			c0.21	0.32	c0.46	
v/s Ratio Perm	0.11	0.41				0.16
v/c Ratio	0.52	1.14	1.00	0.45	1.00	0.19
Uniform Delay, d1	35.0	39.5	39.5	6.2	26.9	15.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	92.5	47.3	0.6	21.3	0.6
Delay (s)	36.2	132.0	86.8	6.7	48.2	16.5
Level of Service	D	F	F	A	D	B
Approach Delay (s)	110.2			26.7	43.9	
Approach LOS	F			C	D	

Intersection Summary				
HCM Average Control Delay	51.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.23			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Volume (vph)	685	867	562	1061	760	910
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	745	942	611	1153	826	989
RTOR Reduction (vph)	0	0	0	456	0	300
Lane Group Flow (vph)	745	942	611	697	826	689
Turn Type	Prot			Perm		Perm
Protected Phases	7		8		1	
Permitted Phases		4		8		1
Actuated Green, G (s)	19.0	58.0	35.0	35.0	34.0	34.0
Effective Green, g (s)	19.0	58.0	35.0	35.0	34.0	34.0
Actuated g/C Ratio	0.19	0.58	0.35	0.35	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	652	2053	1239	554	1167	538
v/s Ratio Prot	c0.22		0.17		0.24	
v/s Ratio Perm		0.27		0.73		0.62
v/c Ratio	1.14	0.46	0.49	1.26	0.71	1.28
Uniform Delay, d1	40.5	12.0	25.5	32.5	28.7	33.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	81.6	0.2	0.3	130.0	2.0	140.3
Delay (s)	122.1	12.2	25.8	162.5	30.7	173.3
Level of Service	F	B	C	F	C	F
Approach Delay (s)		60.7	115.2		108.4	
Approach LOS		E	F		F	

Intersection Summary				
HCM Average Control Delay	95.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.78			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	91.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations		↑↑↑	↱		↑↑↑	↱			↰		↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	1623	406	0	2104	276	0	0	292	0	1251
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1764	441	0	2287	300	0	0	317	0	1360
RTOR Reduction (vph)	0	0	193	0	0	101	0	0	0	0	0
Lane Group Flow (vph)	0	1764	248	0	2287	199	0	0	317	0	1360
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		46.0	46.0		46.0	46.0			86.0		86.0
Effective Green, g (s)		46.0	46.0		46.0	46.0			86.0		86.0
Actuated g/C Ratio		0.33	0.33		0.33	0.33			0.61		0.61
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		1671	520		1671	520			1087		972
v/s Ratio Prot		0.35			c0.45						
v/s Ratio Perm			0.28			0.19			0.18		0.86
v/c Ratio		1.06	0.48		1.37	0.38			0.29		1.40
Uniform Delay, d1		47.0	37.4		47.0	36.1			12.7		27.0
Progression Factor		0.95	1.07		1.00	1.00			1.00		1.00
Incremental Delay, d2		32.7	0.3		169.8	0.5			0.7		185.7
Delay (s)		77.4	40.2		216.8	36.6			13.4		212.7
Level of Service		E	D		F	D			B		F
Approach Delay (s)		70.0			195.9		0.0			175.0	
Approach LOS		E			F		A			F	

Intersection Summary			
HCM Average Control Delay	147.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	115.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations		↑↑	↱	↰	↑↑				↰↰		↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	911	529	491	1109	0	0	0	756	0	562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	990	575	534	1205	0	0	0	822	0	611
RTOR Reduction (vph)	0	0	299	0	0	0	0	0	0	0	56
Lane Group Flow (vph)	0	990	276	534	1205	0	0	0	822	0	555
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		43.0	43.0	40.0	87.0				45.0		45.0
Effective Green, g (s)		43.0	43.0	40.0	87.0				45.0		45.0
Actuated g/C Ratio		0.31	0.31	0.29	0.62				0.32		0.32
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1041	443	506	2199				1103		509
v/s Ratio Prot		0.29		c0.30	0.34						
v/s Ratio Perm			0.40						0.24		0.39
v/c Ratio		0.95	0.62	1.06	0.55				0.75		1.09
Uniform Delay, d1		47.5	41.5	50.0	15.2				42.4		47.5
Progression Factor		1.00	1.00	0.72	0.40				1.00		1.00
Incremental Delay, d2		17.3	2.7	44.6	0.1				4.6		66.5
Delay (s)		64.8	44.3	80.4	6.3				47.0		114.0
Level of Service		E	D	F	A				D		F
Approach Delay (s)		57.2			29.0		0.0			75.5	
Approach LOS		E			C		A			E	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	126	1525	0	0	962	813	0	0	588	0	947
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	1658	0	0	1046	884	0	0	639	0	1029
RTOR Reduction (vph)	0	0	0	0	0	454	0	0	0	0	1
Lane Group Flow (vph)	137	1658	0	0	1046	430	0	0	639	0	1028
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	10.0	56.0			42.0	42.0			76.0		76.0
Effective Green, g (s)	10.0	56.0			42.0	42.0			76.0		76.0
Actuated g/C Ratio	0.07	0.40			0.30	0.30			0.54		0.54
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	126	1416			1062	475			961		859
v/s Ratio Prot	0.08	c0.47			0.30						
v/s Ratio Perm						0.56			0.36		0.65
v/c Ratio	1.09	1.17			0.98	0.91			0.66		1.20
Uniform Delay, d1	65.0	42.0			48.7	47.1			22.9		32.0
Progression Factor	0.94	0.51			1.00	1.00			1.00		1.00
Incremental Delay, d2	81.1	80.9			23.8	20.6			3.6		99.7
Delay (s)	142.3	102.4			72.5	67.7			26.5		131.7
Level of Service	F	F			E	E			C		F
Approach Delay (s)		105.4			70.3		0.0			91.4	
Approach LOS		F			E		A			F	

Intersection Summary			
HCM Average Control Delay	88.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395 — PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5037		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5037		3433	5085
Volume (vph)	381	334	2217	149	438	1464
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	414	363	2410	162	476	1591
RTOR Reduction (vph)	0	175	7	0	0	0
Lane Group Flow (vph)	414	188	2565	0	476	1591
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	25.0	25.0	58.0		15.0	77.0
Effective Green, g (s)	25.0	25.0	58.0		15.0	77.0
Actuated g/C Ratio	0.23	0.23	0.53		0.14	0.70
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	402	360	2656		468	3560
v/s Ratio Prot	c0.23		c0.51		c0.14	0.31
v/s Ratio Perm		0.23				
v/c Ratio	1.03	0.52	0.97		1.02	0.45
Uniform Delay, d1	42.5	37.3	25.0		47.5	7.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	52.8	1.4	10.6		46.0	0.1
Delay (s)	95.3	38.6	35.7		93.5	7.3
Level of Service	F	D	D		F	A
Approach Delay (s)	68.8		35.7			27.1
Approach LOS	E		D			C

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.98		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3305		1770	3469		1770	3509		1770	3487	
Flt Permitted	0.57	1.00		0.29	1.00		0.23	1.00		0.26	1.00	
Satd. Flow (perm)	1064	3305		536	3469		425	3509		493	3487	
Volume (vph)	142	401	317	41	236	36	179	790	47	15	833	91
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	154	436	345	45	257	39	195	859	51	16	905	99
RTOR Reduction (vph)	0	93	0	0	22	0	0	8	0	0	16	0
Lane Group Flow (vph)	154	688	0	45	274	0	195	902	0	16	988	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.9	13.9		13.9	13.9		25.4	25.4		25.4	25.4	
Effective Green, g (s)	13.9	13.9		13.9	13.9		25.4	25.4		25.4	25.4	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.54	0.54		0.54	0.54	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	313	971		158	1019		228	1884		265	1873	
v/s Ratio Prot		c0.24			0.09			0.26			0.29	
v/s Ratio Perm	0.14			0.08			c0.46			0.03		
v/c Ratio	0.49	0.71		0.28	0.27		0.86	0.48		0.06	0.53	
Uniform Delay, d1	13.8	14.9		12.9	12.8		9.4	6.8		5.2	7.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	2.4		1.0	0.1		25.5	0.2		0.1	0.3	
Delay (s)	15.0	17.3		13.9	12.9		34.9	7.0		5.3	7.3	
Level of Service	B	B		B	B		C	A		A	A	
Approach Delay (s)		16.9			13.1			11.9			7.3	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
74: Main St. & Cottonwood Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5021		1770	5085	1583	1770	1863	1583	3433	3379	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5021		1770	5085	1583	1770	1863	1583	3433	3379	
Volume (vph)	163	2018	187	58	1946	355	122	329	89	519	255	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	2193	203	63	2115	386	133	358	97	564	277	120
RTOR Reduction (vph)	0	8	0	0	0	141	0	0	53	0	34	0
Lane Group Flow (vph)	177	2388	0	63	2115	245	133	358	44	564	363	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	14.7	67.7		5.0	58.0	58.0	14.9	28.3	28.3	23.0	36.4	
Effective Green, g (s)	14.7	67.7		5.0	58.0	58.0	14.9	28.3	28.3	23.0	36.4	
Actuated g/C Ratio	0.10	0.48		0.04	0.41	0.41	0.11	0.20	0.20	0.16	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	186	2428		63	2107	656	188	377	320	564	879	
v/s Ratio Prot	0.10	c0.48		0.04	c0.42		0.08	c0.19		c0.16	0.12	
v/s Ratio Perm						0.24			0.06			
v/c Ratio	0.95	0.98		1.00	1.00	0.37	0.71	0.95	0.14	1.00	0.41	
Uniform Delay, d1	62.3	35.6		67.5	41.0	28.4	60.4	55.1	45.8	58.5	42.9	
Progression Factor	1.21	0.25		1.02	1.03	1.24	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	22.4	6.1		108.8	19.7	0.3	11.5	35.2	0.9	37.9	1.4	
Delay (s)	97.5	15.0		177.9	61.9	35.6	71.9	90.4	46.7	96.4	44.4	
Level of Service	F	B		F	E	D	E	F	D	F	D	
Approach Delay (s)		20.7			60.8			79.0			74.9	
Approach LOS		C			E			E			E	

Intersection Summary			
HCM Average Control Delay	49.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
75: Main St. & 7th Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	312	1842	452	9	1648	50	364	277	20	31	327	337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	339	2002	491	10	1791	54	396	301	22	34	355	366
RTOR Reduction (vph)	0	0	120	0	0	16	0	0	17	0	0	268
Lane Group Flow (vph)	339	2002	371	10	1791	38	396	301	5	34	355	98
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.2	89.9	89.9	0.8	75.5	75.5	19.5	29.7	29.7	3.6	13.8	13.8
Effective Green, g (s)	15.2	89.9	89.9	0.8	75.5	75.5	19.5	29.7	29.7	3.6	13.8	13.8
Actuated g/C Ratio	0.11	0.64	0.64	0.01	0.54	0.54	0.14	0.21	0.21	0.03	0.10	0.10
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	373	2273	1017	10	1909	854	478	751	336	46	349	275
v/s Ratio Prot	0.10	c0.57		0.01	c0.51		c0.12	0.09		0.02	0.10	
v/s Ratio Perm			0.31			0.03			0.01			0.13
v/c Ratio	0.91	0.88	0.36	1.00	0.94	0.04	0.83	0.40	0.01	0.74	1.02	0.36
Uniform Delay, d1	61.7	20.6	11.7	69.6	30.1	15.2	58.6	47.5	43.6	67.7	63.1	59.0
Progression Factor	1.11	0.64	0.71	0.64	0.32	0.05	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.4	3.8	0.2	85.4	1.1	0.0	11.3	1.6	0.1	46.3	52.6	3.6
Delay (s)	90.7	17.0	8.5	130.2	10.7	0.7	69.9	49.1	43.7	114.0	115.7	62.6
Level of Service	F	B	A	F	B	A	E	D	D	F	F	E
Approach Delay (s)		24.4			11.1			60.4			89.9	
Approach LOS		C			B			E			F	

Intersection Summary			
HCM Average Control Delay	32.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
76: Main St. & Peach Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5010		1770	5021		1770	3539	1583	1770	3334	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5010		1770	5021		1770	3539	1583	1770	3334	
Volume (vph)	107	1077	119	393	842	77	102	149	323	235	200	126
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	1171	129	427	915	84	111	162	351	255	217	137
RTOR Reduction (vph)	0	9	0	0	7	0	0	0	302	0	71	0
Lane Group Flow (vph)	116	1291	0	427	992	0	111	162	49	255	283	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	13.9	44.2		37.2	67.5		13.3	19.6	19.6	23.0	29.3	
Effective Green, g (s)	13.9	44.2		37.2	67.5		13.3	19.6	19.6	23.0	29.3	
Actuated g/C Ratio	0.10	0.32		0.27	0.48		0.10	0.14	0.14	0.16	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	176	1582		470	2421		168	495	222	291	698	
v/s Ratio Prot	0.07	c0.26		c0.24	0.20		0.06	0.05		c0.14	0.11	
v/s Ratio Perm									0.22			
v/c Ratio	0.66	0.82		0.91	0.41		0.66	0.33	0.22	0.88	0.41	
Uniform Delay, d1	60.8	44.2		49.8	23.4		61.2	54.3	53.4	57.1	47.8	
Progression Factor	1.22	0.53		0.95	0.87		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.4	0.9		19.3	0.1		9.4	1.8	2.3	24.2	0.4	
Delay (s)	76.5	24.2		66.7	20.5		70.5	56.0	55.7	81.3	48.2	
Level of Service	E	C		E	C		E	E	E	F	D	
Approach Delay (s)		28.4			34.3			58.4			62.1	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	40.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
77: Danbury Ave & I Avenue — PM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	0.85	
Flt Protected	0.95	0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3401		1770	3512		1770	3467		1770	2787	
Flt Permitted	0.33	0.96		0.21	1.00		0.95	1.00		0.38	1.00	
Satd. Flow (perm)	614	3401		388	3512		1770	3467		711	2787	
Volume (vph)	42	449	59	14	703	38	24	978	155	66	500	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	488	64	15	764	41	26	1063	168	72	543	18
RTOR Reduction (vph)	0	22	0	0	7	0	0	24	0	0	4	0
Lane Group Flow (vph)	46	530	0	15	798	0	26	1207	0	72	557	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	13.0	13.0		19.2	19.2		0.7	23.9		13.0	13.0	
Effective Green, g (s)	13.0	13.0		19.2	19.2		0.7	23.9		13.0	13.0	
Actuated g/C Ratio	0.29	0.29		0.43	0.43		0.02	0.53		0.29	0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	178	985		166	1502		28	1845		206	807	
v/s Ratio Prot		0.16			0.23		0.01	c0.36				
v/s Ratio Perm	0.07			0.04						0.10	0.20	
v/c Ratio	0.26	0.54		0.09	0.53		0.93	0.65		0.35	0.69	
Uniform Delay, d1	12.2	13.4		7.7	9.5		22.1	7.5		12.6	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.6		0.2	0.4		137.8	0.8		1.0	2.5	
Delay (s)	13.0	14.0		7.9	9.9		159.9	8.4		13.6	16.6	
Level of Service	B	B		A	A		F	A		B	B	
Approach Delay (s)		13.9			9.8			11.5		16.3		
Approach LOS		B			A			B		B		

Intersection Summary					
HCM Average Control Delay	12.4	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	44.9	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	60.3%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
78: Ranchero Rd & Danbury Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.98		1.00	0.94		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	4751		1770	4990		1770	3337		1770	3254	
Flt Permitted	0.95	1.00		0.95	1.00		0.18	1.00		0.52	1.00	
Satd. Flow (perm)	3433	4751		1770	4990		327	3337		963	3254	
Volume (vph)	682	661	515	137	456	65	335	227	140	140	418	484
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	741	718	560	149	496	71	364	247	152	152	454	526
RTOR Reduction (vph)	0	178	0	0	24	0	0	106	0	0	262	0
Lane Group Flow (vph)	741	1100	0	149	543	0	364	293	0	152	718	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	17.0	22.9		8.7	14.6		34.8	23.9		25.7	18.8	
Effective Green, g (s)	17.0	22.9		8.7	14.6		34.8	23.9		25.7	18.8	
Actuated g/C Ratio	0.22	0.29		0.11	0.19		0.44	0.30		0.33	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	744	1388		196	929		366	1017		387	780	
v/s Ratio Prot	c0.22	c0.27		0.08	0.11		c0.15	0.12		0.03	c0.30	
v/s Ratio Perm							0.29			0.09		
v/c Ratio	1.00	0.88dr		0.76	0.58		0.99	0.29		0.39	0.92	
Uniform Delay, d1	30.7	25.6		33.8	29.1		20.2	20.8		19.4	29.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.8	3.2		15.8	0.9		45.3	0.2		0.7	16.0	
Delay (s)	62.4	28.7		49.7	30.1		65.5	20.9		20.0	45.1	
Level of Service	E	C		D	C		E	C		C	D	
Approach Delay (s)		41.1			34.2			42.2			41.7	
Approach LOS		D			C			D			D	

Intersection Summary					
HCM Average Control Delay	40.4	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.03				
Actuated Cycle Length (s)	78.4	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	90.9%	ICU Level of Service		E	
Analysis Period (min)	15				
dr Defacto Right Lane. Recode with 1 though lane as a right lane.					
c Critical Lane Group					

Appendix B-3

- **High Intensity Buildout (with new corridors)**

Hesperia GP Update
1: Highway 138 & Summit Valley Rd AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.47	1.00
Satd. Flow (perm)	3433	5085	5085	1583	866	2787
Volume (vph)	189	231	2886	25	14	1502
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	251	3137	27	15	1633
RTOR Reduction (vph)	0	0	0	10	0	405
Lane Group Flow (vph)	205	251	3137	17	15	1228
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	25.0	66.1	37.1	37.1	8.6	25.0
Effective Green, g (s)	25.0	66.1	37.1	37.1	8.6	25.0
Actuated g/C Ratio	0.30	0.80	0.45	0.45	0.10	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1038	4064	2281	710	90	843
v/s Ratio Prot	0.06	0.05	c0.62			c0.59
v/s Ratio Perm				0.02	c0.02	
v/c Ratio	0.20	0.06	1.38	0.02	0.17	1.46
Uniform Delay, d1	21.4	1.8	22.8	12.7	33.8	28.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	171.7	0.0	0.9	212.3
Delay (s)	21.5	1.8	194.5	12.7	34.7	241.1
Level of Service	C	A	F	B	C	F
Approach Delay (s)		10.6	193.0		239.3	
Approach LOS		B	F		F	

Intersection Summary				
HCM Average Control Delay	191.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.43			
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	115.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.91	0.91				1.00		1.00
Frt		0.94		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	0.97				0.95		1.00
Satd. Flow (prot)		3338		1610	3292				1770		1583
Flt Permitted		1.00		0.95	0.46				0.95		1.00
Satd. Flow (perm)		3338		1610	1543				1770		1583
Volume (vph)	0	299	182	1125	377	0	0	0	55	0	468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	325	198	1223	410	0	0	0	60	0	509
RTOR Reduction (vph)	0	68	0	0	0	0	0	0	0	0	361
Lane Group Flow (vph)	0	455	0	612	1021	0	0	0	60	0	148
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		23.4		58.6	58.6				23.4		23.4
Effective Green, g (s)		23.4		58.6	58.6				23.4		23.4
Actuated g/C Ratio		0.26		0.65	0.65				0.26		0.26
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		868		1048	2143				460		412
v/s Ratio Prot		0.16		c0.38	0.31						
v/s Ratio Perm									0.03		0.32
v/c Ratio		0.52		0.58	0.48				0.13		0.36
Uniform Delay, d1		28.5		8.8	7.9				25.5		27.2
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		2.3		0.8	0.2				0.6		2.4
Delay (s)		30.8		9.7	8.1				26.1		29.6
Level of Service		C		A	A				C		C
Approach Delay (s)		30.8			8.7		0.0			29.2	
Approach LOS		C			A		A			C	

Intersection Summary				
HCM Average Control Delay	17.2	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave AM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0				
Lane Util. Factor	0.97				
Frt	1.00				
Flt Protected	0.95				
Satd. Flow (prot)	3433				
Flt Permitted	0.95				
Satd. Flow (perm)	3433				
Volume (vph)	665	0	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	723	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	723	0	0	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	22.6				
Effective Green, g (s)	22.6				
Actuated g/C Ratio	0.25				
Clearance Time (s)	4.0				
Vehicle Extension (s)	3.0				
Lane Grp Cap (vph)	862				
v/s Ratio Prot	c0.21				
v/s Ratio Perm					
v/c Ratio	0.84				
Uniform Delay, d1	32.0				
Progression Factor	1.00				
Incremental Delay, d2	7.2				
Delay (s)	39.2				
Level of Service	D				
Approach Delay (s)	39.2	0.0		0.0	
Approach LOS	D	A		A	

Intersection Summary				
HCM Average Control Delay	39.2	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	67.4	
Intersection Capacity Utilization	22.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
9: Ranchero Rd & Caliente Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	123	832	434	1103	929	329	111	97	442	257	183	59
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	904	472	1199	1010	358	121	105	480	279	199	64
RTOR Reduction (vph)	0	0	200	0	0	204	0	0	405	0	0	51
Lane Group Flow (vph)	134	904	272	1199	1010	154	121	105	75	279	199	13
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	10.7	24.5	24.5	25.0	38.8	38.8	6.9	14.0	14.0	10.5	17.6	17.6
Effective Green, g (s)	10.7	24.5	24.5	25.0	38.8	38.8	6.9	14.0	14.0	10.5	17.6	17.6
Actuated g/C Ratio	0.12	0.27	0.27	0.28	0.43	0.43	0.08	0.16	0.16	0.12	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	210	1384	431	954	2192	682	263	290	434	401	364	310
v/s Ratio Prot	0.08	0.18		c0.35	0.20		0.04	0.06		c0.08	c0.11	
v/s Ratio Perm			0.30			0.23			0.17			0.04
v/c Ratio	0.64	0.65	0.63	1.26	0.46	0.23	0.46	0.36	0.17	0.70	0.55	0.04
Uniform Delay, d1	37.8	29.0	28.8	32.5	18.2	16.1	39.8	34.0	33.0	38.2	32.6	29.4
Progression Factor	1.00	1.00	1.00	0.97	1.27	2.07	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	1.1	3.0	121.3	0.1	0.1	1.3	3.5	0.9	5.2	5.8	0.2
Delay (s)	44.0	30.1	31.8	153.0	23.1	33.4	41.0	37.5	33.8	43.4	38.4	29.6
Level of Service	D	C	C	F	C	C	D	D	C	D	D	C
Approach Delay (s)		31.9			85.2			35.6			39.9	
Approach LOS		C			F			D			D	

Intersection Summary				
HCM Average Control Delay	58.9	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	78.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		0.99	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4759	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4759	1362	3433	5085				1770		2787
Volume (vph)	0	944	587	463	1394	0	0	0	513	0	966
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1026	638	503	1515	0	0	0	558	0	1050
RTOR Reduction (vph)	0	8	375	0	0	0	0	0	0	0	31
Lane Group Flow (vph)	0	1090	191	503	1515	0	0	0	558	0	1019
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		30.3	30.3	15.7	50.0				32.0		32.0
Effective Green, g (s)		30.3	30.3	15.7	50.0				32.0		32.0
Actuated g/C Ratio		0.34	0.34	0.17	0.56				0.36		0.36
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1602	459	599	2825				629		991
v/s Ratio Prot		0.23		c0.15	0.30						
v/s Ratio Perm			0.42						0.32		0.38
v/c Ratio		0.68	0.42	0.84	0.54				0.89		1.03
Uniform Delay, d1		25.7	23.0	35.9	12.7				27.3		29.0
Progression Factor		0.69	2.65	1.32	1.18				1.00		1.00
Incremental Delay, d2		1.0	0.5	6.5	0.1				16.9		36.1
Delay (s)		18.7	61.5	54.1	15.1				44.2		65.1
Level of Service		B	E	D	B				D		E
Approach Delay (s)		33.3			24.8		0.0			57.8	
Approach LOS		C			C		A			E	

Intersection Summary			
HCM Average Control Delay	37.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	576	881	0	0	1727	743	0	0	130	0	143
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	626	958	0	0	1877	808	0	0	141	0	155
RTOR Reduction (vph)	0	0	0	0	0	264	0	0	0	0	126
Lane Group Flow (vph)	626	958	0	0	1877	544	0	0	141	0	29
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	19.8	65.1			41.3	41.3			16.9		16.9
Effective Green, g (s)	19.8	65.1			41.3	41.3			16.9		16.9
Actuated g/C Ratio	0.22	0.72			0.46	0.46			0.19		0.19
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	755	3678			2333	726			645		297
v/s Ratio Prot	c0.18	0.19			0.37						
v/s Ratio Perm						0.51			0.04		0.10
v/c Ratio	0.83	0.26			0.80	0.75			0.22		0.10
Uniform Delay, d1	33.5	4.2			20.9	20.1			31.0		30.2
Progression Factor	0.78	1.77			0.76	0.48			1.00		1.00
Incremental Delay, d2	4.9	0.0			0.8	1.6			0.8		0.7
Delay (s)	31.1	7.5			16.7	11.2			31.7		30.9
Level of Service	C	A			B	B			C		C
Approach Delay (s)		16.8			15.0		0.0			31.3	
Approach LOS		B			B		A			C	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00	1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085		3433	5085	1583	1770	4707	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085		3433	5085	1583	1770	4707	
Volume (vph)	208	278	538	894	1637	0	345	82	282	4	601	592
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	302	585	972	1779	0	375	89	307	4	653	643
RTOR Reduction (vph)	0	0	137	0	0	0	0	0	204	0	132	0
Lane Group Flow (vph)	226	302	448	972	1779	0	375	89	103	4	1164	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	7.0	17.0	17.0	26.0	36.0		11.0	30.2	30.2	0.8	20.0	
Effective Green, g (s)	7.0	17.0	17.0	26.0	36.0		11.0	30.2	30.2	0.8	20.0	
Actuated g/C Ratio	0.08	0.19	0.19	0.29	0.40		0.12	0.34	0.34	0.01	0.22	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	267	961	299	992	2034		420	1706	531	16	1046	
v/s Ratio Prot	0.07	0.06		c0.28	0.35		c0.11	0.02		0.00	c0.28	
v/s Ratio Perm			0.37						0.19			
v/c Ratio	0.85	0.31	1.50	0.98	0.87		0.89	0.05	0.19	0.25	1.33dr	
Uniform Delay, d1	41.0	31.5	36.5	31.7	24.9		38.9	20.2	21.3	44.3	35.0	
Progression Factor	1.43	0.85	1.02	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	20.8	0.2	240.6	23.4	4.5		20.6	0.1	0.8	8.1	64.1	
Delay (s)	79.2	27.0	277.8	55.2	29.4		59.5	20.3	22.1	52.4	99.1	
Level of Service	E	C	F	E	C		E	C	C	D	F	
Approach Delay (s)		169.4			38.5			40.1			99.0	
Approach LOS		F			D			D			F	

Intersection Summary				
HCM Average Control Delay	76.5	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.26			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	93.7%	ICU Level of Service	F	
Analysis Period (min)	15			

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Hesperia GP Update
13: Ranchero Rd & Escondido Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5007		1770	4987		1770	3494		1770	3429	
Flt Permitted	0.08	1.00		0.33	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	158	5007		619	4987		1770	3494		1770	3429	
Volume (vph)	30	623	71	18	1943	289	90	355	33	177	95	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	677	77	20	2112	314	98	386	36	192	103	27
RTOR Reduction (vph)	0	15	0	0	21	0	0	8	0	0	21	0
Lane Group Flow (vph)	33	739	0	20	2405	0	98	414	0	192	109	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	47.3	47.3		47.3	47.3		8.1	15.7		10.1	17.7	
Effective Green, g (s)	47.3	47.3		47.3	47.3		8.1	15.7		10.1	17.7	
Actuated g/C Ratio	0.56	0.56		0.56	0.56		0.10	0.18		0.12	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	88	2783		344	2772		168	645		210	713	
v/s Ratio Prot		0.15			c0.49		0.06	c0.12		c0.11	0.04	
v/s Ratio Perm	0.21			0.03								
v/c Ratio	0.38	0.27		0.06	0.87		0.58	0.64		0.91	0.15	
Uniform Delay, d1	10.6	9.8		8.7	16.2		36.9	32.1		37.1	27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.1		0.1	3.1		5.1	2.2		38.9	0.1	
Delay (s)	13.3	9.9		8.7	19.3		42.0	34.3		76.0	27.7	
Level of Service	B	A		A	B		D	C		E	C	
Approach Delay (s)		10.0			19.3			35.7			56.5	
Approach LOS		B			B			D			E	

Intersection Summary				
HCM Average Control Delay	22.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	74.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Hesperia GP Update
14: Ranchero Rd & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5026		1770	3517		1770	3233	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5026		1770	3517		1770	3233	
Volume (vph)	49	742	100	80	1659	140	303	316	14	95	253	345
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	807	109	87	1803	152	329	343	15	103	275	375
RTOR Reduction (vph)	0	0	67	0	11	0	0	4	0	0	94	0
Lane Group Flow (vph)	53	807	42	87	1944	0	329	354	0	103	556	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	3.1	34.2	34.2	5.0	36.1		17.7	26.2		8.4	16.9	
Effective Green, g (s)	3.1	34.2	34.2	5.0	36.1		17.7	26.2		8.4	16.9	
Actuated g/C Ratio	0.03	0.38	0.38	0.06	0.40		0.20	0.29		0.09	0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	61	1937	603	99	2020		349	1026		166	608	
v/s Ratio Prot	0.03	0.16		c0.05	c0.39		c0.19	0.10		0.06	c0.20	
v/s Ratio Perm			0.07									
v/c Ratio	0.87	0.42	0.07	0.88	0.96		0.94	0.35		0.62	0.98dr	
Uniform Delay, d1	43.1	20.5	17.7	42.1	26.2		35.5	25.0		39.2	35.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	69.6	0.1	0.0	53.0	12.4		33.4	0.2		7.0	18.3	
Delay (s)	112.8	20.6	17.7	95.1	38.5		69.0	25.3		46.2	54.1	
Level of Service	F	C	B	F	D		E	C		D	D	
Approach Delay (s)		25.3			41.0			46.2			53.0	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM Average Control Delay	40.4	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	89.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	86.7%	ICU Level of Service		E	
Analysis Period (min)	15				

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Hesperia GP Update
15: Ranchero Rd & I Avenue — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.94		1.00	1.00		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4769		1770	3526		1770	4910		1770	3362	
Flt Permitted	0.95	1.00		0.95	1.00		0.19	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4769		1770	3526		360	4910		1770	3362	
Volume (vph)	369	376	267	276	532	14	234	593	177	32	367	184
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	401	409	290	300	578	15	254	645	192	35	399	200
RTOR Reduction (vph)	0	139	0	0	2	0	0	54	0	0	70	0
Lane Group Flow (vph)	401	560	0	300	591	0	254	783	0	35	529	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	21.2	20.1		17.3	16.2		33.7	22.5		7.2	16.7	
Effective Green, g (s)	21.2	20.1		17.3	16.2		33.7	22.5		7.2	16.7	
Actuated g/C Ratio	0.26	0.24		0.21	0.19		0.41	0.27		0.09	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	452	1154		368	687		367	1329		153	676	
v/s Ratio Prot	c0.23	c0.15		0.17	c0.17		c0.11	0.17		0.02	c0.18	
v/s Ratio Perm							0.17					
v/c Ratio	0.89	0.48		0.82	0.86		0.69	0.59		0.23	0.78	
Uniform Delay, d1	29.8	27.1		31.4	32.4		18.7	26.3		35.4	31.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.5	0.3		13.0	10.7		5.6	0.7		0.8	5.9	
Delay (s)	48.3	27.4		44.4	43.1		24.2	27.0		36.1	37.4	
Level of Service	D	C		D	D		C	C		D	D	
Approach Delay (s)		35.0			43.5			26.3			37.3	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	34.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.88				
Actuated Cycle Length (s)	83.1	Sum of lost time (s)		20.0	
Intersection Capacity Utilization	77.9%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.99		1.00	1.00	0.97	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1759		1770	5085	3434	
Flt Permitted	0.96		0.38	1.00	1.00	
Satd. Flow (perm)	1759		710	5085	3434	
Volume (vph)	87	9	12	513	515	128
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	10	13	558	560	139
RTOR Reduction (vph)	7	0	0	0	14	0
Lane Group Flow (vph)	98	0	13	558	685	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	9.4		38.4	38.4	38.4	
Effective Green, g (s)	9.4		38.4	38.4	38.4	
Actuated g/C Ratio	0.17		0.69	0.69	0.69	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	296		489	3499	2363	
v/s Ratio Prot				0.11	c0.20	
v/s Ratio Perm	0.06		0.02			
v/c Ratio	0.33		0.03	0.16	0.29	
Uniform Delay, d1	20.4		2.8	3.0	3.4	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.0	0.0	0.1	
Delay (s)	21.1		2.8	3.1	3.5	
Level of Service	C		A	A	A	
Approach Delay (s)	21.1			3.1	3.5	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	4.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
17: Joshua St & Caliente Rd AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.95		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3378		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3378		1770	3539	1770	1583
Volume (vph)	392	170	548	805	28	237
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	426	185	596	875	30	258
RTOR Reduction (vph)	66	0	0	0	0	226
Lane Group Flow (vph)	545	0	596	875	30	32
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	15.3		26.4	45.7	7.6	7.6
Effective Green, g (s)	15.3		26.4	45.7	7.6	7.6
Actuated g/C Ratio	0.25		0.43	0.75	0.12	0.12
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	843		762	2638	219	196
v/s Ratio Prot	c0.18		c0.34	0.25	0.02	
v/s Ratio Perm						0.16
v/c Ratio	0.65		0.78	0.33	0.14	0.16
Uniform Delay, d1	20.6		15.0	2.6	23.9	24.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7		5.2	0.1	0.3	0.4
Delay (s)	22.3		20.2	2.7	24.2	24.4
Level of Service	C		C	A	C	C
Approach Delay (s)	22.3			9.8	24.4	
Approach LOS	C			A	C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
18: Joshua St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	5025		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	5025		1770	5085	1583
Volume (vph)	333	333	278	203	1178	341	149	245	21	135	733	333
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	362	362	302	221	1280	371	162	266	23	147	797	362
RTOR Reduction (vph)	0	0	130	0	0	130	0	11	0	0	0	256
Lane Group Flow (vph)	362	362	172	221	1280	241	162	278	0	147	797	106
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	13.5	34.2	34.2	14.0	34.7	34.7	4.0	15.3		5.1	16.4	16.4
Effective Green, g (s)	13.5	34.2	34.2	14.0	34.7	34.7	4.0	15.3		5.1	16.4	16.4
Actuated g/C Ratio	0.16	0.40	0.40	0.17	0.41	0.41	0.05	0.18		0.06	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	548	1431	640	293	1452	649	162	909		107	986	307
v/s Ratio Prot	0.11	0.10		c0.12	c0.36		0.05	0.06		c0.08	0.16	
v/s Ratio Perm			0.19			0.23						0.23
v/c Ratio	0.66	0.25	0.27	0.75	0.88	0.37	1.00	0.31		1.37	0.81	0.35
Uniform Delay, d1	33.4	16.7	16.8	33.7	23.1	17.4	40.3	30.0		39.8	32.6	29.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.0	0.1	0.2	10.5	6.6	0.4	70.7	0.2		216.3	5.0	0.7
Delay (s)	36.4	16.8	17.1	44.2	29.7	17.7	111.0	30.2		256.1	37.5	30.2
Level of Service	D	B	B	D	C	B	F	C		F	D	C
Approach Delay (s)		23.8			29.0			59.3			60.1	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM Average Control Delay	39.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	84.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
19: Muscatel St & Escondido Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.92		1.00	0.94		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3244		1770	3309		1770	3528		3433	3433	
Flt Permitted	0.09	1.00		0.44	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	171	3244		812	3309		1770	3528		3433	3433	
Volume (vph)	76	202	254	172	707	539	360	713	15	91	323	81
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	220	276	187	768	586	391	775	16	99	351	88
RTOR Reduction (vph)	0	136	0	0	109	0	0	1	0	0	25	0
Lane Group Flow (vph)	83	360	0	187	1245	0	391	790	0	99	414	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	44.1	44.1		44.1	44.1		15.1	26.8		3.9	15.6	
Effective Green, g (s)	44.1	44.1		44.1	44.1		15.1	26.8		3.9	15.6	
Actuated g/C Ratio	0.51	0.51		0.51	0.51		0.17	0.31		0.04	0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	87	1648		413	1681		308	1089		154	617	
v/s Ratio Prot		0.15			0.41		c0.22	c0.22		0.03	0.13	
v/s Ratio Perm	c0.49			0.23								
v/c Ratio	0.95	0.22		0.45	0.74		1.27	0.73		0.64	0.67	
Uniform Delay, d1	20.4	11.8		13.6	16.8		35.9	26.7		40.8	33.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	80.6	0.1		0.8	1.8		144.4	2.4		8.9	2.9	
Delay (s)	101.0	11.9		14.4	18.6		180.2	29.1		49.6	36.1	
Level of Service	F	B		B	B		F	C		D	D	
Approach Delay (s)		24.7			18.1			79.1			38.6	
Approach LOS		C			B			E			D	

Intersection Summary				
HCM Average Control Delay	40.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

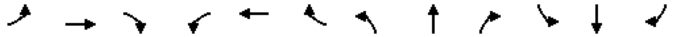
Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. AM Peak Hour



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3391	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3391	
Volume (vph)	403	732	470	222	599	233
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	438	796	511	241	651	253
RTOR Reduction (vph)	0	421	0	0	42	0
Lane Group Flow (vph)	438	375	511	241	862	0
Turn Type		Perm	Prot			
Protected Phases	8		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	23.9	23.9	16.1	41.7	21.6	
Effective Green, g (s)	23.9	23.9	16.1	41.7	21.6	
Actuated g/C Ratio	0.32	0.32	0.22	0.57	0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	575	514	751	2005	995	
v/s Ratio Prot	0.25		c0.15	0.07	c0.27	
v/s Ratio Perm		0.50				
v/c Ratio	0.76	0.73	0.68	0.12	0.87	
Uniform Delay, d1	22.3	22.0	26.4	7.4	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.9	5.1	2.5	0.0	8.0	
Delay (s)	28.2	27.1	28.9	7.4	32.7	
Level of Service	C	C	C	A	C	
Approach Delay (s)	27.5			22.0	32.7	
Approach LOS	C			C	C	

Intersection Summary				
HCM Average Control Delay	27.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.10			
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.09	1.00	1.00	0.12	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	169	5085	2787	222	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	211	1299	620	3	1514	83	854	256	601	758	580	154
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	1412	674	3	1646	90	928	278	653	824	630	167
RTOR Reduction (vph)	0	0	573	0	0	46	0	0	13	0	0	6
Lane Group Flow (vph)	229	1412	101	3	1646	44	928	278	640	824	630	161
Turn Type	Perm		Over	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4	5		8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	44.0	44.0	13.0	44.0	44.0	44.0	13.0	22.0	22.0	12.0	21.0	21.0
Effective Green, g (s)	44.0	44.0	13.0	44.0	44.0	44.0	13.0	22.0	22.0	12.0	21.0	21.0
Actuated g/C Ratio	0.49	0.49	0.14	0.49	0.49	0.49	0.14	0.24	0.24	0.13	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	83	2486	403	109	2486	774	496	1243	387	458	1187	369
v/s Ratio Prot		0.28	0.24		0.32		c0.27	0.05		0.24	0.12	
v/s Ratio Perm	c1.35			0.01		0.06			0.41			0.11
v/c Ratio	2.76	0.57	0.25	0.03	0.66	0.06	1.87	0.22	1.65	1.80	0.53	0.44
Uniform Delay, d1	23.0	16.3	34.2	11.9	17.4	12.1	38.5	27.2	34.0	39.0	30.2	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	824.2	0.3	0.3	0.1	0.7	0.0	399.6	0.1	305.7	368.2	0.5	0.8
Delay (s)	847.2	16.6	34.5	12.0	18.1	12.1	438.1	27.3	339.7	407.2	30.6	30.3
Level of Service	F	B	C	B	B	B	F	C	F	F	C	C
Approach Delay (s)		104.0			17.7			342.1			222.0	
Approach LOS		F			B			F			F	

Intersection Summary				
HCM Average Control Delay	168.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	2.24			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	93.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5075		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5075		3433	5085	1583
Volume (vph)	300	1413	804	6	1228	858	294	1486	20	1009	2509	219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1536	874	7	1335	933	320	1615	22	1097	2727	238
RTOR Reduction (vph)	0	0	238	0	0	384	0	1	0	0	0	78
Lane Group Flow (vph)	326	1536	636	7	1335	549	320	1636	0	1097	2727	160
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.0	34.4	34.4	0.8	28.2	28.2	5.0	26.0		16.0	37.0	37.0
Effective Green, g (s)	7.0	34.4	34.4	0.8	28.2	28.2	5.0	26.0		16.0	37.0	37.0
Actuated g/C Ratio	0.08	0.37	0.37	0.01	0.30	0.30	0.05	0.28		0.17	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	1877	1029	15	1539	843	184	1416		589	2019	628
v/s Ratio Prot	c0.18	0.30		0.00	0.26		0.09	0.32		c0.32	c0.54	
v/s Ratio Perm			0.31			0.33						0.15
v/c Ratio	2.45	0.82	0.62	0.47	0.87	0.65	1.74	1.16		1.86	1.35	0.26
Uniform Delay, d1	43.1	26.6	24.0	46.0	30.7	28.2	44.1	33.6		38.6	28.1	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	675.1	2.9	1.1	21.2	5.4	1.8	354.2	78.2		394.6	161.2	0.2
Delay (s)	718.2	29.5	25.1	67.2	36.2	30.1	398.3	111.8		433.2	189.3	19.1
Level of Service	F	C	C	E	D	C	F	F		F	F	B
Approach Delay (s)		110.2			33.8			158.7			245.2	
Approach LOS		F			C			F			F	

Intersection Summary				
HCM Average Control Delay	152.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.44			
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	111.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
23: Eucalyptus St & Maple Ave AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4999		3433	4906		3433	3539	1583	1770	3466	
Flt Permitted	0.26	1.00		0.95	1.00		0.95	1.00	1.00	0.50	1.00	
Satd. Flow (perm)	487	4999		3433	4906		3433	3539	1583	928	3466	
Volume (vph)	34	571	73	430	1121	344	799	402	70	39	521	84
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	621	79	467	1218	374	868	437	76	42	566	91
RTOR Reduction (vph)	0	17	0	0	57	0	0	0	41	0	8	0
Lane Group Flow (vph)	37	683	0	467	1535	0	868	437	35	42	649	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	15.3	15.3		15.9	35.2		21.2	42.5	42.5	25.7	23.5	
Effective Green, g (s)	15.3	15.3		15.9	35.2		21.2	42.5	42.5	25.7	23.5	
Actuated g/C Ratio	0.17	0.17		0.17	0.38		0.23	0.46	0.46	0.28	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	81	832		594	1879		792	1637	732	280	886	
v/s Ratio Prot		0.14		0.14	c0.32		c0.25	0.12		0.00	c0.19	
v/s Ratio Perm	0.08								0.05	0.04		
v/c Ratio	0.46	0.82		0.79	0.82		1.10	0.27	0.05	0.15	0.73	
Uniform Delay, d1	34.6	37.0		36.4	25.5		35.4	15.1	13.6	24.4	31.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.0	6.5		6.8	2.9		61.4	0.1	0.0	0.2	3.2	
Delay (s)	38.6	43.5		43.2	28.3		96.8	15.2	13.6	24.7	34.5	
Level of Service	D	D		D	C		F	B	B	C	C	
Approach Delay (s)		43.3			31.7			66.4			33.9	
Approach LOS		D			C			E			C	

Intersection Summary				
HCM Average Control Delay	43.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
24: Main St. & Mesa Linda AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4997		1770	5085	1770	1583
Flt Permitted	1.00		0.41	1.00	0.95	1.00
Satd. Flow (perm)	4997		762	5085	1770	1583
Volume (vph)	499	65	64	1489	1	42
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	542	71	70	1618	1	46
RTOR Reduction (vph)	24	0	0	0	0	38
Lane Group Flow (vph)	589	0	70	1618	1	8
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	19.4		19.4	19.4	6.2	6.2
Effective Green, g (s)	19.4		19.4	19.4	6.2	6.2
Actuated g/C Ratio	0.58		0.58	0.58	0.18	0.18
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2885		440	2936	327	292
v/s Ratio Prot	0.12			c0.32	0.00	
v/s Ratio Perm			0.09			0.03
v/c Ratio	0.20		0.16	0.55	0.00	0.03
Uniform Delay, d1	3.4		3.3	4.4	11.2	11.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0		0.2	0.2	0.0	0.0
Delay (s)	3.4		3.5	4.6	11.2	11.3
Level of Service	A		A	A	B	B
Approach Delay (s)	3.4			4.6	11.3	
Approach LOS	A			A	B	

Intersection Summary			
HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	33.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
25: Main St. & Cataba Rd AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	83	1228	2809	11	47	32
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	1335	3053	12	51	35
RTOR Reduction (vph)	0	0	0	3	0	31
Lane Group Flow (vph)	90	1335	3053	9	51	4
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	3.9	59.1	51.2	51.2	7.6	7.6
Effective Green, g (s)	3.9	59.1	51.2	51.2	7.6	7.6
Actuated g/C Ratio	0.05	0.79	0.69	0.69	0.10	0.10
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	4023	3485	1085	180	161
v/s Ratio Prot	c0.03	0.26	c0.60		c0.03	
v/s Ratio Perm				0.01		0.02
v/c Ratio	0.50	0.33	0.88	0.01	0.28	0.02
Uniform Delay, d1	34.5	2.2	9.3	3.7	31.0	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.0	2.8	0.0	0.9	0.1
Delay (s)	36.7	2.3	12.0	3.7	31.9	30.3
Level of Service	D	A	B	A	C	C
Approach Delay (s)		4.4	12.0		31.2	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
26: Main St. & I-15 SB Ramp

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		1.00			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5074			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5074			5085	1583			1770	1583	1504
Volume (vph)	0	1232	18	0	1796	702	0	0	368	0	1368
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1339	20	0	1952	763	0	0	400	0	1487
RTOR Reduction (vph)	0	2	0	0	0	348	0	0	0	5	5
Lane Group Flow (vph)	0	1357	0	0	1952	415	0	0	400	738	739
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		49.0			49.0	49.0			33.0	33.0	33.0
Effective Green, g (s)		49.0			49.0	49.0			33.0	33.0	33.0
Actuated g/C Ratio		0.54			0.54	0.54			0.37	0.37	0.37
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		2763			2769	862			649	580	551
v/s Ratio Prot		0.27			0.38				0.23	0.47	
v/s Ratio Perm						0.48					0.49
v/c Ratio		0.49			0.70	0.48			0.62	1.27	1.34
Uniform Delay, d1		12.7			15.2	12.7			23.3	28.5	28.5
Progression Factor		1.00			0.75	1.67			1.00	1.00	1.00
Incremental Delay, d2		0.1			0.5	0.2			1.7	135.6	165.4
Delay (s)		12.9			11.8	21.4			25.1	164.1	193.9
Level of Service		B			B	C			C	F	F
Approach Delay (s)		12.9			14.5		0.0			146.4	
Approach LOS		B			B		A			F	

Intersection Summary			
HCM Average Control Delay	55.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	141	1676	511	731	1793	75	499	425	608	313	1066	526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	1822	555	795	1949	82	542	462	661	340	1159	572
RTOR Reduction (vph)	0	0	115	0	0	50	0	0	308	0	0	73
Lane Group Flow (vph)	153	1822	440	795	1949	32	542	462	353	340	1159	499
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	19.0	19.0	20.0	35.0	35.0	6.0	24.1	24.1	10.9	29.0	29.0
Effective Green, g (s)	4.0	19.0	19.0	20.0	35.0	35.0	6.0	24.1	24.1	10.9	29.0	29.0
Actuated g/C Ratio	0.04	0.21	0.21	0.22	0.39	0.39	0.07	0.27	0.27	0.12	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	153	1074	334	763	1978	616	229	1362	424	416	1639	510
v/s Ratio Prot	0.04	c0.36		c0.23	0.38		c0.16	0.09		c0.10	0.23	
v/s Ratio Perm			0.35			0.05			0.42			0.36
v/c Ratio	1.00	1.70	1.32	1.04	0.99	0.05	2.37	0.34	0.83	0.82	0.71	0.98
Uniform Delay, d1	43.0	35.5	35.5	35.0	27.2	17.2	42.0	26.5	31.1	38.6	26.8	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	72.8	317.4	162.3	44.0	16.7	0.0	628.4	0.1	13.2	11.8	1.4	34.1
Delay (s)	115.8	352.9	197.8	79.0	44.0	17.2	670.4	26.7	44.2	50.4	28.2	64.3
Level of Service	F	F	F	E	D	B	F	C	D	D	C	E
Approach Delay (s)		304.6			53.1			243.2			41.8	
Approach LOS		F			D			F			D	

Intersection Summary			
HCM Average Control Delay	155.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	29	1435	306	150	1747	205	783	653	183	161	522	587
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	1560	333	163	1899	223	851	710	199	175	567	638
RTOR Reduction (vph)	0	0	217	0	0	114	0	0	144	0	0	239
Lane Group Flow (vph)	32	1560	116	163	1899	109	851	710	55	175	567	399
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.3	31.5	31.5	12.1	40.3	40.3	14.0	25.0	25.0	6.0	17.0	17.0
Effective Green, g (s)	3.3	31.5	31.5	12.1	40.3	40.3	14.0	25.0	25.0	6.0	17.0	17.0
Actuated g/C Ratio	0.04	0.35	0.35	0.13	0.44	0.44	0.15	0.28	0.28	0.07	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	64	1768	550	236	2262	704	530	977	437	227	664	297
v/s Ratio Prot	0.02	0.31		c0.09	c0.37		c0.25	0.20		0.05	0.16	
v/s Ratio Perm			0.21			0.14			0.13			0.40
v/c Ratio	0.50	0.88	0.21	0.69	0.84	0.16	1.61	0.73	0.13	0.77	0.85	1.34
Uniform Delay, d1	42.8	27.8	20.8	37.5	22.3	15.0	38.3	29.7	24.6	41.6	35.6	36.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	5.6	0.2	8.4	2.9	0.1	281.3	2.7	0.1	14.9	10.4	175.7
Delay (s)	48.9	33.4	21.0	45.9	25.2	15.1	319.6	32.4	24.7	56.5	46.0	212.5
Level of Service	D	C	C	D	C	B	F	C	C	E	D	F
Approach Delay (s)		31.5			25.7			170.4			124.3	
Approach LOS		C			C			F			F	

Intersection Summary				
HCM Average Control Delay	80.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.29			
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	102.4%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
29: Bear Valley Rd & I Avenue — AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	1509	403	199	1767	244	339
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1640	438	216	1921	265	368
RTOR Reduction (vph)	0	215	0	0	0	273
Lane Group Flow (vph)	1640	223	216	1921	265	95
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	32.2	32.2	7.4	43.6	11.7	11.7
Effective Green, g (s)	32.2	32.2	7.4	43.6	11.7	11.7
Actuated g/C Ratio	0.51	0.51	0.12	0.69	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2587	805	401	3502	635	293
v/s Ratio Prot	c0.32		0.06	c0.38	0.08	
v/s Ratio Perm		0.28				0.23
v/c Ratio	0.63	0.28	0.54	0.55	0.42	0.32
Uniform Delay, d1	11.3	8.9	26.3	4.9	22.8	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	1.4	0.2	0.4	0.6
Delay (s)	11.8	9.1	27.7	5.1	23.2	23.0
Level of Service	B	A	C	A	C	C
Approach Delay (s)	11.2			7.4	23.1	
Approach LOS	B			A	C	

Intersection Summary				
HCM Average Control Delay	11.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	56.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
30: Main St. & 3rd Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	154	1683	136	401	2042	60	219	661	201	316	399	181
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	167	1829	148	436	2220	65	238	718	218	343	434	197
RTOR Reduction (vph)	0	0	67	0	0	24	0	0	153	0	0	95
Lane Group Flow (vph)	167	1829	81	436	2220	41	238	718	65	343	434	102
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	33.0	33.0	7.0	36.0	36.0	13.0	18.0	18.0	13.5	18.5	18.5
Effective Green, g (s)	4.0	33.0	33.0	7.0	36.0	36.0	13.0	18.0	18.0	13.5	18.5	18.5
Actuated g/C Ratio	0.05	0.38	0.38	0.08	0.41	0.41	0.15	0.21	0.21	0.15	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	1335	597	275	1456	651	263	728	573	530	748	335
v/s Ratio Prot	0.05	0.52		c0.13	c0.63		c0.13	c0.20		0.10	0.12	
v/s Ratio Perm			0.09			0.04			0.08			0.12
v/c Ratio	1.06	1.37	0.14	1.59	1.52	0.06	0.90	0.99	0.11	0.65	0.58	0.31
Uniform Delay, d1	41.8	27.2	17.9	40.2	25.8	15.6	36.6	34.6	28.3	34.8	31.0	29.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	89.8	171.4	0.1	280.1	239.7	0.0	31.5	29.6	0.1	2.7	1.2	0.5
Delay (s)	131.5	198.6	18.0	320.4	265.4	15.6	68.2	64.3	28.3	37.5	32.2	29.6
Level of Service	F	F	B	F	F	B	E	E	C	D	C	C
Approach Delay (s)		180.9			268.3			58.4			33.5	
Approach LOS		F			F			E			C	

Intersection Summary				
HCM Average Control Delay	173.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.30			
Actuated Cycle Length (s)	87.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	101.5%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
31: Main St. & C Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91	0.85	1.00	0.91	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1605	1504	1770	1619	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1605	1504	1770	1619	1504
Volume (vph)	139	900	890	151	1554	155	397	69	327	81	27	91
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	978	967	164	1689	168	432	75	355	88	29	99
RTOR Reduction (vph)	0	0	522	0	0	73	0	67	195	0	34	55
Lane Group Flow (vph)	151	978	445	164	1689	95	432	130	38	88	33	6
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.1	36.3	36.3	6.1	37.3	37.3	13.1	12.7	12.7	7.8	7.4	7.4
Effective Green, g (s)	5.1	36.3	36.3	6.1	37.3	37.3	13.1	12.7	12.7	7.8	7.4	7.4
Actuated g/C Ratio	0.06	0.46	0.46	0.08	0.47	0.47	0.17	0.16	0.16	0.10	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	114	1628	1282	265	1673	748	570	258	242	175	152	141
v/s Ratio Prot	c0.09	0.28		0.05	c0.48		c0.13	0.12		0.05	0.04	
v/s Ratio Perm			0.35			0.11			0.15			0.04
v/c Ratio	1.32	0.60	0.35	0.62	1.01	0.13	0.76	0.50	0.15	0.50	0.21	0.04
Uniform Delay, d1	36.9	15.9	13.7	35.3	20.8	11.7	31.4	30.2	28.5	33.7	33.1	32.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	194.5	0.6	0.2	4.3	24.4	0.1	5.7	1.5	0.3	2.3	0.7	0.1
Delay (s)	231.4	16.5	13.8	39.5	45.2	11.7	37.1	31.8	28.8	36.0	33.8	32.6
Level of Service	F	B	B	D	D	B	D	C	C	D	C	C
Approach Delay (s)		30.8			41.9			33.6			34.4	
Approach LOS		C			D			C			C	

Intersection Summary				
HCM Average Control Delay	35.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
32: Main St. & E Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	1770	3534		1770	3504		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.36	1.00		0.41	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	1770	3534		665	3504		757	3539	1583
Volume (vph)	268	865	135	138	1099	10	305	484	34	50	273	248
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	291	940	147	150	1195	11	332	526	37	54	297	270
RTOR Reduction (vph)	0	0	88	0	1	0	0	6	0	0	0	225
Lane Group Flow (vph)	291	940	59	150	1205	0	332	557	0	54	297	45
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	15.1	34.9	34.9	11.9	31.7		28.5	22.2		16.8	14.5	14.5
Effective Green, g (s)	15.1	34.9	34.9	11.9	31.7		28.5	22.2		16.8	14.5	14.5
Actuated g/C Ratio	0.17	0.40	0.40	0.14	0.36		0.33	0.25		0.19	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	306	1415	1114	241	1283		344	891		172	588	263
v/s Ratio Prot	c0.16	c0.27		0.08	c0.34		c0.11	0.16		0.01	0.08	
v/s Ratio Perm			0.05				c0.20			0.05		0.17
v/c Ratio	0.95	0.66	0.05	0.62	0.94		0.97	0.63		0.31	0.51	0.17
Uniform Delay, d1	35.7	21.4	16.1	35.6	26.9		26.9	28.9		29.4	33.1	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.3	1.2	0.0	4.9	13.1		38.9	1.4		1.1	0.7	0.3
Delay (s)	74.1	22.6	16.1	40.5	39.9		65.8	30.2		30.4	33.8	31.5
Level of Service	E	C	B	D	D		E	C		C	C	C
Approach Delay (s)		32.8			40.0			43.4			32.5	
Approach LOS		C			D			D			C	

Intersection Summary					
HCM Average Control Delay	37.3	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.98				
Actuated Cycle Length (s)	87.3	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	83.3%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
33: Main St. & I Avenue

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	417	3539	1583
Volume (vph)	66	770	286	143	817	155	304	839	101	91	335	86
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	837	311	155	888	168	330	912	110	99	364	93
RTOR Reduction (vph)	0	0	216	0	0	111	0	0	70	0	0	69
Lane Group Flow (vph)	72	837	95	155	888	57	330	912	40	99	364	24
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	2.8	23.2	23.2	5.6	26.0	26.0	11.6	27.7	27.7	23.3	19.7	19.7
Effective Green, g (s)	2.8	23.2	23.2	5.6	26.0	26.0	11.6	27.7	27.7	23.3	19.7	19.7
Actuated g/C Ratio	0.04	0.30	0.30	0.07	0.34	0.34	0.15	0.36	0.36	0.31	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	126	1079	483	253	1209	541	523	1288	576	192	916	410
v/s Ratio Prot	0.02	0.24		c0.05	c0.25		c0.10	c0.26		0.02	0.10	
v/s Ratio Perm			0.20			0.11			0.07	0.13		0.06
v/c Ratio	0.57	0.78	0.20	0.61	0.73	0.11	0.63	0.71	0.07	0.52	0.40	0.06
Uniform Delay, d1	36.1	24.1	19.6	34.2	22.0	17.1	30.2	20.7	15.8	19.7	23.3	21.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	3.6	0.2	4.3	2.4	0.1	2.5	1.8	0.1	2.3	0.3	0.1
Delay (s)	42.2	27.6	19.8	38.5	24.4	17.2	32.7	22.5	15.8	22.0	23.6	21.3
Level of Service	D	C	B	D	C	B	C	C	B	C	C	C
Approach Delay (s)		26.5			25.2			24.5			22.9	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	25.0	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.70				
Actuated Cycle Length (s)	76.1	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	67.5%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3499		1770	3539	1583	1770	5032		1770	5068	
Flt Permitted	0.20	1.00		0.40	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	380	3499		747	3539	1583	1770	5032		1770	5068	
Volume (vph)	26	391	32	41	708	18	114	329	25	242	1404	32
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	425	35	45	770	20	124	358	27	263	1526	35
RTOR Reduction (vph)	0	6	0	0	0	14	0	9	0	0	3	0
Lane Group Flow (vph)	28	454	0	45	770	6	124	377	0	263	1558	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	19.6	19.6		19.6	19.6	19.6	5.7	23.4		12.6	30.3	
Effective Green, g (s)	19.6	19.6		19.6	19.6	19.6	5.7	23.4		12.6	30.3	
Actuated g/C Ratio	0.29	0.29		0.29	0.29	0.29	0.08	0.35		0.19	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	110	1015		217	1026	459	149	1742		330	2272	
v/s Ratio Prot		0.13			c0.22		0.07	0.08		c0.15	c0.31	
v/s Ratio Perm	0.07			0.06		0.01						
v/c Ratio	0.25	0.45		0.21	0.75	0.01	0.83	0.22		0.80	0.69	
Uniform Delay, d1	18.4	19.6		18.1	21.8	17.1	30.5	15.6		26.3	14.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.3		0.5	3.1	0.0	30.9	0.1		12.5	0.9	
Delay (s)	19.6	19.9		18.6	24.9	17.1	61.4	15.7		38.8	15.7	
Level of Service	B	B		B	C	B	E	B		D	B	
Approach Delay (s)		19.9			24.4			26.8			19.1	
Approach LOS		B			C			C			B	

Intersection Summary					
HCM Average Control Delay	21.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.71				
Actuated Cycle Length (s)	67.6	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	70.4%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
35: Smoketree & Hwy 395 AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.06	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	113	5085	5085	1583
Volume (vph)	361	320	68	1483	3103	1151
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	348	74	1612	3373	1251
RTOR Reduction (vph)	0	2	0	0	0	291
Lane Group Flow (vph)	392	346	74	1612	3373	960
Turn Type		custom	Perm			Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	16.0	16.0	66.0	66.0	66.0	66.0
Effective Green, g (s)	16.0	16.0	66.0	66.0	66.0	66.0
Actuated g/C Ratio	0.18	0.18	0.73	0.73	0.73	0.73
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	610	281	83	3729	3729	1161
v/s Ratio Prot				0.32	0.66	
v/s Ratio Perm	0.11	0.22	0.66			0.79
v/c Ratio	0.64	1.23	0.89	0.43	0.90	0.83
Uniform Delay, d1	34.3	37.0	9.2	4.7	9.5	8.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	131.7	63.7	0.1	3.5	5.0
Delay (s)	36.7	168.7	73.0	4.8	13.1	13.1
Level of Service	D	F	E	A	B	B
Approach Delay (s)	98.7			7.8	13.1	
Approach LOS	F			A	B	

Intersection Summary					
HCM Average Control Delay	20.8	HCM Level of Service		C	
HCM Volume to Capacity ratio	1.11				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	86.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
36: Mojave St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5085		3433	5030		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.46	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5085		3433	5030		854	5085	2787
Volume (vph)	1056	892	992	196	2433	2	719	428	33	15	660	405
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1148	970	1078	213	2645	2	782	465	36	16	717	440
RTOR Reduction (vph)	0	0	408	0	0	0	0	10	0	0	0	295
Lane Group Flow (vph)	1148	970	670	213	2647	0	782	491	0	16	717	145
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	32.0	32.0	10.0	29.0		13.0	34.8		17.8	17.8	17.8
Effective Green, g (s)	13.0	32.0	32.0	10.0	29.0		13.0	34.8		17.8	17.8	17.8
Actuated g/C Ratio	0.15	0.36	0.36	0.11	0.33		0.15	0.39		0.20	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	503	1832	1004	199	1661		503	1971		171	1019	559
v/s Ratio Prot	c0.33	0.19		0.12	c0.52		c0.23	0.10			0.14	
v/s Ratio Perm			0.39							0.02		0.16
v/c Ratio	2.28	0.53	0.67	1.07	1.59		1.55	0.25		0.09	0.70	0.26
Uniform Delay, d1	37.9	22.4	23.9	39.4	29.9		37.9	18.2		28.9	33.0	29.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	583.3	0.3	1.7	83.7	270.0		259.3	0.1		0.2	2.2	0.2
Delay (s)	621.2	22.7	25.6	123.1	299.9		297.2	18.3		29.2	35.3	30.2
Level of Service	F	C	C	F	F		F	B		C	D	C
Approach Delay (s)		238.7			286.7			188.3			33.3	
Approach LOS		F			F			F			C	

Intersection Summary				
HCM Average Control Delay	218.9	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.56			
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	123.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
37: Live Oak & Escondido Ave — AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1504	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1504	5085	1583	3433	5085
Volume (vph)	810	578	429	136	588	1145
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	880	628	466	148	639	1245
RTOR Reduction (vph)	0	278	0	125	0	0
Lane Group Flow (vph)	880	350	466	23	639	1245
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	44.0	44.0	13.6	13.6	17.0	34.6
Effective Green, g (s)	44.0	44.0	13.6	13.6	17.0	34.6
Actuated g/C Ratio	0.51	0.51	0.16	0.16	0.20	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	899	764	799	249	674	2032
v/s Ratio Prot			0.09		c0.19	c0.24
v/s Ratio Perm	0.50	0.42		0.09		
v/c Ratio	0.98	0.46	0.58	0.09	0.95	0.61
Uniform Delay, d1	20.8	13.7	33.9	31.2	34.4	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.6	0.4	1.1	0.2	22.5	0.6
Delay (s)	45.5	14.1	35.0	31.4	56.8	21.2
Level of Service	D	B	C	C	E	C
Approach Delay (s)	32.4		34.1			33.3
Approach LOS	C		C			C

Intersection Summary				
HCM Average Control Delay	33.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	91.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
38: Mojave & I-15 SB Ramps
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	1800	363	1287	2024	0	0	0	611	0	730
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1957	395	1399	2200	0	0	0	664	0	793
RTOR Reduction (vph)	0	0	241	0	0	0	0	0	0	0	10
Lane Group Flow (vph)	0	1957	154	1399	2200	0	0	0	664	0	783
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		35.0	35.0	22.0	61.0				21.0		21.0
Effective Green, g (s)		35.0	35.0	22.0	61.0				21.0		21.0
Actuated g/C Ratio		0.39	0.39	0.24	0.68				0.23		0.23
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1978	616	839	3447				801		369
v/s Ratio Prot		c0.38		c0.41	0.43						
v/s Ratio Perm			0.25						0.19		0.50
v/c Ratio		0.99	0.25	1.67	0.64				0.83		2.12
Uniform Delay, d1		27.3	18.6	34.0	8.2				32.8		34.5
Progression Factor		1.00	1.00	0.84	2.23				1.00		1.00
Incremental Delay, d2		17.6	0.2	300.8	0.0				9.7		514.0
Delay (s)		44.9	18.8	329.3	18.4				42.5		548.5
Level of Service		D	B	F	B				D		F
Approach Delay (s)		40.5			139.2		0.0			317.9	
Approach LOS		D			F		A			F	

Intersection Summary			
HCM Average Control Delay	143.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	483	1928	0	0	3162	396	0	0	149	0	1011
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	525	2096	0	0	3437	430	0	0	162	0	1099
RTOR Reduction (vph)	0	0	0	0	0	150	0	0	0	0	21
Lane Group Flow (vph)	525	2096	0	0	3437	280	0	0	162	0	1078
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	11.0	61.0			46.0	46.0			21.0		21.0
Effective Green, g (s)	11.0	61.0			46.0	46.0			21.0		21.0
Actuated g/C Ratio	0.12	0.68			0.51	0.51			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	420	3447			2599	809			413		650
v/s Ratio Prot	c0.15	0.41			c0.68						
v/s Ratio Perm						0.27			0.09		0.39
v/c Ratio	1.25	0.61			1.32	0.35			0.39		1.66
Uniform Delay, d1	39.5	7.9			22.0	13.1			29.1		34.5
Progression Factor	0.78	2.78			1.00	1.00			1.00		1.00
Incremental Delay, d2	119.1	0.1			147.9	0.3			2.8		302.8
Delay (s)	149.9	22.2			169.9	13.3			31.9		337.3
Level of Service	F	C			F	B			C		F
Approach Delay (s)		47.8			152.5		0.0			298.1	
Approach LOS		D			F		A			F	

Intersection Summary			
HCM Average Control Delay	140.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3538		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.31	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	571	5085	1583	1770	3538		3433	3539	1583
Volume (vph)	76	822	148	4	1423	818	400	1020	2	126	451	573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	893	161	4	1547	889	435	1109	2	137	490	623
RTOR Reduction (vph)	0	0	89	0	0	89	0	0	0	0	0	73
Lane Group Flow (vph)	83	893	72	4	1547	800	435	1111	0	137	490	550
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	3.1	40.1	40.1	33.0	33.0	33.0	12.0	33.0		4.0	25.0	25.0
Effective Green, g (s)	3.1	40.1	40.1	33.0	33.0	33.0	12.0	33.0		4.0	25.0	25.0
Actuated g/C Ratio	0.03	0.45	0.45	0.37	0.37	0.37	0.13	0.37		0.04	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	119	2289	712	211	1883	586	238	1310		154	993	444
v/s Ratio Prot	c0.02	0.18			0.30		c0.25	0.31		0.04	0.14	
v/s Ratio Perm			0.10	0.01		0.56						0.39
v/c Ratio	0.70	0.39	0.10	0.02	0.82	1.36	1.83	0.85		0.89	0.49	1.24
Uniform Delay, d1	42.5	16.3	14.1	17.8	25.4	28.0	38.5	25.7		42.3	26.8	32.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.3	0.1	0.1	0.0	3.0	174.8	388.5	5.3		41.5	0.4	125.8
Delay (s)	58.9	16.5	14.2	17.8	28.4	202.9	427.0	31.0		83.8	27.2	157.8
Level of Service	E	B	B	B	C	F	F	C		F	C	F
Approach Delay (s)		19.2			91.9			142.5			98.5	
Approach LOS		B			F			F			F	

Intersection Summary				
HCM Average Control Delay	92.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.49			
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	95.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3459	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3459	
Volume (vph)	110	1624	220	351	1627	36	180	907	300	237	634	112
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1765	239	382	1768	39	196	986	326	258	689	122
RTOR Reduction (vph)	0	0	27	0	0	10	0	0	111	0	16	0
Lane Group Flow (vph)	120	1765	212	382	1768	29	196	986	215	258	795	0
Turn Type	Prot		pt+ov	Prot		pt+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	8 1	5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	5.0	30.0	40.0	10.0	35.0	46.0	6.0	26.9	26.9	7.0	27.9	
Effective Green, g (s)	5.0	30.0	40.0	10.0	35.0	46.0	6.0	26.9	26.9	7.0	27.9	
Actuated g/C Ratio	0.06	0.33	0.44	0.11	0.39	0.51	0.07	0.30	0.30	0.08	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1697	704	382	1980	810	229	1059	474	267	1073	
v/s Ratio Prot	0.03	c0.35	0.15	c0.11	0.35	0.02	0.06	c0.28		c0.08	0.23	
v/s Ratio Perm									0.21			
v/c Ratio	0.63	1.04	0.30	1.00	0.89	0.04	0.86	0.93	0.45	0.97	0.74	
Uniform Delay, d1	41.5	30.0	16.0	40.0	25.7	10.9	41.5	30.6	25.5	41.3	27.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.3	33.1	0.2	46.0	5.6	0.0	25.5	14.0	0.7	45.3	2.8	
Delay (s)	47.9	63.0	16.2	86.0	31.3	10.9	67.0	44.6	26.2	86.7	30.6	
Level of Service	D	E	B	F	C	B	E	D	C	F	C	
Approach Delay (s)		56.9			40.5			43.6			44.1	
Approach LOS		E			D			D			D	

Intersection Summary				
HCM Average Control Delay	46.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	86.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
42: Lemon St & E Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.88			0.97	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	2787			3433	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.72	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	2787			2608	1583
Volume (vph)	68	758	392	89	1300	38	372	264	97	93	201	241
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	824	426	97	1413	41	404	287	105	101	218	262
RTOR Reduction (vph)	0	0	276	0	0	26	0	35	0	0	0	140
Lane Group Flow (vph)	74	824	150	97	1413	15	404	357	0	0	319	122
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	5.6	27.2	27.2	6.3	27.9	27.9	12.6	31.5			14.9	14.9
Effective Green, g (s)	5.6	27.2	27.2	6.3	27.9	27.9	12.6	31.5			14.9	14.9
Actuated g/C Ratio	0.07	0.35	0.35	0.08	0.36	0.36	0.16	0.41			0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	129	1796	559	145	1842	574	562	1140			505	306
v/s Ratio Prot	0.04	0.16		c0.05	c0.28		c0.12	0.14				
v/s Ratio Perm			0.27			0.03					0.12	0.17
v/c Ratio	0.57	0.46	0.27	0.67	0.77	0.03	0.72	0.31			0.63	0.40
Uniform Delay, d1	34.5	19.2	17.8	34.3	21.7	15.8	30.5	15.4			28.5	27.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	6.0	0.2	0.3	11.1	2.0	0.0	4.4	0.2			2.6	0.9
Delay (s)	40.6	19.4	18.1	45.4	23.7	15.8	34.9	15.6			31.1	28.0
Level of Service	D	B	B	D	C	B	C	B			C	C
Approach Delay (s)		20.2			24.8		25.4				29.7	
Approach LOS		C			C		C				C	

Intersection Summary				
HCM Average Control Delay	24.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
43: Lemon St & I Avenue

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5046		1770	5049		1770	3539	1583	1770	3473	
Flt Permitted	0.15	1.00		0.36	1.00		0.37	1.00	1.00	0.24	1.00	
Satd. Flow (perm)	274	5046		665	5049		692	3539	1583	447	3473	
Volume (vph)	13	600	32	149	1222	61	204	774	70	17	479	68
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	652	35	162	1328	66	222	841	76	18	521	74
RTOR Reduction (vph)	0	7	0	0	6	0	0	0	37	0	11	0
Lane Group Flow (vph)	14	680	0	162	1388	0	222	841	39	18	584	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	27.2	27.2		27.2	27.2		26.3	26.3	26.3	26.3	26.3	
Effective Green, g (s)	27.2	27.2		27.2	27.2		26.3	26.3	26.3	26.3	26.3	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.43	0.43	0.43	0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	121	2232		294	2233		296	1513	677	191	1485	
v/s Ratio Prot		0.14			c0.28			0.24			0.17	
v/s Ratio Perm	0.05			0.24			c0.32		0.05	0.04		
v/c Ratio	0.12	0.30		0.55	0.62		0.75	0.56	0.06	0.09	0.39	
Uniform Delay, d1	10.1	11.1		12.6	13.2		14.8	13.2	10.3	10.5	12.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		2.2	0.5		10.2	0.4	0.0	0.2	0.2	
Delay (s)	10.5	11.1		14.9	13.7		25.0	13.7	10.4	10.7	12.3	
Level of Service	B	B		B	B		C	B	B	B	B	
Approach Delay (s)		11.1			13.9			15.7			12.2	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM Average Control Delay	13.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	68.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	1051	288	766	874	0	0	0	889	0	109
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1142	313	833	950	0	0	0	966	0	118
RTOR Reduction (vph)	0	0	197	0	0	0	0	0	0	0	88
Lane Group Flow (vph)	0	1142	116	833	950	0	0	0	966	0	30
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		33.3	33.3	22.0	59.3				22.7		22.7
Effective Green, g (s)		33.3	33.3	22.0	59.3				22.7		22.7
Actuated g/C Ratio		0.37	0.37	0.24	0.66				0.25		0.25
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1254	533	433	2332				866		399
v/s Ratio Prot		c0.34		c0.47	0.27						
v/s Ratio Perm			0.22						0.28		0.07
v/c Ratio		0.91	0.22	1.92	0.41				1.12		0.07
Uniform Delay, d1		26.9	19.4	34.0	7.2				33.6		25.6
Progression Factor		1.00	1.00	1.08	1.94				1.00		1.00
Incremental Delay, d2		10.0	0.2	419.5	0.1				67.4		0.4
Delay (s)		37.0	19.6	456.2	14.0				101.1		26.0
Level of Service		D	B	F	B				F		C
Approach Delay (s)		33.2			220.6		0.0			92.9	
Approach LOS		C			F		A			F	

Intersection Summary			
HCM Average Control Delay	125.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	145	1796	0	0	1582	1035	0	0	58	0	1036
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	1952	0	0	1720	1125	0	0	63	0	1126
RTOR Reduction (vph)	0	0	0	0	0	375	0	0	0	0	29
Lane Group Flow (vph)	158	1952	0	0	1720	750	0	0	63	0	1097
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	9.0	61.0			48.0	48.0			21.0		21.0
Effective Green, g (s)	9.0	61.0			48.0	48.0			21.0		21.0
Actuated g/C Ratio	0.10	0.68			0.53	0.53			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	177	2399			1887	844			413		650
v/s Ratio Prot	0.09	c0.55			0.49						
v/s Ratio Perm						0.71			0.04		0.40
v/c Ratio	0.89	0.81			0.91	0.89			0.15		1.69
Uniform Delay, d1	40.0	10.4			19.1	18.6			27.4		34.5
Progression Factor	0.97	2.01			1.00	1.00			1.00		1.00
Incremental Delay, d2	13.0	0.5			7.1	11.2			0.8		316.0
Delay (s)	51.8	21.5			26.2	29.8			28.2		350.5
Level of Service	D	C			C	C			C		F
Approach Delay (s)		23.7			27.6		0.0			333.4	
Approach LOS		C			C		A			F	

Intersection Summary			
HCM Average Control Delay	85.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	498	577	1757	87	1891	13	516	164	35	26	449	211
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	541	627	1910	95	2055	14	561	178	38	28	488	229
RTOR Reduction (vph)	0	0	203	0	0	8	0	0	27	0	0	1
Lane Group Flow (vph)	541	627	1707	95	2055	6	561	178	11	28	488	228
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.3	37.3	37.3	6.9	27.9	27.9	12.0	24.9	24.9	3.0	15.9	32.2
Effective Green, g (s)	16.3	37.3	37.3	6.9	27.9	27.9	12.0	24.9	24.9	3.0	15.9	32.2
Actuated g/C Ratio	0.19	0.42	0.42	0.08	0.32	0.32	0.14	0.28	0.28	0.03	0.18	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	635	2153	670	139	1610	501	468	1437	447	60	918	650
v/s Ratio Prot	c0.16	0.12		0.05	0.40		c0.16	0.04		0.02	c0.10	0.07
v/s Ratio Perm			1.21			0.01			0.02			0.08
v/c Ratio	0.85	0.29	2.55	0.68	1.28	0.01	1.20	0.12	0.02	0.47	0.53	0.35
Uniform Delay, d1	34.7	16.7	25.4	39.5	30.1	20.6	38.0	23.5	22.8	41.8	32.7	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	0.1	700.9	13.0	129.3	0.0	108.5	0.0	0.0	5.6	0.6	0.3
Delay (s)	45.4	16.8	726.3	52.6	159.4	20.7	146.6	23.5	22.8	47.4	33.3	20.7
Level of Service	D	B	F	D	F	C	F	C	C	D	C	C
Approach Delay (s)		462.1			153.9			112.3			30.0	
Approach LOS		F			F			F			C	

Intersection Summary			
HCM Average Control Delay	275.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.89		
Actuated Cycle Length (s)	88.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	132.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.98		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3481		3433	3385		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3481		3433	3385		1770	3539	1583	3433	3539	1583
Volume (vph)	47	571	70	122	638	261	33	1152	266	115	845	92
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	621	76	133	693	284	36	1252	289	125	918	100
RTOR Reduction (vph)	0	11	0	0	50	0	0	0	108	0	0	57
Lane Group Flow (vph)	51	686	0	133	927	0	36	1252	181	125	918	43
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	2.8	23.3		4.9	25.4		2.1	32.9	32.9	3.5	34.3	34.3
Effective Green, g (s)	2.8	23.3		4.9	25.4		2.1	32.9	32.9	3.5	34.3	34.3
Actuated g/C Ratio	0.03	0.29		0.06	0.32		0.03	0.41	0.41	0.04	0.43	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	61	1006		209	1067		46	1445	646	149	1506	674
v/s Ratio Prot	0.03	0.20		c0.04	c0.29		0.02	c0.35		c0.04	0.26	
v/s Ratio Perm									0.18			0.06
v/c Ratio	0.84	0.68		0.64	0.87		0.78	0.87	0.28	0.84	0.61	0.06
Uniform Delay, d1	38.7	25.4		37.0	26.0		39.0	21.8	15.9	38.3	18.0	13.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.3	1.9		6.2	7.7		57.8	5.7	0.2	31.8	0.7	0.0
Delay (s)	99.0	27.3		43.2	33.7		96.8	27.6	16.2	70.1	18.7	13.7
Level of Service	F	C		D	C		F	C	B	E	B	B
Approach Delay (s)		32.2			34.8			27.1			23.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
48: E Ave & I Avenue
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1837		1770	1857		1770	3475		1770	3440	
Flt Permitted	0.55	1.00		0.67	1.00		0.46	1.00		0.32	1.00	
Satd. Flow (perm)	1027	1837		1255	1857		863	3475		592	3440	
Volume (vph)	73	109	11	133	236	5	13	661	91	4	383	88
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	118	12	145	257	5	14	718	99	4	416	96
RTOR Reduction (vph)	0	5	0	0	1	0	0	11	0	0	20	0
Lane Group Flow (vph)	79	125	0	145	261	0	14	806	0	4	492	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.5	9.5		9.5	9.5		19.8	19.8		19.8	19.8	
Effective Green, g (s)	9.5	9.5		9.5	9.5		19.8	19.8		19.8	19.8	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.53	0.53		0.53	0.53	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	262	468		320	473		458	1845		314	1826	
v/s Ratio Prot		0.07			c0.14			c0.24			0.15	
v/s Ratio Perm	0.08			0.12			0.02			0.01		
v/c Ratio	0.30	0.27		0.45	0.55		0.03	0.44		0.01	0.27	
Uniform Delay, d1	11.2	11.1		11.7	12.1		4.2	5.3		4.1	4.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3		1.0	1.4		0.0	0.2		0.0	0.1	
Delay (s)	11.9	11.4		12.7	13.5		4.2	5.5		4.1	4.9	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		11.6			13.2			5.5			4.9	
Approach LOS		B			B			A			A	

Intersection Summary					
HCM Average Control Delay	7.6	HCM Level of Service		A	
HCM Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	37.3	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	47.9%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
49: Eucalyptus St & I Avenue
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3462		1770	3535		1770	3530		1770	3335	
Flt Permitted	0.95	1.00		0.46	1.00		0.95	1.00		0.48	1.00	
Satd. Flow (perm)	1770	3462		854	3535		1770	3530		890	3335	
Volume (vph)	431	411	70	91	607	5	248	434	7	14	389	243
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	468	447	76	99	660	5	270	472	8	15	423	264
RTOR Reduction (vph)	0	15	0	0	1	0	0	1	0	0	109	0
Lane Group Flow (vph)	468	508	0	99	664	0	270	479	0	15	578	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	21.0	43.0		18.0	18.0		15.4	37.3		17.9	17.9	
Effective Green, g (s)	21.0	43.0		18.0	18.0		15.4	37.3		17.9	17.9	
Actuated g/C Ratio	0.24	0.49		0.20	0.20		0.17	0.42		0.20	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	421	1686		174	721		309	1491		180	676	
v/s Ratio Prot	c0.26	0.15			c0.19		c0.15	0.14			c0.21	
v/s Ratio Perm				0.12						0.02		
v/c Ratio	1.11	0.30		0.57	0.92		0.87	0.32		0.08	0.85	
Uniform Delay, d1	33.6	13.6		31.7	34.5		35.5	17.0		28.5	33.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	77.7	0.1		4.2	17.2		22.8	0.1		0.2	10.3	
Delay (s)	111.4	13.7		35.9	51.6		58.3	17.2		28.7	44.2	
Level of Service	F	B		D	D		E	B		C	D	
Approach Delay (s)		59.8			49.6			32.0			43.9	
Approach LOS		E			D			C			D	

Intersection Summary					
HCM Average Control Delay	47.4	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.99				
Actuated Cycle Length (s)	88.3	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	86.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5068		3433	4858		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.30	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5068		3433	4858		566	3539	1583
Volume (vph)	181	569	795	510	1248	29	1492	582	247	10	649	229
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	618	864	554	1357	32	1622	633	268	11	705	249
RTOR Reduction (vph)	0	0	701	0	3	0	0	85	0	0	0	134
Lane Group Flow (vph)	197	618	163	554	1386	0	1622	816	0	11	705	115
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	8.0	17.0	17.0	13.0	22.0		27.0	48.0		17.0	17.0	17.0
Effective Green, g (s)	8.0	17.0	17.0	13.0	22.0		27.0	48.0		17.0	17.0	17.0
Actuated g/C Ratio	0.09	0.19	0.19	0.14	0.24		0.30	0.53		0.19	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	157	961	526	496	1239		1030	2591		107	668	299
v/s Ratio Prot	0.11	0.12		c0.16	0.27		c0.47	0.19			c0.20	
v/s Ratio Perm			0.31							0.02		0.16
v/c Ratio	1.25	0.64	0.31	1.12	1.12		1.57	0.31		0.10	1.06	0.39
Uniform Delay, d1	41.0	33.7	31.4	38.5	34.0		31.5	11.8		30.2	36.5	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	156.1	1.5	0.3	76.5	64.7		263.3	0.1		0.4	50.3	0.8
Delay (s)	197.1	35.2	31.8	115.0	98.7		294.8	11.8		30.6	86.8	32.8
Level of Service	F	D	C	F	F		F	B		C	F	C
Approach Delay (s)		52.4			103.3			193.8			72.2	
Approach LOS		D			F			F			E	

Intersection Summary					
HCM Average Control Delay	119.2	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.39				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	108.6%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
55: Sultana St & E Ave — AM Peak Hour

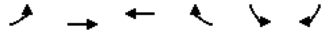
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.93		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3166		1770	3308		1770	3526		1770	3359	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3166		1770	3308		1770	3526		1770	3359	
Volume (vph)	105	129	305	48	414	319	308	838	21	23	295	152
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	140	332	52	450	347	335	911	23	25	321	165
RTOR Reduction (vph)	0	234	0	0	140	0	0	2	0	0	71	0
Lane Group Flow (vph)	114	238	0	52	657	0	335	932	0	25	415	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.8	22.8		4.0	20.0		17.6	33.5		1.3	17.2	
Effective Green, g (s)	6.8	22.8		4.0	20.0		17.6	33.5		1.3	17.2	
Actuated g/C Ratio	0.09	0.29		0.05	0.26		0.23	0.43		0.02	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	155	930		91	853		401	1522		30	745	
v/s Ratio Prot	c0.06	c0.15		0.03	c0.24		c0.19	c0.26		0.01	0.14	
v/s Ratio Perm												
v/c Ratio	0.74	0.26		0.57	0.77		0.84	0.61		0.83	0.56	
Uniform Delay, d1	34.5	20.9		36.0	26.7		28.6	17.0		38.0	26.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.5	0.1		8.4	4.2		14.0	0.7		95.9	0.9	
Delay (s)	51.0	21.1		44.4	30.9		42.6	17.8		133.9	27.7	
Level of Service	D	C		D	C		D	B		F	C	
Approach Delay (s)		26.9			31.7			24.3			32.9	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	28.1	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	77.6	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	70.9%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	287	177	587	1356	796	302
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	312	192	638	1474	865	328
RTOR Reduction (vph)	0	155	0	0	0	234
Lane Group Flow (vph)	312	38	638	1474	865	94
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	17.5	17.5	34.4	64.1	25.7	25.7
Effective Green, g (s)	17.5	17.5	34.4	64.1	25.7	25.7
Actuated g/C Ratio	0.20	0.20	0.38	0.72	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	346	309	680	2532	1015	454
v/s Ratio Prot			c0.36	0.42	c0.24	
v/s Ratio Perm	0.18	0.12				0.21
v/c Ratio	0.90	0.12	0.94	0.58	0.85	0.21
Uniform Delay, d1	35.2	29.7	26.6	6.2	30.2	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.5	0.2	20.5	1.0	9.0	1.0
Delay (s)	60.7	29.9	47.1	7.2	39.2	25.3
Level of Service	E	C	D	A	D	C
Approach Delay (s)	48.9			19.3	35.3	
Approach LOS	D			B	D	

Intersection Summary				
HCM Average Control Delay	28.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	80.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Volume (vph)	287	554	1004	760	679	843
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	312	602	1091	826	738	916
RTOR Reduction (vph)	0	0	0	337	0	235
Lane Group Flow (vph)	312	602	1091	489	738	681
Turn Type	Prot			Perm		Perm
Protected Phases	7		8		1	
Permitted Phases		4		8		1
Actuated Green, G (s)	8.6	39.8	27.2	27.2	11.1	11.1
Effective Green, g (s)	8.6	39.8	27.2	27.2	11.1	11.1
Actuated g/C Ratio	0.15	0.68	0.46	0.46	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	501	2391	1634	731	647	298
v/s Ratio Prot	c0.09		0.31		0.21	
v/s Ratio Perm		0.17		0.52		0.58
v/c Ratio	0.62	0.25	0.67	0.67	1.14	2.29
Uniform Delay, d1	23.6	3.7	12.3	12.3	23.9	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	0.1	1.0	2.3	80.9	589.6
Delay (s)	26.0	3.8	13.4	14.7	104.8	613.5
Level of Service	C	A	B	B	F	F
Approach Delay (s)		11.4	13.9		386.5	
Approach LOS		B	B		F	

Intersection Summary				
HCM Average Control Delay	150.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.50			
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	86.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	1129	692	0	2268	545	0	0	269	0	1202
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1227	752	0	2465	592	0	0	292	0	1307
RTOR Reduction (vph)	0	0	328	0	0	258	0	0	0	0	39
Lane Group Flow (vph)	0	1227	424	0	2465	334	0	0	292	0	1268
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		50.8	50.8		50.8	50.8			31.2		31.2
Effective Green, g (s)		50.8	50.8		50.8	50.8			31.2		31.2
Actuated g/C Ratio		0.56	0.56		0.56	0.56			0.35		0.35
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		2870	894		2870	894			614		549
v/s Ratio Prot		0.24			c0.48						
v/s Ratio Perm			0.47			0.37			0.17		0.83
v/c Ratio		0.43	0.47		0.86	0.37			0.48		2.31
Uniform Delay, d1		11.3	11.7		16.6	10.8			23.0		29.4
Progression Factor		0.71	1.60		1.00	1.00			1.00		1.00
Incremental Delay, d2		0.1	0.4		2.8	0.3			2.6		594.9
Delay (s)		8.1	19.1		19.3	11.1			25.6		624.3
Level of Service		A	B		B	B			C		F
Approach Delay (s)		12.3			17.7		0.0			515.0	
Approach LOS		B			B		A			F	

Intersection Summary			
HCM Average Control Delay	135.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		0.95	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3221	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3221	1441	1770	3539				3433		1583
Volume (vph)	0	360	565	380	1040	0	0	0	736	0	324
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	391	614	413	1130	0	0	0	800	0	352
RTOR Reduction (vph)	0	65	323	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	521	96	413	1130	0	0	0	800	0	269
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		20.7	20.7	24.9	49.6				32.4		32.4
Effective Green, g (s)		20.7	20.7	24.9	49.6				32.4		32.4
Actuated g/C Ratio		0.23	0.23	0.28	0.55				0.36		0.36
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		741	331	490	1950				1236		570
v/s Ratio Prot		0.18		c0.23	0.32						
v/s Ratio Perm			0.29						0.23		0.22
v/c Ratio		0.70	0.29	0.84	0.58				0.65		0.47
Uniform Delay, d1		31.8	28.6	30.7	13.3				24.0		22.2
Progression Factor		1.00	1.00	1.00	1.00				1.00		1.00
Incremental Delay, d2		3.0	0.5	12.5	0.4				2.6		2.8
Delay (s)		34.9	29.1	43.2	13.7				26.7		25.0
Level of Service		C	C	D	B				C		C
Approach Delay (s)		32.5			21.6		0.0			26.1	
Approach LOS		C			C		A			C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	34	1062	0	0	1060	896	0	0	359	0	760
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	1154	0	0	1152	974	0	0	390	0	826
RTOR Reduction (vph)	0	0	0	0	0	516	0	0	0	0	88
Lane Group Flow (vph)	37	1154	0	0	1152	458	0	0	390	0	738
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	5.1	54.3			45.2	45.2			35.7		35.7
Effective Green, g (s)	5.1	54.3			45.2	45.2			35.7		35.7
Actuated g/C Ratio	0.05	0.55			0.46	0.46			0.36		0.36
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	92	1961			1632	730			645		577
v/s Ratio Prot	0.02	c0.33			0.33						
v/s Ratio Perm						0.62			0.22		0.52
v/c Ratio	0.40	0.59			0.71	0.63			0.60		1.28
Uniform Delay, d1	45.0	14.5			21.1	20.0			25.4		31.1
Progression Factor	1.00	1.00			1.00	1.00			1.00		1.00
Incremental Delay, d2	2.9	0.5			1.4	1.7			4.2		138.7
Delay (s)	47.8	14.9			22.5	21.7			29.6		169.9
Level of Service	D	B			C	C			C		F
Approach Delay (s)		15.9			22.1		0.0			124.9	
Approach LOS		B			C		A			F	

Intersection Summary			
HCM Average Control Delay	48.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395 AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5055		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5055		3433	5085
Volume (vph)	192	300	1317	54	426	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	326	1432	59	463	1493
RTOR Reduction (vph)	0	262	5	0	0	0
Lane Group Flow (vph)	209	64	1486	0	463	1493
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	13.3	13.3	28.7		14.0	46.7
Effective Green, g (s)	13.3	13.3	28.7		14.0	46.7
Actuated g/C Ratio	0.20	0.20	0.42		0.21	0.69
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	346	310	2134		707	3492
v/s Ratio Prot	0.12		c0.29		c0.13	0.29
v/s Ratio Perm		0.21				
v/c Ratio	0.60	0.21	0.70		0.65	0.43
Uniform Delay, d1	24.9	22.9	16.1		24.8	4.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.0	0.3	1.0		2.2	0.1
Delay (s)	27.9	23.3	17.1		27.0	4.8
Level of Service	C	C	B		C	A
Approach Delay (s)	25.1		17.1			10.1
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.98		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3320		1770	3459		1770	3527		1770	3353	
Flt Permitted	0.25	1.00		0.51	1.00		0.31	1.00		0.30	1.00	
Satd. Flow (perm)	469	3320		954	3459		573	3527		561	3353	
Volume (vph)	46	146	103	23	427	76	368	789	18	20	513	278
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	159	112	25	464	83	400	858	20	22	558	302
RTOR Reduction (vph)	0	91	0	0	16	0	0	2	0	0	11	0
Lane Group Flow (vph)	50	180	0	25	531	0	400	876	0	22	849	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.9	15.9		15.9	15.9		61.5	61.5		61.5	61.5	
Effective Green, g (s)	15.9	15.9		15.9	15.9		61.5	61.5		61.5	61.5	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.72	0.72		0.72	0.72	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	87	618		178	644		413	2540		404	2415	
v/s Ratio Prot		0.08			c0.16			0.25			0.26	
v/s Ratio Perm	0.11			0.03			c0.70			0.04		
v/c Ratio	0.57	0.29		0.14	0.82		0.97	0.34		0.05	0.35	
Uniform Delay, d1	31.7	29.9		29.0	33.4		11.1	4.4		3.5	4.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.9	0.3		0.4	8.4		35.7	0.1		0.1	0.1	
Delay (s)	40.5	30.2		29.4	41.8		46.7	4.5		3.5	4.6	
Level of Service	D	C		C	D		D	A		A	A	
Approach Delay (s)		31.8			41.3			17.7			4.5	
Approach LOS		C			D			B			A	

Intersection Summary					
HCM Average Control Delay	19.8	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.94				
Actuated Cycle Length (s)	85.4	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	74.4%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
74: Main St. & Cottonwood Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5072		1770	5085	1583	1770	1863	1583	3433	3332	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5072		1770	5085	1583	1770	1863	1583	3433	3332	
Volume (vph)	69	1730	30	43	1597	325	132	232	47	356	272	174
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1880	33	47	1736	353	143	252	51	387	296	189
RTOR Reduction (vph)	0	2	0	0	0	202	0	0	41	0	104	0
Lane Group Flow (vph)	75	1911	0	47	1736	151	143	252	10	387	381	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	3.7	35.7		2.7	34.7	34.7	8.3	15.5	15.5	11.1	18.3	
Effective Green, g (s)	3.7	35.7		2.7	34.7	34.7	8.3	15.5	15.5	11.1	18.3	
Actuated g/C Ratio	0.05	0.44		0.03	0.43	0.43	0.10	0.19	0.19	0.14	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	81	2235		59	2178	678	181	357	303	470	753	
v/s Ratio Prot	c0.04	c0.38		0.03	0.34		0.08	0.14		c0.11	c0.15	
v/s Ratio Perm						0.22			0.03			
v/c Ratio	0.93	0.86		0.80	0.80	0.22	0.79	0.71	0.03	0.82	0.51	
Uniform Delay, d1	38.5	20.3		38.9	20.1	14.6	35.5	30.6	26.6	34.0	27.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	74.7	3.4		51.1	2.1	0.2	20.5	6.2	0.0	11.1	0.5	
Delay (s)	113.2	23.8		90.0	22.2	14.8	56.0	36.9	26.7	45.1	27.9	
Level of Service	F	C		F	C	B	E	D	C	D	C	
Approach Delay (s)		27.1			22.5			41.8			35.6	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM Average Control Delay	27.9	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.78				
Actuated Cycle Length (s)	81.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	73.1%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
75: Main St. & 7th Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	199	1710	248	5	1460	55	387	475	3	107	196	297
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	1859	270	5	1587	60	421	516	3	116	213	323
RTOR Reduction (vph)	0	0	108	0	0	30	0	0	2	0	0	133
Lane Group Flow (vph)	216	1859	162	5	1587	30	421	516	1	116	213	190
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	49.6	49.6	0.8	44.4	44.4	10.0	16.4	16.4	7.8	14.2	14.2
Effective Green, g (s)	6.0	49.6	49.6	0.8	44.4	44.4	10.0	16.4	16.4	7.8	14.2	14.2
Actuated g/C Ratio	0.07	0.55	0.55	0.01	0.49	0.49	0.11	0.18	0.18	0.09	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	1937	867	16	1734	776	379	641	287	152	555	437
v/s Ratio Prot	c0.06	c0.53		0.00	0.45		c0.12	c0.15		0.07	0.06	
v/s Ratio Perm			0.17			0.04			0.00			0.12
v/c Ratio	0.95	0.96	0.19	0.31	0.92	0.04	1.11	0.80	0.00	0.76	0.38	0.43
Uniform Delay, d1	42.2	19.5	10.3	44.6	21.4	12.0	40.3	35.6	30.4	40.5	34.3	34.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	46.0	12.2	0.1	10.9	7.9	0.0	79.7	7.3	0.0	20.0	0.4	0.7
Delay (s)	88.2	31.7	10.4	55.5	29.3	12.0	120.0	42.8	30.4	60.5	34.7	35.3
Level of Service	F	C	B	E	C	B	F	D	C	E	C	D
Approach Delay (s)		34.5			28.8			77.3			39.6	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM Average Control Delay	40.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
76: Main St. & Peach Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5011		1770	4940		1770	3539	1583	1770	3354	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5011		1770	4940		1770	3539	1583	1770	3354	
Volume (vph)	59	436	47	197	917	216	93	165	315	68	172	92
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	474	51	214	997	235	101	179	342	74	187	100
RTOR Reduction (vph)	0	13	0	0	41	0	0	0	281	0	82	0
Lane Group Flow (vph)	64	512	0	214	1191	0	101	179	61	74	205	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	3.6	16.7		10.0	23.1		4.4	10.3	10.3	4.3	10.2	
Effective Green, g (s)	3.6	16.7		10.0	23.1		4.4	10.3	10.3	4.3	10.2	
Actuated g/C Ratio	0.06	0.29		0.17	0.40		0.08	0.18	0.18	0.08	0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	111	1460		309	1992		136	636	285	133	597	
v/s Ratio Prot	0.04	0.10		c0.12	c0.25		c0.06	0.05		0.04	0.09	
v/s Ratio Perm									0.22			
v/c Ratio	0.58	0.35		0.69	0.60		0.74	0.28	0.22	0.56	0.34	
Uniform Delay, d1	26.1	16.0		22.2	13.4		25.9	20.3	20.1	25.6	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	0.1		6.6	0.5		19.5	0.2	0.4	5.0	0.3	
Delay (s)	33.2	16.2		28.8	13.9		45.4	20.5	20.4	30.5	21.0	
Level of Service	C	B		C	B		D	C	C	C	C	
Approach Delay (s)		18.0			16.1			24.5			22.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
77: Danbury Ave & I Avenue — AM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.85	
Flt Protected	0.95	0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3413		1770	3532		1770	3491		1770	2787	
Flt Permitted	0.47	0.96		0.50	1.00		0.95	1.00		0.49	1.00	
Satd. Flow (perm)	875	3413		933	3532		1770	3491		912	2787	
Volume (vph)	88	367	32	5	799	11	27	362	36	248	376	8
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	399	35	5	868	12	29	393	39	270	409	9
RTOR Reduction (vph)	0	8	0	0	1	0	0	8	0	0	2	0
Lane Group Flow (vph)	96	426	0	5	879	0	29	424	0	270	416	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	21.6	21.6		19.6	19.6		1.0	24.6		21.6	21.6	
Effective Green, g (s)	21.6	21.6		19.6	19.6		1.0	24.6		21.6	21.6	
Actuated g/C Ratio	0.40	0.40		0.36	0.36		0.02	0.45		0.40	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	349	1360		337	1277		33	1584		363	1111	
v/s Ratio Prot		0.13			c0.25		c0.02	0.12				
v/s Ratio Perm	0.11			0.01						c0.30	0.15	
v/c Ratio	0.28	0.31		0.01	0.69		0.88	0.27		0.74	0.37	
Uniform Delay, d1	11.0	11.2		11.1	14.7		26.5	9.2		13.9	11.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.0	1.6		106.2	0.1		8.0	0.2	
Delay (s)	11.4	11.3		11.1	16.3		132.8	9.3		22.0	11.7	
Level of Service	B	B		B	B		F	A		C	B	
Approach Delay (s)		11.4			16.2			17.1		15.7		
Approach LOS		B			B			B		B		

Intersection Summary					
HCM Average Control Delay	15.2	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	54.2	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	57.7%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
78: Ranchero Rd & Danbury Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0							
Lane Util. Factor	0.97	0.91		1.00	0.91							
Frt	1.00	0.95		1.00	0.97							
Flt Protected	0.95	1.00		0.95	1.00							
Satd. Flow (prot)	3433	4843		1770	4938							
Flt Permitted	0.95	1.00		0.95	1.00							
Satd. Flow (perm)	3433	4843		1770	4938							
Volume (vph)	410	418	194	97	586	140	0	0	0	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	446	454	211	105	637	152	0	0	0	0	0	0
RTOR Reduction (vph)	0	62	0	0	36	0	0	0	0	0	0	0
Lane Group Flow (vph)	446	603	0	105	753	0	0	0	0	0	0	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	10.9	20.1		5.1	14.3							
Effective Green, g (s)	10.9	20.1		5.1	14.3							
Actuated g/C Ratio	0.25	0.47		0.12	0.33							
Clearance Time (s)	4.0	4.0		4.0	4.0							
Vehicle Extension (s)	3.0	3.0		3.0	3.0							
Lane Grp Cap (vph)	874	2274		211	1650							
v/s Ratio Prot	c0.13	0.14		0.06	c0.16							
v/s Ratio Perm												
v/c Ratio	0.51	0.27		0.50	0.46							
Uniform Delay, d1	13.7	6.9		17.7	11.2							
Progression Factor	1.00	1.00		1.00	1.00							
Incremental Delay, d2	0.5	0.1		1.8	0.2							
Delay (s)	14.2	6.9		19.5	11.4							
Level of Service	B	A		B	B							
Approach Delay (s)		9.8			12.3			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary					
HCM Average Control Delay	11.0	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	42.8	Sum of lost time (s)		17.6	
Intersection Capacity Utilization	32.8%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
1: Highway 138 & Summit Valley Rd PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.25	1.00
Satd. Flow (perm)	3433	5085	5085	1583	463	2787
Volume (vph)	1372	2406	792	28	23	575
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1491	2615	861	30	25	625
RTOR Reduction (vph)	0	0	0	22	0	464
Lane Group Flow (vph)	1491	2615	861	8	25	161
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	15.6	36.4	16.8	16.8	16.1	15.6
Effective Green, g (s)	15.6	36.4	16.8	16.8	16.1	15.6
Actuated g/C Ratio	0.26	0.60	0.28	0.28	0.27	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	885	3059	1412	440	123	719
v/s Ratio Prot	c0.43	c0.51	0.17			0.22
v/s Ratio Perm				0.02	c0.05	
v/c Ratio	1.68	0.85	0.61	0.02	0.20	0.22
Uniform Delay, d1	22.4	9.9	19.0	15.9	17.2	17.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	313.1	2.5	0.8	0.0	0.8	0.2
Delay (s)	335.5	12.4	19.8	15.9	18.0	17.8
Level of Service	F	B	B	B	B	B
Approach Delay (s)		129.7	19.6		17.9	
Approach LOS		F	B		B	

Intersection Summary			
HCM Average Control Delay	99.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.91	0.91				1.00		1.00
Frt		0.96		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	0.98				0.95		1.00
Satd. Flow (prot)		3411		1610	3339				1770		1583
Flt Permitted		1.00		0.95	0.46				0.95		1.00
Satd. Flow (perm)		3411		1610	1543				1770		1583
Volume (vph)	0	1009	320	722	639	0	0	0	239	0	623
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1097	348	785	695	0	0	0	260	0	677
RTOR Reduction (vph)	0	35	0	0	0	0	0	0	0	0	51
Lane Group Flow (vph)	0	1410	0	477	1003	0	0	0	260	0	626
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		45.2		36.8	36.8				45.2		45.2
Effective Green, g (s)		45.2		36.8	36.8				45.2		45.2
Actuated g/C Ratio		0.50		0.41	0.41				0.50		0.50
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1713		658	1365				889		795
v/s Ratio Prot		0.42		0.30	c0.30						
v/s Ratio Perm									0.15		0.43
v/c Ratio		0.82		0.72	0.73				0.29		0.79
Uniform Delay, d1		19.0		22.3	22.5				13.1		18.4
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		4.6		4.0	2.1				0.8		7.8
Delay (s)		23.6		26.3	24.6				13.9		26.2
Level of Service		C		C	C				B		C
Approach Delay (s)		23.6			25.1		0.0			22.8	
Approach LOS		C			C		A			C	

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave PM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		
Lane Util. Factor	0.97		1.00		
Frt	1.00		0.86		
Flt Protected	0.95		1.00		
Satd. Flow (prot)	3433		1611		
Flt Permitted	0.95		1.00		
Satd. Flow (perm)	3433		1611		
Volume (vph)	1905	0	543	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2071	0	590	0	0
RTOR Reduction (vph)	0	0	477	0	0
Lane Group Flow (vph)	2071	0	113	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	64.8		17.2		
Effective Green, g (s)	64.8		17.2		
Actuated g/C Ratio	0.72		0.19		
Clearance Time (s)	4.0		4.0		
Vehicle Extension (s)	3.0		3.0		
Lane Grp Cap (vph)	2472		308		
v/s Ratio Prot	c0.60				
v/s Ratio Perm			0.37		
v/c Ratio	0.84		0.37		
Uniform Delay, d1	8.9		31.7		
Progression Factor	1.00		1.00		
Incremental Delay, d2	2.6		3.3		
Delay (s)	11.5		35.0		
Level of Service	B		C		
Approach Delay (s)	11.5	35.0		0.0	
Approach LOS	B	C		A	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
9: Ranchero Rd & Caliente Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	104	597	281	1179	1174	430	741	407	1317	449	252	134
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	649	305	1282	1276	467	805	442	1432	488	274	146
RTOR Reduction (vph)	0	0	230	0	0	215	0	0	454	0	0	97
Lane Group Flow (vph)	113	649	75	1282	1276	253	805	442	978	488	274	49
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	22.0	22.0	18.0	35.0	35.0	17.0	26.0	26.0	8.0	17.0	17.0
Effective Green, g (s)	5.0	22.0	22.0	18.0	35.0	35.0	17.0	26.0	26.0	8.0	17.0	17.0
Actuated g/C Ratio	0.06	0.24	0.24	0.20	0.39	0.39	0.19	0.29	0.29	0.09	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	98	1243	387	687	1978	616	648	538	805	305	352	299
v/s Ratio Prot	0.06	0.13		c0.37	0.25		0.23	0.24		c0.14	0.15	
v/s Ratio Perm			0.19			0.29			0.51			0.09
v/c Ratio	1.15	0.52	0.19	1.87	0.65	0.41	1.24	0.82	1.22	1.60	0.78	0.16
Uniform Delay, d1	42.5	29.4	27.0	36.0	22.4	20.0	36.5	29.8	32.0	41.0	34.7	30.5
Progression Factor	1.00	1.00	1.00	1.15	0.67	0.59	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	138.0	0.4	0.2	392.3	0.3	0.2	121.8	13.2	108.2	284.9	15.5	1.2
Delay (s)	180.5	29.8	27.2	433.6	15.5	11.9	158.3	43.1	140.2	325.9	50.3	31.7
Level of Service	F	C	C	F	B	B	F	D	F	F	D	C
Approach Delay (s)		45.0			192.1			129.6			195.4	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	150.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4806	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4806	1362	3433	5085				1770		2787
Volume (vph)	0	2151	212	264	1647	0	0	0	596	0	1137
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2338	230	287	1790	0	0	0	648	0	1236
RTOR Reduction (vph)	0	0	112	0	0	0	0	0	0	0	13
Lane Group Flow (vph)	0	2338	118	287	1790	0	0	0	648	0	1223
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		37.0	37.0	8.0	49.0				33.0		33.0
Effective Green, g (s)		37.0	37.0	8.0	49.0				33.0		33.0
Actuated g/C Ratio		0.41	0.41	0.09	0.54				0.37		0.37
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1976	560	305	2769				649		1022
v/s Ratio Prot		c0.49		c0.08	0.35						
v/s Ratio Perm			0.17						0.37		0.44
v/c Ratio		1.18	0.21	0.94	0.65				1.00		1.20
Uniform Delay, d1		26.5	17.1	40.8	14.4				28.5		28.5
Progression Factor		1.17	2.05	0.71	2.51				1.00		1.00
Incremental Delay, d2		83.0	0.0	19.9	0.2				35.0		98.0
Delay (s)		114.0	35.0	49.0	36.3				63.4		126.5
Level of Service		F	C	D	D				E		F
Approach Delay (s)		106.9			38.1		0.0			104.8	
Approach LOS		F			D		A			F	

Intersection Summary			
HCM Average Control Delay	84.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	117.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	1231	1517	0	0	1214	1220	0	0	697	0	1215
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1338	1649	0	0	1320	1326	0	0	758	0	1321
RTOR Reduction (vph)	0	0	0	0	0	543	0	0	0	0	7
Lane Group Flow (vph)	1338	1649	0	0	1320	783	0	0	758	0	1314
Turn Type	Prot					Perm			Prot		custom
Protected Phases	7	4			8				5		
Permitted Phases						8					2
Actuated Green, G (s)	20.0	45.0			21.0	21.0			37.0		37.0
Effective Green, g (s)	20.0	45.0			21.0	21.0			37.0		37.0
Actuated g/C Ratio	0.22	0.50			0.23	0.23			0.41		0.41
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	763	2543			1187	369			1411		651
v/s Ratio Prot	c0.39	0.32			0.26				0.22		
v/s Ratio Perm						0.84					0.83
v/c Ratio	1.75	0.65			1.11	2.12			0.54		2.02
Uniform Delay, d1	35.0	16.6			34.5	34.5			20.0		26.5
Progression Factor	1.26	1.37			0.67	2.24			1.00		1.00
Incremental Delay, d2	339.6	0.1			51.7	506.0			0.4		463.7
Delay (s)	383.6	22.8			74.8	583.4			20.4		490.2
Level of Service	F	C			E	F			C		F
Approach Delay (s)		184.4			329.7		0.0			318.9	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	270.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	117.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00		0.91	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085		3433	5085	1583		4642	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085		3433	5085	1583		4642	
Volume (vph)	895	1409	428	529	851	0	1115	487	923	0	398	553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	973	1532	465	575	925	0	1212	529	1003	0	433	601
RTOR Reduction (vph)	0	0	327	0	0	0	0	0	317	0	281	0
Lane Group Flow (vph)	973	1532	138	575	925	0	1212	529	686	0	753	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Perm		
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	21.3	19.8	19.8	17.5	16.0		20.0	40.7	40.7		16.7	
Effective Green, g (s)	21.3	19.8	19.8	17.5	16.0		20.0	40.7	40.7		16.7	
Actuated g/C Ratio	0.24	0.22	0.22	0.19	0.18		0.22	0.45	0.45		0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	812	1119	348	668	904		763	2300	716		861	
v/s Ratio Prot	c0.28	c0.30		0.17	0.18		c0.35	0.10			0.22	
v/s Ratio Perm			0.29						0.63			
v/c Ratio	1.20	1.37	0.40	0.86	1.02		1.59	0.23	0.96		1.05dr	
Uniform Delay, d1	34.4	35.1	30.0	35.1	37.0		35.0	15.1	23.8		35.6	
Progression Factor	1.08	1.03	1.34	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	90.4	166.6	0.1	11.0	36.0		271.0	0.2	24.9		12.0	
Delay (s)	127.4	202.9	40.2	46.1	73.0		306.0	15.3	48.8		47.7	
Level of Service	F	F	D	D	E		F	B	D		D	
Approach Delay (s)		152.7			62.6			155.9			47.7	
Approach LOS		F			E			F			D	

Intersection Summary			
HCM Average Control Delay	124.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.6%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Hesperia GP Update
13: Ranchero Rd & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5017		1770	4972		1770	3475		1770	3455	
Flt Permitted	0.10	1.00		0.10	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	179	5017		177	4972		1770	3475		1770	3455	
Volume (vph)	57	1873	185	28	1219	212	64	155	21	410	282	53
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	2036	201	30	1325	230	70	168	23	446	307	58
RTOR Reduction (vph)	0	12	0	0	26	0	0	12	0	0	17	0
Lane Group Flow (vph)	62	2225	0	30	1529	0	70	179	0	446	348	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	42.0	42.0		42.0	42.0		7.5	10.4		20.0	22.9	
Effective Green, g (s)	42.0	42.0		42.0	42.0		7.5	10.4		20.0	22.9	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.09	0.12		0.24	0.27	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	89	2497		88	2474		157	428		419	937	
v/s Ratio Prot		c0.45			0.31		0.04	0.05		c0.25	c0.11	
v/s Ratio Perm	0.35			0.17								
v/c Ratio	0.70	0.89		0.34	0.62		0.45	0.42		1.06	0.37	
Uniform Delay, d1	16.3	19.1		12.8	15.4		36.5	34.2		32.2	24.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.1	4.5		2.3	0.5		2.0	0.7		62.1	0.2	
Delay (s)	37.4	23.6		15.1	15.8		38.5	34.9		94.3	25.2	
Level of Service	D	C		B	B		D	C		F	C	
Approach Delay (s)		24.0			15.8			35.8			63.2	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Hesperia GP Update
14: Ranchero Rd & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5040		1770	3508		1770	3473	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5040		1770	3508		1770	3473	
Volume (vph)	163	1841	336	13	1325	84	73	363	23	156	480	68
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	2001	365	14	1440	91	79	395	25	170	522	74
RTOR Reduction (vph)	0	0	183	0	8	0	0	5	0	0	12	0
Lane Group Flow (vph)	177	2001	182	14	1523	0	79	415	0	170	584	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.2	42.5	42.5	0.7	35.0		7.2	15.7		10.4	18.9	
Effective Green, g (s)	8.2	42.5	42.5	0.7	35.0		7.2	15.7		10.4	18.9	
Actuated g/C Ratio	0.10	0.50	0.50	0.01	0.41		0.08	0.18		0.12	0.22	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	170	2534	789	15	2068		149	646		216	770	
v/s Ratio Prot	c0.10	c0.39		0.01	0.30		0.04	0.12		c0.10	c0.17	
v/s Ratio Perm			0.23									
v/c Ratio	1.04	0.79	0.23	0.93	0.74		0.53	0.64		0.79	0.76	
Uniform Delay, d1	38.5	17.7	12.1	42.3	21.3		37.4	32.2		36.4	31.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	80.3	1.7	0.2	197.1	1.4		3.6	2.2		17.0	4.3	
Delay (s)	118.9	19.4	12.3	239.4	22.7		41.0	34.4		53.4	35.4	
Level of Service	F	B	B	F	C		D	C		D	D	
Approach Delay (s)		25.3			24.6			35.4			39.4	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM Average Control Delay	28.1	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	85.3	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
15: Ranchero Rd & I Avenue — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.93		1.00	0.98		1.00	0.94		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4751		1770	3473		1770	4782		1770	3445	
Flt Permitted	0.95	1.00		0.95	1.00		0.13	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4751		1770	3473		243	4782		1770	3445	
Volume (vph)	85	486	379	270	375	53	329	511	337	13	736	159
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	528	412	293	408	58	358	555	366	14	800	173
RTOR Reduction (vph)	0	156	0	0	12	0	0	113	0	0	20	0
Lane Group Flow (vph)	92	784	0	293	454	0	358	808	0	14	953	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	7.6	16.8		16.0	25.2		45.6	35.4		6.2	26.6	
Effective Green, g (s)	7.6	16.8		16.0	25.2		45.6	35.4		6.2	26.6	
Actuated g/C Ratio	0.08	0.19		0.18	0.28		0.50	0.39		0.07	0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	149	883		313	968		376	1873		121	1014	
v/s Ratio Prot	0.05	c0.20		c0.17	0.13		c0.16	0.19		0.01	0.28	
v/s Ratio Perm							c0.32					
v/c Ratio	0.62	0.89		0.94	0.47		0.95	0.43		0.12	0.94	
Uniform Delay, d1	40.0	35.9		36.7	27.1		24.7	20.1		39.5	31.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.4	10.8		34.2	0.4		34.0	0.2		0.4	15.6	
Delay (s)	47.4	46.7		70.9	27.4		58.7	20.3		40.0	46.7	
Level of Service	D	D		E	C		E	C		D	D	
Approach Delay (s)		46.7			44.2			31.0			46.6	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	41.3	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.96				
Actuated Cycle Length (s)	90.4	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	89.8%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1753		1770	5085	3462	
Flt Permitted	0.96		0.28	1.00	1.00	
Satd. Flow (perm)	1753		520	5085	3462	
Volume (vph)	167	26	21	558	728	123
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	28	23	607	791	134
RTOR Reduction (vph)	8	0	0	0	13	0
Lane Group Flow (vph)	202	0	23	607	912	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	9.0		24.1	24.1	24.1	
Effective Green, g (s)	9.0		24.1	24.1	24.1	
Actuated g/C Ratio	0.22		0.59	0.59	0.59	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	384		305	2982	2030	
v/s Ratio Prot				0.12	c0.27	
v/s Ratio Perm	0.12		0.04			
v/c Ratio	0.53		0.08	0.20	0.45	
Uniform Delay, d1	14.2		3.7	4.0	4.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.3		0.1	0.0	0.2	
Delay (s)	15.5		3.8	4.0	4.9	
Level of Service	B		A	A	A	
Approach Delay (s)	15.5			4.0	4.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	41.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
17: Joshua St & Caliente Rd PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3497		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3497		1770	3539	1770	1583
Volume (vph)	526	46	446	761	171	843
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	572	50	485	827	186	916
RTOR Reduction (vph)	8	0	0	0	0	184
Lane Group Flow (vph)	614	0	485	827	186	732
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	19.5		10.0	33.5	39.1	39.1
Effective Green, g (s)	19.5		10.0	33.5	39.1	39.1
Actuated g/C Ratio	0.24		0.12	0.42	0.49	0.49
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	846		220	1471	859	768
v/s Ratio Prot	c0.18		c0.27	0.23	0.11	
v/s Ratio Perm						0.58
v/c Ratio	0.73		2.20	0.56	0.22	0.95
Uniform Delay, d1	28.1		35.3	18.0	11.9	19.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1		556.6	0.5	0.1	21.7
Delay (s)	31.2		591.9	18.5	12.1	41.6
Level of Service	C		F	B	B	D
Approach Delay (s)	31.2			230.4	36.6	
Approach LOS	C			F	D	

Intersection Summary			
HCM Average Control Delay	119.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
18: Joshua St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	4977		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	4977		1770	5085	1583
Volume (vph)	433	1203	320	68	701	221	671	892	147	423	872	356
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	471	1308	348	74	762	240	729	970	160	460	948	387
RTOR Reduction (vph)	0	0	200	0	0	177	0	25	0	0	0	270
Lane Group Flow (vph)	471	1308	148	74	762	63	729	1105	0	460	948	117
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	16.3	31.5	31.5	7.6	22.8	22.8	12.0	20.1		12.0	20.1	20.1
Effective Green, g (s)	16.3	31.5	31.5	7.6	22.8	22.8	12.0	20.1		12.0	20.1	20.1
Actuated g/C Ratio	0.19	0.36	0.36	0.09	0.26	0.26	0.14	0.23		0.14	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	642	1278	572	154	925	414	472	1147		244	1172	365
v/s Ratio Prot	c0.14	c0.37		0.04	0.22		0.21	0.23		c0.26	0.19	
v/s Ratio Perm			0.22			0.15						0.24
v/c Ratio	0.73	1.02	0.26	0.48	0.82	0.15	1.54	0.96		1.89	0.81	0.32
Uniform Delay, d1	33.4	27.9	19.6	37.9	30.3	24.8	37.6	33.2		37.6	31.7	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.3	31.3	0.2	2.4	6.0	0.2	255.4	18.4		413.5	4.2	0.5
Delay (s)	37.7	59.1	19.9	40.3	36.3	24.9	293.0	51.6		451.1	35.9	28.4
Level of Service	D	E	B	D	D	C	F	D		F	D	C
Approach Delay (s)		48.0			34.1			146.2			140.7	
Approach LOS		D			C			F			F	

Intersection Summary					
HCM Average Control Delay	96.7	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.16				
Actuated Cycle Length (s)	87.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	94.3%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
19: Muscatel St & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.95		1.00	0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3374		1770	3281		1770	3506		3433	3486	
Flt Permitted	0.25	1.00		0.12	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	459	3374		225	3281		1770	3506		3433	3486	
Volume (vph)	63	852	384	49	352	335	177	660	44	587	852	95
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	926	417	53	383	364	192	717	48	638	926	103
RTOR Reduction (vph)	0	56	0	0	186	0	0	6	0	0	10	0
Lane Group Flow (vph)	68	1287	0	53	561	0	192	759	0	638	1019	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.1	33.1		33.1	33.1		13.8	23.1		18.3	27.6	
Effective Green, g (s)	33.1	33.1		33.1	33.1		13.8	23.1		18.3	27.6	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.16	0.27		0.21	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	1291		86	1256		282	936		726	1112	
v/s Ratio Prot		c0.40			0.23		0.11	0.22		c0.19	c0.30	
v/s Ratio Perm	0.15			0.24								
v/c Ratio	0.39	1.00		0.62	0.45		0.68	0.81		0.88	0.92	
Uniform Delay, d1	19.3	26.6		21.6	19.9		34.3	29.7		33.0	28.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	24.1		12.4	0.3		6.6	5.4		11.7	11.6	
Delay (s)	20.8	50.7		34.0	20.1		40.9	35.1		44.7	40.0	
Level of Service	C	D		C	C		D	D		D	D	
Approach Delay (s)		49.3			21.0			36.2			41.8	
Approach LOS		D			C			D			D	

Intersection Summary					
HCM Average Control Delay	39.5	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	86.5	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	88.9%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. PM Peak Hour

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.93	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3296	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3296	
Volume (vph)	396	690	897	600	429	363
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	750	975	652	466	395
RTOR Reduction (vph)	0	563	0	0	162	0
Lane Group Flow (vph)	430	187	975	652	699	0
Turn Type		custom	Prot			
Protected Phases	3		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	19.1	19.1	27.6	49.7	18.1	
Effective Green, g (s)	19.1	19.1	27.6	49.7	18.1	
Actuated g/C Ratio	0.25	0.25	0.36	0.65	0.24	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	440	394	1234	2290	777	
v/s Ratio Prot	0.24		c0.28	0.18	c0.26	
v/s Ratio Perm		0.47				
v/c Ratio	0.98	0.47	0.79	0.28	0.90	
Uniform Delay, d1	28.6	24.6	22.0	5.9	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	36.6	0.9	3.5	0.1	13.2	
Delay (s)	65.2	25.5	25.5	5.9	41.7	
Level of Service	E	C	C	A	D	
Approach Delay (s)	40.0			17.7	41.7	
Approach LOS	D			B	D	

Intersection Summary				
HCM Average Control Delay	30.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	81.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.10	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	177	5085	2787	177	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	111	1539	515	259	1572	494	974	838	33	152	247	197
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	1673	560	282	1709	537	1059	911	36	165	268	214
RTOR Reduction (vph)	0	0	288	0	0	116	0	0	8	0	0	4
Lane Group Flow (vph)	121	1673	272	282	1709	421	1059	911	28	165	268	210
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	42.1	42.1	42.1	42.1	42.1	42.1	17.0	26.5	26.5	6.0	15.5	15.5
Effective Green, g (s)	42.1	42.1	42.1	42.1	42.1	42.1	17.0	26.5	26.5	6.0	15.5	15.5
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49	0.49	0.20	0.31	0.31	0.07	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	86	2472	1355	86	2472	770	674	1556	484	238	910	283
v/s Ratio Prot		0.33			0.34		c0.31	0.18		0.05	0.05	
v/s Ratio Perm	0.68		0.20	c1.59		0.34			0.02			0.14
v/c Ratio	1.41	0.68	0.20	3.28	0.69	0.55	1.57	0.59	0.06	0.69	0.29	0.74
Uniform Delay, d1	22.2	17.0	12.7	22.2	17.2	15.6	34.8	25.4	21.2	39.4	30.8	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	238.7	0.7	0.1	1054.9	0.8	0.8	264.2	0.6	0.0	8.4	0.2	10.0
Delay (s)	260.9	17.8	12.7	1077.1	18.1	16.4	299.0	26.0	21.3	47.8	31.0	43.7
Level of Service	F	B	B	F	B	B	F	C	C	D	C	D
Approach Delay (s)		29.1			135.8			170.0			39.5	
Approach LOS		C			F			F			D	

Intersection Summary				
HCM Average Control Delay	103.3	HCM Level of Service	F	
HCM Volume to Capacity ratio	2.36			
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	90.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5078		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5078		3433	5085	1583
Volume (vph)	327	1210	648	13	1712	1231	956	3109	29	1075	2251	258
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	355	1315	704	14	1861	1338	1039	3379	32	1168	2447	280
RTOR Reduction (vph)	0	0	321	0	0	272	0	1	0	0	0	77
Lane Group Flow (vph)	355	1315	383	14	1861	1066	1039	3410	0	1168	2447	203
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.0	30.4	30.4	0.8	24.2	24.2	9.0	34.0		12.0	37.0	37.0
Effective Green, g (s)	7.0	30.4	30.4	0.8	24.2	24.2	9.0	34.0		12.0	37.0	37.0
Actuated g/C Ratio	0.08	0.33	0.33	0.01	0.26	0.26	0.10	0.36		0.13	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	1659	909	15	1320	724	332	1852		442	2019	628
v/s Ratio Prot	c0.20	0.26		0.01	0.37		c0.30	c0.67		0.34	c0.48	
v/s Ratio Perm			0.25			0.48						0.18
v/c Ratio	2.67	0.79	0.42	0.93	1.41	1.47	3.13	1.84		2.64	1.21	0.32
Uniform Delay, d1	43.1	28.5	24.5	46.2	34.5	34.5	42.1	29.6		40.6	28.1	19.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	772.2	2.7	0.3	197.1	189.0	219.8	966.2	380.6		745.6	100.2	0.3
Delay (s)	815.3	31.2	24.8	243.3	223.5	254.3	1008.3	410.2		786.2	128.3	19.7
Level of Service	F	C	C	F	F	F	F	F		F	F	B
Approach Delay (s)		146.6			236.4			549.9			317.8	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	344.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	2.12			
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	155.9%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
23: Eucalyptus St & Maple Ave PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4825		3433	4985		3433	3539	1583	1770	3483	
Flt Permitted	0.21	1.00		0.95	1.00		0.95	1.00	1.00	0.15	1.00	
Satd. Flow (perm)	400	4825		3433	4985		3433	3539	1583	282	3483	
Volume (vph)	87	1124	581	141	945	143	139	708	496	342	470	56
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	1222	632	153	1027	155	151	770	539	372	511	61
RTOR Reduction (vph)	0	102	0	0	21	0	0	0	151	0	10	0
Lane Group Flow (vph)	95	1752	0	153	1161	0	151	770	388	372	562	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	24.1	24.1		6.9	35.0		8.2	26.1	26.1	43.1	30.9	
Effective Green, g (s)	24.1	24.1		6.9	35.0		8.2	26.1	26.1	43.1	30.9	
Actuated g/C Ratio	0.28	0.28		0.08	0.41		0.10	0.30	0.30	0.50	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	112	1351		275	2026		327	1073	480	366	1250	
v/s Ratio Prot		c0.38		0.04	c0.24		0.04	0.22		c0.15	0.16	
v/s Ratio Perm	0.24								0.34	0.36		
v/c Ratio	0.85	1.30		0.56	0.57		0.46	0.72	0.81	1.02	0.45	
Uniform Delay, d1	29.3	31.0		38.1	19.8		36.9	26.7	27.7	21.5	21.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	41.5	139.3		2.4	0.4		1.0	2.3	9.6	51.3	0.3	
Delay (s)	70.8	170.3		40.6	20.2		37.9	29.0	37.3	72.8	21.4	
Level of Service	E	F		D	C		D	C	D	E	C	
Approach Delay (s)		165.5			22.5			33.0			41.6	
Approach LOS		F			C			C			D	

Intersection Summary				
HCM Average Control Delay	77.4	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085		1770	5085	1770	1583
Flt Permitted	1.00		0.34	1.00	0.95	1.00
Satd. Flow (perm)	5085		642	5085	1770	1583
Volume (vph)	908	0	36	739	1	152
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	987	0	39	803	1	165
RTOR Reduction (vph)	0	0	0	0	0	108
Lane Group Flow (vph)	987	0	39	803	1	57
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	11.6		11.6	11.6	6.6	6.6
Effective Green, g (s)	11.6		11.6	11.6	6.6	6.6
Actuated g/C Ratio	0.44		0.44	0.44	0.25	0.25
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2251		284	2251	446	399
v/s Ratio Prot	c0.19			0.16	0.00	
v/s Ratio Perm			0.06			0.10
v/c Ratio	0.44		0.14	0.36	0.00	0.14
Uniform Delay, d1	5.0		4.3	4.8	7.3	7.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1		0.2	0.1	0.0	0.2
Delay (s)	5.2		4.6	4.9	7.3	7.8
Level of Service	A		A	A	A	A
Approach Delay (s)	5.2			4.9	7.8	
Approach LOS	A			A	A	

Intersection Summary				
HCM Average Control Delay	5.3	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	26.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	571	2852	2551	130	202	389
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	621	3100	2773	141	220	423
RTOR Reduction (vph)	0	0	0	59	0	279
Lane Group Flow (vph)	621	3100	2773	82	220	144
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	18.2	65.3	43.1	43.1	14.3	14.3
Effective Green, g (s)	18.2	65.3	43.1	43.1	14.3	14.3
Actuated g/C Ratio	0.21	0.75	0.49	0.49	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	713	3791	2502	779	289	258
v/s Ratio Prot	0.18	c0.61	c0.55		0.12	
v/s Ratio Perm				0.09		0.27
v/c Ratio	0.87	0.82	1.11	0.10	0.76	0.56
Uniform Delay, d1	33.6	7.3	22.2	11.9	35.0	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.3	1.5	55.2	0.1	11.2	2.6
Delay (s)	44.9	8.7	77.5	12.0	46.2	36.3
Level of Service	D	A	E	B	D	D
Approach Delay (s)		14.8	74.3		39.7	
Approach LOS		B	E		D	

Intersection Summary				
HCM Average Control Delay	40.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	87.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	86.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
26: Main St. & I-15 SB Ramp

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		1.00			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5076			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5076			5085	1583			1770	1583	1504
Volume (vph)	0	3067	40	0	1658	1397	0	0	429	0	1433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3334	43	0	1802	1518	0	0	466	0	1558
RTOR Reduction (vph)	0	2	0	0	0	436	0	0	0	12	12
Lane Group Flow (vph)	0	3375	0	0	1802	1082	0	0	466	767	767
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		54.0			54.0	54.0			28.0	28.0	28.0
Effective Green, g (s)		54.0			54.0	54.0			28.0	28.0	28.0
Actuated g/C Ratio		0.60			0.60	0.60			0.31	0.31	0.31
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		3046			3051	950			551	492	468
v/s Ratio Prot		0.67			0.35				0.26	0.49	
v/s Ratio Perm						0.96					0.52
v/c Ratio		1.11			0.59	1.14			0.85	1.56	1.64
Uniform Delay, d1		18.0			11.2	18.0			29.0	31.0	31.0
Progression Factor		1.00			1.15	3.88			1.00	1.00	1.00
Incremental Delay, d2		54.1			0.0	63.7			11.4	261.0	296.7
Delay (s)		72.1			12.9	133.6			40.4	292.0	327.7
Level of Service		E			B	F			D	F	F
Approach Delay (s)		72.1			68.1		0.0			247.8	
Approach LOS		E			E		A			F	

Intersection Summary			
HCM Average Control Delay	111.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	623	1272	590	881	2316	452	365	1023	913	416	1253	292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	677	1383	641	958	2517	491	397	1112	992	452	1362	317
RTOR Reduction (vph)	0	0	95	0	0	91	0	0	1	0	0	0
Lane Group Flow (vph)	677	1383	546	958	2517	400	397	1112	991	452	1362	317
Turn Type	Prot		Perm	Prot		Perm	Prot		pm+ov	Prot		pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.0	25.0	25.0	15.0	28.0	28.0	5.0	24.2	39.2	9.0	28.2	40.2
Effective Green, g (s)	12.0	25.0	25.0	15.0	28.0	28.0	5.0	24.2	39.2	9.0	28.2	40.2
Actuated g/C Ratio	0.13	0.28	0.28	0.17	0.31	0.31	0.06	0.27	0.44	0.10	0.32	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	462	1425	444	577	1596	497	192	1380	767	346	1608	784
v/s Ratio Prot	0.20	0.27		c0.28	c0.49		c0.12	0.22	c0.22	0.13	c0.27	0.05
v/s Ratio Perm			0.40			0.31			0.41			0.15
v/c Ratio	1.47	0.97	1.23	1.66	1.58	0.80	2.07	0.81	1.29	1.31	0.85	0.40
Uniform Delay, d1	38.6	31.7	32.1	37.1	30.6	28.1	42.1	30.3	25.0	40.1	28.5	16.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	221.0	17.2	121.8	304.8	262.7	9.2	498.0	3.5	141.3	157.3	4.3	0.3
Delay (s)	259.6	49.0	153.9	341.9	293.3	37.3	540.1	33.8	166.3	197.4	32.8	16.8
Level of Service	F	D	F	F	F	D	F	C	F	F	C	B
Approach Delay (s)		126.7			273.4			166.8			65.3	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM Average Control Delay	175.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	211	2243	866	195	2067	223	605	668	189	282	968	206
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	2438	941	212	2247	242	658	726	205	307	1052	224
RTOR Reduction (vph)	0	0	147	0	0	130	0	0	124	0	0	162
Lane Group Flow (vph)	229	2438	794	212	2247	112	658	726	82	307	1052	62
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	34.0	34.0	7.0	28.0	28.0	10.0	25.0	25.0	8.0	23.0	23.0
Effective Green, g (s)	13.0	34.0	34.0	7.0	28.0	28.0	10.0	25.0	25.0	8.0	23.0	23.0
Actuated g/C Ratio	0.14	0.38	0.38	0.08	0.31	0.31	0.11	0.28	0.28	0.09	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	1921	598	138	1582	492	381	983	440	305	904	405
v/s Ratio Prot	0.13	0.48		c0.12	0.44		c0.19	0.21		0.09	c0.30	
v/s Ratio Perm			0.59			0.15			0.13			0.14
v/c Ratio	0.89	1.27	1.33	1.54	1.42	0.23	1.73	0.74	0.19	1.01	1.16	0.15
Uniform Delay, d1	37.8	28.0	28.0	41.5	31.0	23.0	40.0	29.5	24.7	41.0	33.5	25.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.1	125.4	158.5	274.2	192.9	0.2	338.0	2.9	0.2	53.2	85.8	0.2
Delay (s)	67.9	153.4	186.5	315.7	223.9	23.2	378.0	32.5	24.9	94.2	119.3	26.1
Level of Service	E	F	F	F	F	C	F	C	C	F	F	C
Approach Delay (s)		156.6			213.1			174.6			101.3	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	166.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.45			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	111.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
29: Bear Valley Rd & I Avenue — PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	2887	285	333	2106	572	335
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3138	310	362	2289	622	364
RTOR Reduction (vph)	0	116	0	0	0	231
Lane Group Flow (vph)	3138	194	362	2289	622	133
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	46.0	46.0	13.9	63.9	16.0	16.0
Effective Green, g (s)	46.0	46.0	13.9	63.9	16.0	16.0
Actuated g/C Ratio	0.52	0.52	0.16	0.73	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2661	828	543	3697	625	288
v/s Ratio Prot	c0.62		0.11	c0.45	0.18	
v/s Ratio Perm		0.20				0.23
v/c Ratio	1.18	0.23	0.67	0.62	1.00	0.46
Uniform Delay, d1	21.0	11.4	34.8	6.0	35.9	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	84.9	0.1	3.1	0.3	34.6	1.2
Delay (s)	105.8	11.5	37.9	6.3	70.5	33.3
Level of Service	F	B	D	A	E	C
Approach Delay (s)	97.4			10.6	56.7	
Approach LOS	F			B	E	

Intersection Summary				
HCM Average Control Delay	59.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.11			
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	91.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
30: Main St. & 3rd Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	308	2783	177	541	2956	213	272	578	471	368	791	309
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	3025	192	588	3213	232	296	628	512	400	860	336
RTOR Reduction (vph)	0	0	53	0	0	60	0	0	171	0	0	87
Lane Group Flow (vph)	335	3025	139	588	3213	172	296	628	341	400	860	249
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	33.0	33.0	7.0	35.0	35.0	7.0	18.3	18.3	14.4	25.7	25.7
Effective Green, g (s)	5.0	33.0	33.0	7.0	35.0	35.0	7.0	18.3	18.3	14.4	25.7	25.7
Actuated g/C Ratio	0.06	0.37	0.37	0.08	0.39	0.39	0.08	0.21	0.21	0.16	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	1317	589	271	1396	625	140	730	575	557	1025	459
v/s Ratio Prot	0.10	0.85		c0.17	c0.91		c0.17	0.18		c0.12	c0.24	
v/s Ratio Perm			0.12			0.15			0.18			0.21
v/c Ratio	1.73	2.30	0.24	2.17	2.30	0.28	2.11	0.86	0.59	0.72	0.84	0.54
Uniform Delay, d1	41.9	27.9	19.2	40.9	26.9	18.2	40.9	34.0	31.8	35.2	29.6	26.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	347.8	586.0	0.2	538.4	588.0	0.2	524.7	10.1	1.6	4.4	6.1	1.3
Delay (s)	389.6	613.9	19.4	579.3	614.8	18.5	565.6	44.1	33.5	39.6	35.7	27.9
Level of Service	F	F	B	F	F	B	F	D	C	D	D	C
Approach Delay (s)		560.6			575.3			147.8			35.0	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	431.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.63		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	142.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
31: Main St. & C Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	0.85	1.00	0.90	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1589	1504	1770	1601	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1589	1504	1182	1601	1504
Volume (vph)	151	2320	768	328	1975	143	788	43	216	259	103	440
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	164	2522	835	357	2147	155	857	47	235	282	112	478
RTOR Reduction (vph)	0	0	271	0	0	59	0	80	108	0	71	100
Lane Group Flow (vph)	164	2522	564	357	2147	96	857	67	27	282	235	184
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	6.0	38.0	38.0	6.0	38.0	38.0	12.0	17.7	17.7	25.7	15.7	15.7
Effective Green, g (s)	6.0	38.0	38.0	6.0	38.0	38.0	12.0	17.7	17.7	25.7	15.7	15.7
Actuated g/C Ratio	0.07	0.43	0.43	0.07	0.43	0.43	0.14	0.20	0.20	0.29	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	121	1533	1208	235	1533	686	470	321	304	413	287	269
v/s Ratio Prot	0.09	c0.71		c0.10	0.61		c0.25	0.09		0.08	c0.19	
v/s Ratio Perm			0.30			0.10			0.09	0.12		0.19
v/c Ratio	1.36	1.65	0.47	1.52	1.40	0.14	1.82	0.21	0.09	0.68	0.82	0.68
Uniform Delay, d1	40.9	24.9	17.7	40.9	24.9	15.0	37.9	29.2	28.5	26.2	34.6	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	204.3	293.3	0.3	254.2	184.3	0.1	378.8	0.3	0.1	4.6	16.3	7.0
Delay (s)	245.2	318.1	17.9	295.1	209.1	15.1	416.7	29.5	28.6	30.8	50.9	40.7
Level of Service	F	F	B	F	F	B	F	C	C	C	D	D
Approach Delay (s)		243.5			209.3			320.7			41.1	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	221.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	123.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
32: Main St. & E Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3538		1770	3377		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.16	1.00		0.44	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3538		293	3377		818	3539	1583
Volume (vph)	444	1634	296	51	1442	4	237	294	130	22	651	487
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	483	1776	322	55	1567	4	258	320	141	24	708	529
RTOR Reduction (vph)	0	0	101	0	0	0	0	52	0	0	0	244
Lane Group Flow (vph)	483	1776	221	55	1571	0	258	409	0	24	708	285
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	18.0	46.6	46.6	3.2	31.8		31.4	25.8		23.0	21.4	21.4
Effective Green, g (s)	18.0	46.6	46.6	3.2	31.8		31.4	25.8		23.0	21.4	21.4
Actuated g/C Ratio	0.19	0.50	0.50	0.03	0.34		0.34	0.28		0.25	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	342	1770	792	61	1207		194	935		218	813	363
v/s Ratio Prot	c0.27	0.50		0.03	c0.44		c0.09	0.14		0.00	0.20	
v/s Ratio Perm			0.20				c0.36			0.03		0.33
v/c Ratio	1.41	1.00	0.28	0.90	1.30		1.33	0.44		0.11	0.87	0.78
Uniform Delay, d1	37.6	23.3	13.5	44.8	30.7		28.6	27.7		26.8	34.6	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	202.1	22.2	0.2	80.6	141.9		179.4	0.3		0.2	10.1	10.6
Delay (s)	239.7	45.5	13.7	125.4	172.6		208.0	28.1		27.1	44.6	44.3
Level of Service	F	D	B	F	F		F	C		C	D	D
Approach Delay (s)		77.9			171.0			92.6			44.2	
Approach LOS		E			F			F			D	

Intersection Summary					
HCM Average Control Delay	97.2	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.32				
Actuated Cycle Length (s)	93.2	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	109.0%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
33: Main St. & I Avenue

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	306	3539	1583
Volume (vph)	71	1626	393	173	993	73	362	582	252	311	1236	53
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	1767	427	188	1079	79	393	633	274	338	1343	58
RTOR Reduction (vph)	0	0	133	0	0	49	0	0	92	0	0	36
Lane Group Flow (vph)	77	1767	294	188	1079	30	393	633	182	338	1343	22
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	4.0	34.8	34.8	4.0	34.8	34.8	7.0	22.0	22.0	40.0	29.0	29.0
Effective Green, g (s)	4.0	34.8	34.8	4.0	34.8	34.8	7.0	22.0	22.0	40.0	29.0	29.0
Actuated g/C Ratio	0.04	0.38	0.38	0.04	0.38	0.38	0.08	0.24	0.24	0.44	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	1356	607	151	1356	607	265	857	384	361	1130	506
v/s Ratio Prot	0.02	c0.50		c0.05	0.30		c0.11	0.18		c0.14	c0.38	
v/s Ratio Perm			0.27			0.05			0.17	0.27		0.04
v/c Ratio	0.51	1.30	0.49	1.25	0.80	0.05	1.48	0.74	0.47	0.94	1.19	0.04
Uniform Delay, d1	42.4	28.0	21.2	43.4	24.8	17.6	41.9	31.7	29.5	21.7	30.9	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	141.9	0.6	153.7	3.3	0.0	236.5	3.4	0.9	31.2	93.9	0.0
Delay (s)	45.1	169.9	21.8	197.1	28.2	17.6	278.4	35.1	30.4	52.8	124.8	21.4
Level of Service	D	F	C	F	C	B	F	D	C	D	F	C
Approach Delay (s)		137.8			51.1			107.7			107.4	
Approach LOS		F			D			F			F	

Intersection Summary					
HCM Average Control Delay	106.4	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.21				
Actuated Cycle Length (s)	90.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	107.7%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3539	1583	1770	5073		1770	5071	
Flt Permitted	0.26	1.00		0.34	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	489	3480		641	3539	1583	1770	5073		1770	5071	
Volume (vph)	23	422	53	10	568	275	63	1430	24	78	524	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	459	58	11	617	299	68	1554	26	85	570	11
RTOR Reduction (vph)	0	11	0	0	0	167	0	2	0	0	3	0
Lane Group Flow (vph)	25	506	0	11	617	132	68	1578	0	85	578	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	15.8	15.8		15.8	15.8	15.8	4.3	28.4		4.5	28.6	
Effective Green, g (s)	15.8	15.8		15.8	15.8	15.8	4.3	28.4		4.5	28.6	
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.26	0.07	0.47		0.07	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	127	906		167	921	412	125	2374		131	2389	
v/s Ratio Prot		0.15			0.17		0.04	c0.31		c0.05	0.11	
v/s Ratio Perm	0.05			0.02		0.19						
v/c Ratio	0.20	0.56		0.07	0.67	0.32	0.54	0.66		0.65	0.24	
Uniform Delay, d1	17.5	19.4		16.9	20.1	18.1	27.3	12.5		27.3	9.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.8		0.2	1.9	0.5	4.8	0.7		10.6	0.1	
Delay (s)	18.3	20.2		17.1	22.0	18.6	32.0	13.2		37.9	9.6	
Level of Service	B	C		B	C	B	C	B		D	A	
Approach Delay (s)		20.1			20.8			14.0			13.2	
Approach LOS		C			C			B			B	

Intersection Summary					
HCM Average Control Delay	16.4	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	60.7	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	61.6%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
35: Smoketree & Hwy 395 PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	5085	5085	1583
Volume (vph)	719	102	369	4158	2753	589
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	782	111	401	4520	2992	640
RTOR Reduction (vph)	0	85	0	0	0	257
Lane Group Flow (vph)	782	26	401	4520	2992	383
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	21.0	21.0	10.0	61.0	47.0	47.0
Effective Green, g (s)	21.0	21.0	10.0	61.0	47.0	47.0
Actuated g/C Ratio	0.23	0.23	0.11	0.68	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	801	369	197	3447	2656	827
v/s Ratio Prot			c0.23	c0.89	0.59	
v/s Ratio Perm	0.23	0.07				0.40
v/c Ratio	0.98	0.07	2.04	1.31	1.13	0.46
Uniform Delay, d1	34.3	26.9	40.0	14.5	21.5	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.8	0.1	483.3	142.2	62.4	0.4
Delay (s)	60.0	27.0	523.3	156.7	83.9	14.0
Level of Service	E	C	F	F	F	B
Approach Delay (s)	55.9			186.6	71.6	
Approach LOS	E			F	E	

Intersection Summary					
HCM Average Control Delay	130.0	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.29				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	107.5%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
36: Mojave St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5085		3433	4973		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.28	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5085		3433	4973		514	5085	2787
Volume (vph)	877	2204	1051	152	1332	1	1457	780	134	4	1134	1207
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	953	2396	1142	165	1448	1	1584	848	146	4	1233	1312
RTOR Reduction (vph)	0	0	548	0	0	0	0	27	0	0	0	274
Lane Group Flow (vph)	953	2396	594	165	1449	0	1584	967	0	4	1233	1038
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	26.0	26.0	6.0	19.0		19.0	46.0		23.0	23.0	23.0
Effective Green, g (s)	13.0	26.0	26.0	6.0	19.0		19.0	46.0		23.0	23.0	23.0
Actuated g/C Ratio	0.14	0.29	0.29	0.07	0.21		0.21	0.51		0.26	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	496	1469	805	118	1074		725	2542		131	1300	712
v/s Ratio Prot	c0.28	c0.47		0.09	0.28		c0.46	0.20			0.24	
v/s Ratio Perm			0.41							0.01		0.47
v/c Ratio	1.92	1.63	0.74	1.40	1.35		2.18	0.38		0.03	0.95	1.46
Uniform Delay, d1	38.5	32.0	28.9	42.0	35.5		35.5	13.4		25.1	32.9	33.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	422.1	287.1	3.6	222.4	163.4		537.7	0.1		0.1	14.3	213.8
Delay (s)	460.6	319.1	32.5	264.4	198.9		573.2	13.4		25.2	47.2	247.3
Level of Service	F	F	C	F	F		F	B		C	D	F
Approach Delay (s)		276.2			205.6			357.4			150.2	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	256.1	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.85			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	127.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
37: Live Oak & Escondido Ave — PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	0.97	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1733	1504	5085	1583	3433	5085
Flt Permitted	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1733	1504	5085	1583	3433	5085
Volume (vph)	384	749	1294	818	616	1508
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	417	814	1407	889	670	1639
RTOR Reduction (vph)	12	226	0	382	0	0
Lane Group Flow (vph)	526	467	1407	507	670	1639
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	23.1	23.1	36.8	36.8	15.0	55.8
Effective Green, g (s)	23.1	23.1	36.8	36.8	15.0	55.8
Actuated g/C Ratio	0.27	0.27	0.42	0.42	0.17	0.64
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	461	400	2153	670	593	3265
v/s Ratio Prot			0.28		c0.20	0.32
v/s Ratio Perm	0.31	0.46		0.56		
v/c Ratio	1.14	1.17	0.65	0.76	1.13	0.50
Uniform Delay, d1	31.9	31.9	20.0	21.3	36.0	8.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	86.8	99.1	0.7	4.9	78.2	0.1
Delay (s)	118.7	131.0	20.7	26.2	114.1	8.3
Level of Service	F	F	C	C	F	A
Approach Delay (s)	125.6		22.8			39.0
Approach LOS	F		C			D

Intersection Summary				
HCM Average Control Delay	50.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.41			
Actuated Cycle Length (s)	86.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
38: Mojave & I-15 SB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	2695	283	1159	2597	0	0	0	587	0	950
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2929	308	1260	2823	0	0	0	638	0	1033
RTOR Reduction (vph)	0	0	126	0	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	2929	182	1260	2823	0	0	0	638	0	1032
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		39.0	39.0	14.0	57.0				25.0		25.0
Effective Green, g (s)		39.0	39.0	14.0	57.0				25.0		25.0
Actuated g/C Ratio		0.43	0.43	0.16	0.63				0.28		0.28
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		2204	686	534	3221				954		440
v/s Ratio Prot		c0.58		c0.37	0.56						
v/s Ratio Perm			0.19						0.19		0.65
v/c Ratio		1.33	0.26	2.36	0.88				0.67		2.34
Uniform Delay, d1		25.5	16.3	38.0	13.6				28.8		32.5
Progression Factor		1.00	1.00	0.82	1.85				1.00		1.00
Incremental Delay, d2		151.3	0.2	612.3	0.3				3.7		612.1
Delay (s)		176.8	16.5	643.4	25.5				32.5		644.6
Level of Service		F	B	F	C				C		F
Approach Delay (s)		161.5			216.2		0.0			410.9	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	232.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	115.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	667	2615	0	0	3038	958	0	0	718	0	1517
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	725	2842	0	0	3302	1041	0	0	780	0	1649
RTOR Reduction (vph)	0	0	0	0	0	378	0	0	0	0	1
Lane Group Flow (vph)	725	2842	0	0	3302	663	0	0	780	0	1648
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	8.0	53.0			41.0	41.0			29.0		29.0
Effective Green, g (s)	8.0	53.0			41.0	41.0			29.0		29.0
Actuated g/C Ratio	0.09	0.59			0.46	0.46			0.32		0.32
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	305	2995			2317	721			570		898
v/s Ratio Prot	c0.21	0.56			0.65						
v/s Ratio Perm						0.66			0.44		0.59
v/c Ratio	2.38	0.95			1.43	0.92			1.37		1.83
Uniform Delay, d1	41.0	17.2			24.5	22.9			30.5		30.5
Progression Factor	0.72	1.91			1.00	1.00			1.00		1.00
Incremental Delay, d2	620.6	0.9			193.9	16.6			176.8		380.0
Delay (s)	650.3	33.7			218.4	39.6			207.3		410.5
Level of Service	F	C			F	D			F		F
Approach Delay (s)		159.0			175.5		0.0			345.3	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	209.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	115.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3524		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.20	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	373	5085	1583	1770	3524		3433	3539	1583
Volume (vph)	327	1491	330	19	1124	275	347	805	23	913	1234	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	355	1621	359	21	1222	299	377	875	25	992	1341	110
RTOR Reduction (vph)	0	0	205	0	0	233	0	1	0	0	0	68
Lane Group Flow (vph)	355	1621	154	21	1222	66	377	899	0	992	1341	42
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	8.0	32.0	32.0	20.0	20.0	20.0	12.0	25.0		21.0	34.0	34.0
Effective Green, g (s)	8.0	32.0	32.0	20.0	20.0	20.0	12.0	25.0		21.0	34.0	34.0
Actuated g/C Ratio	0.09	0.36	0.36	0.22	0.22	0.22	0.13	0.28		0.23	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	305	1808	563	83	1130	352	236	979		801	1337	598
v/s Ratio Prot	c0.10	0.32			c0.24		c0.21	0.26		c0.29	c0.38	
v/s Ratio Perm			0.23	0.06		0.19						0.07
v/c Ratio	1.16	0.90	0.27	0.25	1.08	0.19	1.60	0.92		1.24	1.00	0.07
Uniform Delay, d1	41.0	27.4	20.7	28.8	35.0	28.4	39.0	31.5		34.5	28.0	17.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	103.6	6.3	0.3	1.6	51.6	0.3	287.9	13.0		117.9	25.3	0.0
Delay (s)	144.6	33.7	21.0	30.5	86.6	28.7	326.9	44.5		152.4	53.3	17.9
Level of Service	F	C	C	C	F	C	F	D		F	D	B
Approach Delay (s)		48.6			74.6			127.9			92.0	
Approach LOS		D			E			F			F	

Intersection Summary				
HCM Average Control Delay	81.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	98.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3491	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3491	
Volume (vph)	180	2187	269	324	1818	97	267	854	525	180	1166	118
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	2377	292	352	1976	105	290	928	571	196	1267	128
RTOR Reduction (vph)	0	0	3	0	0	13	0	0	89	0	9	0
Lane Group Flow (vph)	196	2377	289	352	1976	92	290	928	482	196	1386	0
Turn Type	Prot		pt+ov	Prot		pm+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	1	5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.0	31.0	41.0	7.0	33.0	39.0	6.0	30.0	30.0	6.0	30.0	
Effective Green, g (s)	5.0	31.0	41.0	7.0	33.0	39.0	6.0	30.0	30.0	6.0	30.0	
Actuated g/C Ratio	0.06	0.34	0.46	0.08	0.37	0.43	0.07	0.33	0.33	0.07	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1752	721	267	1865	756	229	1180	528	229	1164	
v/s Ratio Prot	0.06	c0.47	0.18	c0.10	0.39	0.01	c0.08	0.26		0.06	c0.40	
v/s Ratio Perm						0.06			0.36			
v/c Ratio	1.03	1.36	0.40	1.32	1.06	0.12	1.27	0.79	0.91	0.86	1.19	
Uniform Delay, d1	42.5	29.5	16.3	41.5	28.5	15.3	42.0	27.1	28.8	41.6	30.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	72.1	164.3	0.4	167.2	38.7	0.1	149.8	3.5	20.3	25.5	94.7	
Delay (s)	114.6	193.8	16.7	208.7	67.2	15.3	191.8	30.6	49.0	67.0	124.7	
Level of Service	F	F	B	F	E	B	F	C	D	E	F	
Approach Delay (s)		170.4			85.4			62.6			117.6	
Approach LOS		F			F			E			F	

Intersection Summary				
HCM Average Control Delay	114.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.27			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	108.4%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
42: Lemon St & E Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.88			0.97	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	2787			3433	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.93	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	2787			3347	1583
Volume (vph)	313	1547	572	138	1153	10	524	288	123	15	381	143
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	340	1682	622	150	1253	11	570	313	134	16	414	155
RTOR Reduction (vph)	0	0	267	0	0	8	0	45	0	0	0	128
Lane Group Flow (vph)	340	1682	355	150	1253	3	570	402	0	0	430	27
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	19.1	34.7	34.7	8.0	23.6	23.6	14.0	33.3			15.3	15.3
Effective Green, g (s)	19.1	34.7	34.7	8.0	23.6	23.6	14.0	33.3			15.3	15.3
Actuated g/C Ratio	0.22	0.39	0.39	0.09	0.27	0.27	0.16	0.38			0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	384	2005	624	161	1364	425	546	1055			582	275
v/s Ratio Prot	c0.19	0.33		0.08	0.25		c0.17	0.16				
v/s Ratio Perm			0.39			0.01					c0.13	0.10
v/c Ratio	0.89	0.84	0.57	0.93	0.92	0.01	1.04	0.38			0.74	0.10
Uniform Delay, d1	33.4	24.1	20.8	39.7	31.3	23.6	37.0	19.9			34.5	30.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	20.8	3.3	1.2	50.9	10.0	0.0	50.5	0.2			4.9	0.2
Delay (s)	54.2	27.4	22.0	90.7	41.3	23.6	87.5	20.1			39.3	30.7
Level of Service	D	C	C	F	D	C	F	C			D	C
Approach Delay (s)		29.6			46.4		57.9				37.1	
Approach LOS		C			D		E				D	

Intersection Summary				
HCM Average Control Delay	39.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
43: Lemon St & I Avenue

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5016		1770	5054		1770	3539	1583	1770	3515	
Flt Permitted	0.21	1.00		0.10	1.00		0.13	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	391	5016		184	5054		249	3539	1583	542	3515	
Volume (vph)	99	1448	145	133	954	41	61	620	138	70	925	43
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	1574	158	145	1037	45	66	674	150	76	1005	47
RTOR Reduction (vph)	0	12	0	0	4	0	0	0	5	0	4	0
Lane Group Flow (vph)	108	1720	0	145	1078	0	66	674	145	76	1048	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	40.4	40.4		40.4	40.4		29.9	29.9	29.9	29.9	29.9	
Effective Green, g (s)	40.4	40.4		40.4	40.4		29.9	29.9	29.9	29.9	29.9	
Actuated g/C Ratio	0.52	0.52		0.52	0.52		0.38	0.38	0.38	0.38	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	202	2588		95	2608		95	1351	604	207	1342	
v/s Ratio Prot		0.35			0.21			0.19			c0.30	
v/s Ratio Perm	0.28			c0.79			0.26		0.09	0.14		
v/c Ratio	0.53	0.66		1.53	0.41		0.69	0.50	0.24	0.37	0.78	
Uniform Delay, d1	12.7	14.0		18.9	11.7		20.4	18.5	16.5	17.4	21.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	0.7		282.9	0.1		19.8	0.3	0.2	1.1	3.0	
Delay (s)	15.4	14.6		301.8	11.8		40.1	18.8	16.7	18.5	24.3	
Level of Service	B	B		F	B		D	B	B	B	C	
Approach Delay (s)		14.7			46.0			20.0			23.9	
Approach LOS		B			D			C			C	

Intersection Summary				
HCM Average Control Delay	25.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	78.3	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	82.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	882	260	937	1532	0	0	0	892	0	157
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	959	283	1018	1665	0	0	0	970	0	171
RTOR Reduction (vph)	0	0	185	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	959	98	1018	1665	0	0	0	970	0	130
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		31.1	31.1	27.0	62.1				19.9		19.9
Effective Green, g (s)		31.1	31.1	27.0	62.1				19.9		19.9
Actuated g/C Ratio		0.35	0.35	0.30	0.69				0.22		0.22
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1171	498	531	2442				759		350
v/s Ratio Prot		c0.28		c0.58	0.47						
v/s Ratio Perm			0.20						0.28		0.11
v/c Ratio		0.82	0.20	1.92	0.68				1.28		0.37
Uniform Delay, d1		26.9	20.7	31.5	8.2				35.0		29.8
Progression Factor		1.00	1.00	1.00	1.74				1.00		1.00
Incremental Delay, d2		4.6	0.2	413.3	0.1				135.2		3.0
Delay (s)		31.5	20.9	444.9	14.3				170.2		32.8
Level of Service		C	C	F	B				F		C
Approach Delay (s)		29.0			177.7		0.0			149.6	
Approach LOS		C			F		A			F	

Intersection Summary			
HCM Average Control Delay	134.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	144	1631	0	0	2240	1110	0	0	229	0	1136
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	1773	0	0	2435	1207	0	0	249	0	1235
RTOR Reduction (vph)	0	0	0	0	0	377	0	0	0	0	43
Lane Group Flow (vph)	157	1773	0	0	2435	830	0	0	249	0	1192
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	4.0	61.0			53.0	53.0			21.0		21.0
Effective Green, g (s)	4.0	61.0			53.0	53.0			21.0		21.0
Actuated g/C Ratio	0.04	0.68			0.59	0.59			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	79	2399			2084	932			413		650
v/s Ratio Prot	c0.09	0.50			0.69						
v/s Ratio Perm						0.76			0.14		0.44
v/c Ratio	1.99	0.74			1.17	0.89			0.60		1.83
Uniform Delay, d1	43.0	9.4			18.5	16.0			30.8		34.5
Progression Factor	1.06	2.09			1.00	1.00			1.00		1.00
Incremental Delay, d2	448.4	0.1			81.4	10.6			6.4		381.3
Delay (s)	493.8	19.7			99.9	26.6			37.2		415.8
Level of Service	F	B			F	C			D		F
Approach Delay (s)		58.3			75.6		0.0			352.2	
Approach LOS		E			E		A			F	

Intersection Summary			
HCM Average Control Delay	129.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	322	1670	775	130	927	29	1932	629	68	9	648	491
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	350	1815	842	141	1008	32	2100	684	74	10	704	534
RTOR Reduction (vph)	0	0	22	0	0	26	0	0	35	0	0	0
Lane Group Flow (vph)	350	1815	820	141	1008	6	2100	684	39	10	704	534
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	19.0	48.0	8.0	18.0	18.0	29.0	48.2	48.2	0.8	20.0	29.0
Effective Green, g (s)	9.0	19.0	48.0	8.0	18.0	18.0	29.0	48.2	48.2	0.8	20.0	29.0
Actuated g/C Ratio	0.10	0.21	0.52	0.09	0.20	0.20	0.32	0.52	0.52	0.01	0.22	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	336	1050	895	154	995	310	1082	2664	829	15	1105	568
v/s Ratio Prot	0.10	c0.36	c0.30	0.08	0.20		c0.61	0.13		0.01	0.14	c0.09
v/s Ratio Perm			0.24			0.02			0.05			0.25
v/c Ratio	1.04	1.73	0.92	0.92	1.01	0.02	1.94	0.26	0.05	0.67	0.64	0.94
Uniform Delay, d1	41.5	36.5	20.1	41.7	37.0	29.9	31.5	12.0	10.7	45.5	32.7	30.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.4	331.9	13.7	48.0	31.8	0.0	426.8	0.1	0.0	75.9	1.2	23.9
Delay (s)	101.9	368.4	33.9	89.6	68.8	29.9	458.3	12.1	10.7	121.3	33.9	54.5
Level of Service	F	F	C	F	E	C	F	B	B	F	C	D
Approach Delay (s)		243.7			70.2			339.9			43.4	
Approach LOS		F			E			F			D	

Intersection Summary			
HCM Average Control Delay	222.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	120.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3508		3433	3432		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3508		3433	3432		1770	3539	1583	3433	3539	1583
Volume (vph)	178	856	53	284	771	196	83	1077	156	292	1054	66
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	193	930	58	309	838	213	90	1171	170	317	1146	72
RTOR Reduction (vph)	0	5	0	0	25	0	0	0	110	0	0	45
Lane Group Flow (vph)	193	983	0	309	1026	0	90	1171	60	317	1146	27
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	9.0	27.0		9.0	27.0		4.0	31.7	31.7	6.0	33.7	33.7
Effective Green, g (s)	9.0	27.0		9.0	27.0		4.0	31.7	31.7	6.0	33.7	33.7
Actuated g/C Ratio	0.10	0.30		0.10	0.30		0.04	0.35	0.35	0.07	0.38	0.38
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	178	1056		344	1033		79	1251	559	230	1330	595
v/s Ratio Prot	c0.11	0.28		0.09	c0.31		0.05	c0.33		c0.09	0.32	
v/s Ratio Perm									0.11			0.05
v/c Ratio	1.08	0.93		0.90	0.99		1.14	0.94	0.11	1.38	0.86	0.05
Uniform Delay, d1	40.4	30.4		39.9	31.3		42.9	28.0	19.5	41.9	25.8	17.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	91.7	14.1		24.7	26.2		143.9	12.9	0.1	195.1	6.0	0.0
Delay (s)	132.1	44.5		64.6	57.4		186.7	40.9	19.6	236.9	31.8	17.8
Level of Service	F	D		E	E		F	D	B	F	C	B
Approach Delay (s)		58.8			59.1			47.6			73.5	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM Average Control Delay	60.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
48: E Ave & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1841		1770	1854		1770	3414		1770	3478	
Flt Permitted	0.65	1.00		0.39	1.00		0.19	1.00		0.27	1.00	
Satd. Flow (perm)	1217	1841		723	1854		354	3414		510	3478	
Volume (vph)	138	323	27	128	146	5	8	607	188	3	872	114
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	351	29	139	159	5	9	660	204	3	948	124
RTOR Reduction (vph)	0	4	0	0	1	0	0	30	0	0	11	0
Lane Group Flow (vph)	150	376	0	139	163	0	9	834	0	3	1061	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.6	14.6		14.6	14.6		22.0	22.0		22.0	22.0	
Effective Green, g (s)	14.6	14.6		14.6	14.6		22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.49	0.49		0.49	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	398	603		237	607		175	1684		252	1716	
v/s Ratio Prot		c0.21			0.09			0.25			c0.31	
v/s Ratio Perm	0.12			0.19			0.03			0.01		
v/c Ratio	0.38	0.62		0.59	0.27		0.05	0.50		0.01	0.62	
Uniform Delay, d1	11.5	12.7		12.5	11.1		5.9	7.6		5.8	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.0		3.7	0.2		0.1	0.2		0.0	0.7	
Delay (s)	12.1	14.7		16.2	11.3		6.0	7.8		5.8	8.9	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		14.0			13.5			7.8			8.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	44.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
49: Eucalyptus St & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3410		1770	3501		1770	3463		1770	3368	
Flt Permitted	0.95	1.00		0.23	1.00		0.95	1.00		0.39	1.00	
Satd. Flow (perm)	1770	3410		430	3501		1770	3463		718	3368	
Volume (vph)	313	804	259	5	565	43	176	551	93	13	672	320
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	340	874	282	5	614	47	191	599	101	14	730	348
RTOR Reduction (vph)	0	35	0	0	6	0	0	15	0	0	63	0
Lane Group Flow (vph)	340	1121	0	5	655	0	191	685	0	14	1015	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	17.0	39.0		18.0	18.0		11.0	43.0		28.0	28.0	
Effective Green, g (s)	17.0	39.0		18.0	18.0		11.0	43.0		28.0	28.0	
Actuated g/C Ratio	0.19	0.43		0.20	0.20		0.12	0.48		0.31	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	1478		86	700		216	1655		223	1048	
v/s Ratio Prot	c0.19	0.34			c0.19		c0.11	0.20			c0.32	
v/s Ratio Perm				0.01						0.02		
v/c Ratio	1.02	0.76		0.06	0.94		0.88	0.41		0.06	0.97	
Uniform Delay, d1	36.5	21.5		29.1	35.4		38.9	15.3		21.8	30.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	53.9	2.3		0.3	19.7		31.9	0.2		0.1	20.3	
Delay (s)	90.4	23.8		29.4	55.1		70.8	15.5		21.9	50.8	
Level of Service	F	C		C	E		E	B		C	D	
Approach Delay (s)		38.9			54.9			27.3			50.4	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	42.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5063		3433	4761		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.21	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5063		3433	4761		392	3539	1583
Volume (vph)	246	1506	1838	363	974	29	1039	771	571	44	747	251
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	267	1637	1998	395	1059	32	1129	838	621	48	812	273
RTOR Reduction (vph)	0	0	645	0	3	0	0	115	0	0	0	136
Lane Group Flow (vph)	267	1637	1353	395	1088	0	1129	1344	0	48	812	137
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	31.0	31.0	7.0	25.0		25.0	48.0		19.0	19.0	19.0
Effective Green, g (s)	13.0	31.0	31.0	7.0	25.0		25.0	48.0		19.0	19.0	19.0
Actuated g/C Ratio	0.13	0.32	0.32	0.07	0.26		0.26	0.49		0.19	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	235	1609	882	245	1292		876	2332		76	686	307
v/s Ratio Prot	0.15	0.32		c0.12	0.22		c0.33	0.31			c0.23	
v/s Ratio Perm			0.72							0.12		0.17
v/c Ratio	1.14	1.02	1.53	1.61	0.84		1.29	0.58		0.63	1.18	0.45
Uniform Delay, d1	42.5	33.5	33.5	45.5	34.6		36.5	17.8		36.3	39.5	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	100.3	26.9	246.2	293.7	5.2		138.6	0.3		15.9	97.1	1.0
Delay (s)	142.8	60.4	279.7	339.2	39.8		175.1	18.1		52.1	136.6	35.9
Level of Service	F	E	F	F	D		F	B		D	F	D
Approach Delay (s)		178.3			119.4			86.6			108.7	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	134.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.66			
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	105.3%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
55: Sultana St & E Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3371		1770	3458		1770	3489		1770	3428	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3371		1770	3458		1770	3489		1770	3428	
Volume (vph)	243	624	290	36	339	61	299	503	52	253	808	213
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	678	315	39	368	66	325	547	57	275	878	232
RTOR Reduction (vph)	0	59	0	0	16	0	0	8	0	0	27	0
Lane Group Flow (vph)	264	934	0	39	418	0	325	596	0	275	1083	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.0	26.9		2.3	16.2		15.0	28.0		16.5	29.5	
Effective Green, g (s)	13.0	26.9		2.3	16.2		15.0	28.0		16.5	29.5	
Actuated g/C Ratio	0.14	0.30		0.03	0.18		0.17	0.31		0.18	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	1011		45	625		296	1089		326	1127	
v/s Ratio Prot	c0.15	c0.29		0.02	0.13		c0.18	0.17		0.16	c0.32	
v/s Ratio Perm												
v/c Ratio	1.03	0.92		0.87	0.67		1.10	0.55		0.84	0.96	
Uniform Delay, d1	38.4	30.4		43.5	34.2		37.4	25.6		35.4	29.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	63.4	13.5		84.0	2.7		81.1	0.6		17.7	18.1	
Delay (s)	101.7	43.9		127.6	37.0		118.5	26.2		53.1	47.7	
Level of Service	F	D		F	D		F	C		D	D	
Approach Delay (s)		56.1			44.4			58.5			48.7	
Approach LOS		E			D			E			D	

Intersection Summary				
HCM Average Control Delay	52.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	88.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

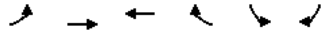
Hesperia GP Update
56: Sultana St & I Avenue PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	245	624	313	1058	1607	232
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	678	340	1150	1747	252
RTOR Reduction (vph)	0	466	0	0	0	97
Lane Group Flow (vph)	266	212	340	1150	1747	155
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	15.4	15.4	20.6	66.0	41.4	41.4
Effective Green, g (s)	15.4	15.4	20.6	66.0	41.4	41.4
Actuated g/C Ratio	0.17	0.17	0.23	0.74	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	305	273	408	2613	1639	733
v/s Ratio Prot			c0.19	0.32	c0.49	
v/s Ratio Perm	0.15	0.43				0.16
v/c Ratio	0.87	0.78	0.83	0.44	1.07	0.21
Uniform Delay, d1	36.0	35.4	32.8	4.5	24.0	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.8	12.9	13.6	0.5	42.1	0.7
Delay (s)	58.9	48.3	46.4	5.1	66.1	14.9
Level of Service	E	D	D	A	E	B
Approach Delay (s)	51.3			14.5	59.7	
Approach LOS	D			B	E	

Intersection Summary				
HCM Average Control Delay	42.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.29			
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
57: Joshua St & Hwy 395 PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Volume (vph)	658	903	844	942	1150	773
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	715	982	917	1024	1250	840
RTOR Reduction (vph)	0	0	0	615	0	177
Lane Group Flow (vph)	715	982	917	409	1250	663
Turn Type	Prot			Perm		custom
Protected Phases	7		8		1	
Permitted Phases		4		8		6
Actuated Green, G (s)	9.0	36.0	23.0	23.0	35.0	35.0
Effective Green, g (s)	9.0	36.0	23.0	23.0	35.0	35.0
Actuated g/C Ratio	0.11	0.46	0.29	0.29	0.44	0.44
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	391	1613	1030	461	1521	701
v/s Ratio Prot	c0.21		0.26		0.36	
v/s Ratio Perm		0.28		0.65		0.53
v/c Ratio	1.83	0.61	0.89	0.89	0.82	0.95
Uniform Delay, d1	35.0	16.2	26.8	26.8	19.3	21.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	382.8	0.7	9.8	18.2	3.7	23.1
Delay (s)	417.8	16.9	36.5	44.9	23.0	44.2
Level of Service	F	B	D	D	C	D
Approach Delay (s)		185.8	41.0		31.5	
Approach LOS		F	D		C	

Intersection Summary				
HCM Average Control Delay	80.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.63			
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	84.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	1908	1080	0	2563	466	0	0	717	0	1539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2074	1174	0	2786	507	0	0	779	0	1673
RTOR Reduction (vph)	0	0	558	0	0	218	0	0	0	0	2
Lane Group Flow (vph)	0	2074	616	0	2786	289	0	0	779	0	1671
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		44.0	44.0		44.0	44.0			38.0		38.0
Effective Green, g (s)		44.0	44.0		44.0	44.0			38.0		38.0
Actuated g/C Ratio		0.49	0.49		0.49	0.49			0.42		0.42
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		2486	774		2486	774			747		668
v/s Ratio Prot		0.41			0.55						
v/s Ratio Perm			0.74			0.32			0.44		1.06
v/c Ratio		0.83	0.80		1.12	0.37			1.04		2.50
Uniform Delay, d1		19.9	19.3		23.0	14.4			26.0		26.0
Progression Factor		0.86	3.00		1.00	1.00			1.00		1.00
Incremental Delay, d2		0.2	0.5		60.4	0.3			44.6		680.3
Delay (s)		17.2	58.3		83.4	14.7			70.6		706.3
Level of Service		B	E		F	B			E		F
Approach Delay (s)		32.1			72.8		0.0			504.4	
Approach LOS		C			E		A			F	

Intersection Summary			
HCM Average Control Delay	175.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	138.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	1297	584	553	1528	0	0	0	1000	0	359
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1410	635	601	1661	0	0	0	1087	0	390
RTOR Reduction (vph)	0	0	314	0	0	0	0	0	0	0	39
Lane Group Flow (vph)	0	1410	321	601	1661	0	0	0	1087	0	351
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		45.5	45.5	12.0	61.5				20.5		20.5
Effective Green, g (s)		45.5	45.5	12.0	61.5				20.5		20.5
Actuated g/C Ratio		0.51	0.51	0.13	0.68				0.23		0.23
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1714	729	236	2418				782		361
v/s Ratio Prot		0.42		c0.34	0.47						
v/s Ratio Perm			0.44						0.32		0.25
v/c Ratio		0.82	0.44	2.55	0.69				1.39		0.97
Uniform Delay, d1		18.8	14.2	39.0	8.5				34.8		34.5
Progression Factor		1.00	1.00	0.90	1.63				1.00		1.00
Incremental Delay, d2		3.3	0.4	697.1	0.1				183.4		41.1
Delay (s)		22.2	14.6	732.0	13.9				218.1		75.6
Level of Service		C	B	F	B				F		E
Approach Delay (s)		19.8			204.7		0.0			180.5	
Approach LOS		B			F		A			F	

Intersection Summary			
HCM Average Control Delay	133.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	131.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	266	2015	0	0	1286	999	0	0	744	0	1113
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	289	2190	0	0	1398	1086	0	0	809	0	1210
RTOR Reduction (vph)	0	0	0	0	0	367	0	0	0	0	10
Lane Group Flow (vph)	289	2190	0	0	1398	719	0	0	809	0	1200
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	16.0	61.0			41.0	41.0			21.0		21.0
Effective Green, g (s)	16.0	61.0			41.0	41.0			21.0		21.0
Actuated g/C Ratio	0.18	0.68			0.46	0.46			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	315	2399			1612	721			413		369
v/s Ratio Prot	0.16	c0.62			0.40						
v/s Ratio Perm						0.69			0.46		0.76
v/c Ratio	0.92	0.91			0.87	1.00			1.96		3.25
Uniform Delay, d1	36.4	12.3			22.1	24.4			34.5		34.5
Progression Factor	0.67	0.99			1.00	1.00			1.00		1.00
Incremental Delay, d2	4.4	0.6			5.2	32.6			440.2		1020.5
Delay (s)	28.8	12.8			27.3	57.0			474.7		1055.0
Level of Service	C	B			C	E			F		F
Approach Delay (s)		14.6			40.3		0.0			822.4	
Approach LOS		B			D		A			F	

Intersection Summary			
HCM Average Control Delay	257.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	131.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395
PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5034		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5034		3433	5085
Volume (vph)	265	451	2080	149	472	1834
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	288	490	2261	162	513	1993
RTOR Reduction (vph)	0	190	9	0	0	0
Lane Group Flow (vph)	288	300	2414	0	513	1993
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	16.0	16.0	48.8		13.0	65.8
Effective Green, g (s)	16.0	16.0	48.8		13.0	65.8
Actuated g/C Ratio	0.18	0.18	0.54		0.14	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	315	282	2736		497	3726
v/s Ratio Prot	0.16		c0.48		c0.15	0.39
v/s Ratio Perm		0.31				
v/c Ratio	0.91	1.06	0.88		1.03	0.53
Uniform Delay, d1	36.2	36.9	18.0		38.4	5.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	29.5	71.6	3.7		48.9	0.1
Delay (s)	65.8	108.5	21.7		87.3	5.4
Level of Service	E	F	C		F	A
Approach Delay (s)	92.7		21.7			22.2
Approach LOS	F		C			C

Intersection Summary			
HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3378		1770	3470		1770	3517		1770	3472	
Flt Permitted	0.43	1.00		0.16	1.00		0.12	1.00		0.28	1.00	
Satd. Flow (perm)	800	3378		301	3470		226	3517		526	3472	
Volume (vph)	289	563	245	22	348	52	205	725	32	38	1056	153
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	314	612	266	24	378	57	223	788	35	41	1148	166
RTOR Reduction (vph)	0	44	0	0	14	0	0	4	0	0	12	0
Lane Group Flow (vph)	314	834	0	24	421	0	223	819	0	41	1302	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.0	32.0		32.0	32.0		50.0	50.0		50.0	50.0	
Effective Green, g (s)	32.0	32.0		32.0	32.0		50.0	50.0		50.0	50.0	
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.56	0.56		0.56	0.56	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	1201		107	1234		126	1954		292	1929	
v/s Ratio Prot		0.26			0.13			0.23			0.38	
v/s Ratio Perm	c0.39			0.08			c0.98			0.08		
v/c Ratio	1.11	0.69		0.22	0.34		1.77	0.42		0.14	0.67	
Uniform Delay, d1	29.0	24.8		20.3	21.3		20.0	11.6		9.6	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	84.7	1.8		1.1	0.2		376.6	0.1		0.2	0.9	
Delay (s)	113.7	26.6		21.4	21.4		396.6	11.7		9.9	15.2	
Level of Service	F	C		C	C		F	B		A	B	
Approach Delay (s)		49.5			21.4			93.8			15.0	
Approach LOS		D			C			F			B	

Intersection Summary			
HCM Average Control Delay	46.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
74: Main St. & Cottonwood Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5051		1770	5085	1583	1770	1863	1583	3433	3413	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.47	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5051		1770	5085	1583	866	1863	1583	3433	3413	
Volume (vph)	216	2378	113	89	2243	404	65	353	106	489	356	111
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	2585	123	97	2438	439	71	384	115	532	387	121
RTOR Reduction (vph)	0	6	0	0	0	216	0	0	87	0	33	0
Lane Group Flow (vph)	235	2702	0	97	2438	223	71	384	28	532	475	0
Turn Type	Prot			Prot		Perm	Perm		Perm	Prot		
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases						8	2		2			
Actuated Green, G (s)	12.0	39.0		5.0	32.0	32.0	20.3	20.3	20.3	9.0	33.3	
Effective Green, g (s)	12.0	39.0		5.0	32.0	32.0	20.3	20.3	20.3	9.0	33.3	
Actuated g/C Ratio	0.13	0.44		0.06	0.36	0.36	0.23	0.23	0.23	0.10	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	238	2206		99	1822	567	197	424	360	346	1273	
v/s Ratio Prot	c0.13	c0.54		0.05	c0.48			c0.21		c0.15	0.15	
v/s Ratio Perm						0.28	0.08		0.07			
v/c Ratio	0.99	1.23		0.98	1.34	0.39	0.36	0.91	0.08	1.54	0.37	
Uniform Delay, d1	38.6	25.1		42.1	28.6	21.4	29.0	33.6	27.1	40.1	20.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	54.3	105.5		82.9	156.0	0.5	1.1	22.4	0.1	256.0	0.2	
Delay (s)	92.8	130.7		125.0	184.6	21.9	30.2	56.0	27.2	296.1	20.6	
Level of Service	F	F		F	F	C	C	E	C	F	C	
Approach Delay (s)		127.6			158.6			47.0			161.5	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	138.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	89.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
75: Main St. & 7th Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	303	1997	573	8	1832	106	401	327	7	87	553	358
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	329	2171	623	9	1991	115	436	355	8	95	601	389
RTOR Reduction (vph)	0	0	182	0	0	47	0	0	6	0	0	121
Lane Group Flow (vph)	329	2171	441	9	1991	68	436	355	2	95	601	268
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	51.4	51.4	0.8	45.2	45.2	8.0	20.2	20.2	5.6	17.8	17.8
Effective Green, g (s)	7.0	51.4	51.4	0.8	45.2	45.2	8.0	20.2	20.2	5.6	17.8	17.8
Actuated g/C Ratio	0.07	0.55	0.55	0.01	0.48	0.48	0.09	0.21	0.21	0.06	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	1935	866	15	1702	761	292	761	340	105	670	528
v/s Ratio Prot	c0.10	c0.61		0.01	0.56		c0.13	0.10		0.05	c0.17	
v/s Ratio Perm			0.39			0.07			0.01			0.14
v/c Ratio	1.29	1.12	0.51	0.60	1.17	0.09	1.49	0.47	0.01	0.90	0.90	0.51
Uniform Delay, d1	43.5	21.3	13.4	46.4	24.4	13.2	43.0	32.2	29.0	43.9	37.2	34.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	154.6	62.4	0.5	51.0	83.1	0.1	239.2	0.5	0.0	58.1	14.7	0.8
Delay (s)	198.1	83.7	13.8	97.5	107.5	13.3	282.2	32.7	29.0	102.0	51.9	34.9
Level of Service	F	F	B	F	F	B	F	C	C	F	D	C
Approach Delay (s)		81.8			102.3			168.8			50.2	
Approach LOS		F			F			F			D	

Intersection Summary				
HCM Average Control Delay	92.9	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.09			
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	99.3%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
76: Main St. & Peach Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5016		1770	4965		1770	3539	1583	1770	3358	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.46	1.00	
Satd. Flow (perm)	1770	5016		1770	4965		1770	3539	1583	861	3358	
Volume (vph)	115	1334	133	432	896	167	84	183	367	323	247	128
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	1450	145	470	974	182	91	199	399	351	268	139
RTOR Reduction (vph)	0	13	0	0	26	0	0	0	340	0	76	0
Lane Group Flow (vph)	125	1582	0	470	1130	0	91	199	59	351	331	0
Turn Type	Prot			Prot			Prot		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)	9.6	27.9		22.0	40.3		5.5	12.2	12.2	24.7	15.7	
Effective Green, g (s)	9.6	27.9		22.0	40.3		5.5	12.2	12.2	24.7	15.7	
Actuated g/C Ratio	0.11	0.32		0.25	0.46		0.06	0.14	0.14	0.28	0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	195	1607		447	2297		112	496	222	338	605	
v/s Ratio Prot	0.07	c0.32		c0.27	0.23		0.05	0.06		c0.11	0.12	
v/s Ratio Perm									0.25	0.19		
v/c Ratio	0.64	0.98		1.05	0.49		0.81	0.40	0.27	1.04	0.55	
Uniform Delay, d1	37.1	29.4		32.5	16.3		40.3	34.1	33.5	30.0	32.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.0	18.7		56.7	0.2		34.4	0.5	0.6	59.3	1.0	
Delay (s)	44.1	48.1		89.3	16.4		74.7	34.7	34.1	89.3	33.5	
Level of Service	D	D		F	B		E	C	C	F	C	
Approach Delay (s)		47.8			37.5			39.6			59.3	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM Average Control Delay	45.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.23			
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	89.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
77: Danbury Ave & I Avenue — PM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	0.85	
Flt Protected	0.95	0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3404		1770	3493		1770	3462		1770	2787	
Flt Permitted	0.17	0.96		0.15	1.00		0.95	1.00		0.32	1.00	
Satd. Flow (perm)	324	3404		285	3493		1770	3462		588	2787	
Volume (vph)	19	547	64	14	719	69	57	1070	181	14	719	69
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	595	70	15	782	75	62	1163	197	15	782	75
RTOR Reduction (vph)	0	12	0	0	7	0	0	13	0	0	9	0
Lane Group Flow (vph)	21	653	0	15	850	0	62	1347	0	15	848	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	25.7	25.7		26.1	26.1		2.9	33.0		25.7	25.7	
Effective Green, g (s)	25.7	25.7		26.1	26.1		2.9	33.0		25.7	25.7	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.04	0.49		0.39	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	125	1312		112	1367		77	1713		227	1074	
v/s Ratio Prot		0.20			0.25		0.04	c0.39				
v/s Ratio Perm	0.06			0.05						0.03	0.31	
v/c Ratio	0.17	0.50		0.13	0.62		0.81	0.79		0.07	0.79	
Uniform Delay, d1	13.5	15.6		13.0	16.3		31.6	13.9		12.9	18.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.3		0.5	0.9		43.8	2.5		0.1	3.9	
Delay (s)	14.1	15.9		13.6	17.2		75.4	16.4		13.1	22.1	
Level of Service	B	B		B	B		E	B		B	C	
Approach Delay (s)		15.8			17.2			19.0		21.9		
Approach LOS		B			B			B		C		

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
78: Ranchero Rd & Danbury Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	4797		1770	5033		1770	3262		1770	3209	
Flt Permitted	0.95	1.00		0.95	1.00		0.16	1.00		0.50	1.00	
Satd. Flow (perm)	3433	4797		1770	5033		292	3262		935	3209	
Volume (vph)	733	779	474	205	529	39	361	175	191	132	367	603
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	797	847	515	223	575	42	392	190	208	143	399	655
RTOR Reduction (vph)	0	122	0	0	9	0	0	148	0	0	334	0
Lane Group Flow (vph)	797	1240	0	223	608	0	392	250	0	143	720	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	22.3	26.2		12.0	15.9		37.5	25.5		30.3	21.9	
Effective Green, g (s)	22.3	26.2		12.0	15.9		37.5	25.5		30.3	21.9	
Actuated g/C Ratio	0.25	0.30		0.14	0.18		0.43	0.29		0.34	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	869	1427		241	908		326	944		401	798	
v/s Ratio Prot	c0.23	c0.28		0.13	0.12		c0.16	0.12		0.03	0.33	
v/s Ratio Perm							c0.35			0.09		
v/c Ratio	0.92	0.87		0.93	0.67		1.20	0.27		0.36	0.90	
Uniform Delay, d1	32.0	29.3		37.6	33.7		40.3	24.1		20.6	32.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.2	5.9		37.9	1.9		116.7	0.2		0.5	13.4	
Delay (s)	46.2	35.2		75.5	35.5		157.0	24.2		21.2	45.4	
Level of Service	D	D		E	D		F	C		C	D	
Approach Delay (s)		39.3			46.2			90.1			42.5	
Approach LOS		D			D			F			D	

Intersection Summary			
HCM Average Control Delay	49.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	88.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Appendix B-4

- **High Intensity Buildout (no new corridors)**

Hesperia GP Update
1: Highway 138 & Summit Valley Rd AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.41	1.00
Satd. Flow (perm)	3433	5085	5085	1583	768	2787
Volume (vph)	113	176	1838	27	21	1055
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	191	1998	29	23	1147
RTOR Reduction (vph)	0	0	0	16	0	411
Lane Group Flow (vph)	123	191	1998	13	23	736
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	24.1	64.6	36.5	36.5	9.7	24.1
Effective Green, g (s)	24.1	64.6	36.5	36.5	9.7	24.1
Actuated g/C Ratio	0.29	0.78	0.44	0.44	0.12	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1005	3991	2255	702	91	816
v/s Ratio Prot	0.04	0.04	c0.39			c0.41
v/s Ratio Perm				0.02	c0.03	
v/c Ratio	0.12	0.05	0.89	0.02	0.25	0.90
Uniform Delay, d1	21.3	2.0	21.0	12.8	33.0	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	4.6	0.0	1.5	13.2
Delay (s)	21.4	2.0	25.6	12.9	34.5	41.1
Level of Service	C	A	C	B	C	D
Approach Delay (s)		9.6	25.4		41.0	
Approach LOS		A	C		D	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	82.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.91	0.91				1.00		1.00
Frt		0.94		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	0.97				0.95		1.00
Satd. Flow (prot)		3342		1610	3285				1770		1583
Flt Permitted		1.00		0.95	0.46				0.95		1.00
Satd. Flow (perm)		3342		1610	1543				1770		1583
Volume (vph)	0	298	176	1406	395	0	0	0	53	0	424
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	324	191	1528	429	0	0	0	58	0	461
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	0	0	354
Lane Group Flow (vph)	0	478	0	764	1193	0	0	0	58	0	107
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		20.9		61.1	61.1				20.9		20.9
Effective Green, g (s)		20.9		61.1	61.1				20.9		20.9
Actuated g/C Ratio		0.23		0.68	0.68				0.23		0.23
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		776		1093	2230				411		368
v/s Ratio Prot		0.15		c0.47	0.36						
v/s Ratio Perm									0.03		0.29
v/c Ratio		0.62		0.70	0.53				0.14		0.29
Uniform Delay, d1		31.0		8.8	7.3				27.4		28.4
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		3.6		2.0	0.2				0.7		2.0
Delay (s)		34.6		10.8	7.5				28.1		30.4
Level of Service		C		B	A				C		C
Approach Delay (s)		34.6			8.8		0.0			30.2	
Approach LOS		C			A		A			C	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave AM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		
Lane Util. Factor	0.97		1.00		
Frt	1.00		0.86		
Flt Protected	0.95		1.00		
Satd. Flow (prot)	3433		1611		
Flt Permitted	0.95		1.00		
Satd. Flow (perm)	3433		1611		
Volume (vph)	586	0	250	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	637	0	272	0	0
RTOR Reduction (vph)	0	0	85	0	0
Lane Group Flow (vph)	637	0	187	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	20.2		61.8		
Effective Green, g (s)	20.2		61.8		
Actuated g/C Ratio	0.22		0.69		
Clearance Time (s)	4.0		4.0		
Vehicle Extension (s)	3.0		3.0		
Lane Grp Cap (vph)	771		1106		
v/s Ratio Prot	c0.19				
v/s Ratio Perm			0.17		
v/c Ratio	0.83		0.17		
Uniform Delay, d1	33.2		5.0		
Progression Factor	1.00		1.00		
Incremental Delay, d2	7.2		0.3		
Delay (s)	40.5		5.3		
Level of Service	D		A		
Approach Delay (s)	40.5	5.3		0.0	
Approach LOS	D	A		A	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
9: Ranchero Rd & Caliente Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	112	1823	692	1010	1268	338	189	35	438	268	45	53
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	1982	752	1098	1378	367	205	38	476	291	49	58
RTOR Reduction (vph)	0	0	329	0	0	170	0	0	432	0	0	53
Lane Group Flow (vph)	122	1982	423	1098	1378	197	205	38	44	291	49	5
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.5	29.0	29.0	30.7	48.2	48.2	6.0	8.3	8.3	6.0	8.3	8.3
Effective Green, g (s)	11.5	29.0	29.0	30.7	48.2	48.2	6.0	8.3	8.3	6.0	8.3	8.3
Actuated g/C Ratio	0.13	0.32	0.32	0.34	0.54	0.54	0.07	0.09	0.09	0.07	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	226	1639	510	1171	2723	848	229	172	257	229	172	146
v/s Ratio Prot	0.07	0.39		c0.32	0.27		0.06	0.02		c0.08	0.03	
v/s Ratio Perm			0.47			0.23			0.17			0.04
v/c Ratio	0.54	1.21	0.83	0.94	0.51	0.23	0.90	0.22	0.17	1.27	0.28	0.04
Uniform Delay, d1	36.8	30.5	28.2	28.7	13.3	11.1	41.7	37.9	37.7	42.0	38.1	37.2
Progression Factor	1.00	1.00	1.00	1.09	1.08	1.11	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	100.1	10.7	9.2	0.1	0.1	32.7	2.9	1.4	151.5	4.1	0.5
Delay (s)	39.2	130.6	38.9	40.5	14.5	12.4	74.4	40.8	39.1	193.5	42.2	37.7
Level of Service	D	F	D	D	B	B	E	D	D	F	D	D
Approach Delay (s)		102.6			24.3			49.3			152.2	
Approach LOS		F			C			D			F	

Intersection Summary			
HCM Average Control Delay	67.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		0.95	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4581	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4581	1362	3433	5085				1770		2787
Volume (vph)	0	1119	1411	616	1647	0	0	0	226	0	970
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1216	1534	670	1790	0	0	0	246	0	1054
RTOR Reduction (vph)	0	91	486	0	0	0	0	0	0	0	15
Lane Group Flow (vph)	0	1677	496	670	1790	0	0	0	246	0	1039
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		30.0	30.0	16.0	50.0				32.0		32.0
Effective Green, g (s)		30.0	30.0	16.0	50.0				32.0		32.0
Actuated g/C Ratio		0.33	0.33	0.18	0.56				0.36		0.36
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1527	454	610	2825				629		991
v/s Ratio Prot		0.39		c0.20	0.35						
v/s Ratio Perm			0.72						0.14		0.38
v/c Ratio		1.10	1.09	1.10	0.63				0.39		1.05
Uniform Delay, d1		30.0	30.0	37.0	13.7				21.7		29.0
Progression Factor		0.89	3.65	1.22	1.32				1.00		1.00
Incremental Delay, d2		45.5	45.5	56.4	0.2				1.8		42.2
Delay (s)		72.0	154.8	101.6	18.3				23.5		71.2
Level of Service		E	F	F	B				C		E
Approach Delay (s)		101.6			41.0		0.0			62.2	
Approach LOS		F			D		A			E	

Intersection Summary			
HCM Average Control Delay	70.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	636	709	0	0	1966	445	0	0	297	0	192
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	691	771	0	0	2137	484	0	0	323	0	209
RTOR Reduction (vph)	0	0	0	0	0	263	0	0	0	0	171
Lane Group Flow (vph)	691	771	0	0	2137	221	0	0	323	0	38
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	20.5	65.5			41.0	41.0			16.5		16.5
Effective Green, g (s)	20.5	65.5			41.0	41.0			16.5		16.5
Actuated g/C Ratio	0.23	0.73			0.46	0.46			0.18		0.18
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	782	3701			2317	721			629		290
v/s Ratio Prot	c0.20	0.15			c0.42						
v/s Ratio Perm						0.31			0.09		0.13
v/c Ratio	0.88	0.21			0.92	0.31			0.51		0.13
Uniform Delay, d1	33.6	3.9			23.0	15.5			33.1		30.8
Progression Factor	0.74	2.65			0.90	0.80			1.00		1.00
Incremental Delay, d2	3.6	0.0			2.4	0.1			3.0		0.9
Delay (s)	28.4	10.4			23.1	12.5			36.1		31.7
Level of Service	C	B			C	B			D		C
Approach Delay (s)		18.9			21.1		0.0			34.4	
Approach LOS		B			C		A			C	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00	1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085		3433	5085	1583	1770	4769	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085		3433	5085	1583	1770	4769	
Volume (vph)	165	279	457	1101	1539	0	474	55	309	4	694	490
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	303	497	1197	1673	0	515	60	336	4	754	533
RTOR Reduction (vph)	0	0	131	0	0	0	0	0	223	0	131	0
Lane Group Flow (vph)	179	303	366	1197	1673	0	515	60	113	4	1156	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	7.0	17.0	17.0	26.0	36.0		11.0	30.2	30.2	0.8	20.0	
Effective Green, g (s)	7.0	17.0	17.0	26.0	36.0		11.0	30.2	30.2	0.8	20.0	
Actuated g/C Ratio	0.08	0.19	0.19	0.29	0.40		0.12	0.34	0.34	0.01	0.22	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	267	961	299	992	2034		420	1706	531	16	1060	
v/s Ratio Prot	0.05	0.06		c0.35	0.33		c0.15	0.01		0.00	c0.27	
v/s Ratio Perm			0.31						0.21			
v/c Ratio	0.67	0.32	1.22	1.21	0.82		1.23	0.04	0.21	0.25	1.10dr	
Uniform Delay, d1	40.4	31.5	36.5	32.0	24.1		39.5	20.1	21.4	44.3	35.0	
Progression Factor	1.44	0.92	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.3	0.2	126.0	102.6	2.8		121.3	0.0	0.9	8.1	55.6	
Delay (s)	64.4	29.1	162.7	134.6	27.0		160.8	20.1	22.3	52.4	90.6	
Level of Service	E	C	F	F	C		F	C	C	D	F	
Approach Delay (s)		103.4			71.9			100.4			90.4	
Approach LOS		F			E			F			F	

Intersection Summary				
HCM Average Control Delay	85.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	94.1%	ICU Level of Service	F	
Analysis Period (min)	15			

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Hesperia GP Update
13: Ranchero Rd & Escondido Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5031		1770	4969		1770	3487		1770	3396	
Flt Permitted	0.08	1.00		0.34	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	152	5031		637	4969		1770	3487		1770	3396	
Volume (vph)	33	632	49	17	2084	375	192	310	34	132	70	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	687	53	18	2265	408	209	337	37	143	76	28
RTOR Reduction (vph)	0	9	0	0	26	0	0	10	0	0	22	0
Lane Group Flow (vph)	36	731	0	18	2647	0	209	364	0	143	82	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	49.1	49.1		49.1	49.1		11.9	14.0		9.5	11.6	
Effective Green, g (s)	49.1	49.1		49.1	49.1		11.9	14.0		9.5	11.6	
Actuated g/C Ratio	0.58	0.58		0.58	0.58		0.14	0.17		0.11	0.14	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	88	2920		370	2884		249	577		199	466	
v/s Ratio Prot		0.15			c0.54		c0.12	c0.11		0.08	0.03	
v/s Ratio Perm	0.24			0.03								
v/c Ratio	0.41	0.25		0.05	0.92		0.84	0.63		0.72	0.18	
Uniform Delay, d1	9.8	8.7		7.7	15.9		35.4	32.9		36.3	32.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.0		0.1	5.2		21.3	2.3		11.7	0.2	
Delay (s)	12.8	8.8		7.7	21.2		56.7	35.1		48.0	32.4	
Level of Service	B	A		A	C		E	D		D	C	
Approach Delay (s)		8.9			21.1			42.9			41.4	
Approach LOS		A			C			D			D	

Intersection Summary				
HCM Average Control Delay	23.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	84.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	75.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Hesperia GP Update
14: Ranchero Rd & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5030		1770	3523		1770	3231	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5030		1770	3523		1770	3231	
Volume (vph)	51	718	116	25	1864	144	359	370	12	103	225	313
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	780	126	27	2026	157	390	402	13	112	245	340
RTOR Reduction (vph)	0	0	72	0	9	0	0	2	0	0	85	0
Lane Group Flow (vph)	55	780	54	27	2174	0	390	413	0	112	500	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	3.1	38.8	38.8	2.0	37.7		18.0	25.8		8.6	16.4	
Effective Green, g (s)	3.1	38.8	38.8	2.0	37.7		18.0	25.8		8.6	16.4	
Actuated g/C Ratio	0.03	0.43	0.43	0.02	0.41		0.20	0.28		0.09	0.18	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	60	2163	673	39	2079		349	997		167	581	
v/s Ratio Prot	c0.03	0.15		0.02	c0.43		c0.22	0.12		0.06	c0.18	
v/s Ratio Perm			0.08									
v/c Ratio	0.92	0.36	0.08	0.69	1.05		1.12	0.41		0.67	0.93dr	
Uniform Delay, d1	43.9	17.8	15.6	44.3	26.8		36.6	26.6		39.9	36.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	85.9	0.1	0.1	41.8	32.9		83.8	0.3		10.1	12.4	
Delay (s)	129.8	17.9	15.6	86.1	59.6		120.4	26.8		50.0	48.6	
Level of Service	F	B	B	F	E		F	C		D	D	
Approach Delay (s)		24.0			59.9			72.2			48.9	
Approach LOS		C			E			E			D	

Intersection Summary					
HCM Average Control Delay	53.0	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.05				
Actuated Cycle Length (s)	91.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	88.6%	ICU Level of Service		E	
Analysis Period (min)	15				

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Hesperia GP Update
15: Ranchero Rd & I Avenue — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.95		1.00	1.00		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4830		1770	3524		1770	4908		1770	3329	
Flt Permitted	0.95	1.00		0.95	1.00		0.21	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4830		1770	3524		392	4908		1770	3329	
Volume (vph)	368	374	189	218	559	17	211	631	191	32	284	187
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	407	205	237	608	18	229	686	208	35	309	203
RTOR Reduction (vph)	0	94	0	0	2	0	0	57	0	0	127	0
Lane Group Flow (vph)	400	518	0	237	624	0	229	837	0	35	385	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	21.0	22.3		15.2	16.5		31.3	20.1		7.2	15.0	
Effective Green, g (s)	21.0	22.3		15.2	16.5		31.3	20.1		7.2	15.0	
Actuated g/C Ratio	0.26	0.28		0.19	0.20		0.39	0.25		0.09	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	460	1333		333	720		362	1221		158	618	
v/s Ratio Prot	c0.23	0.13		0.13	c0.18		c0.10	c0.18		0.02	0.15	
v/s Ratio Perm							0.15					
v/c Ratio	0.87	0.39		0.71	0.87		0.63	0.69		0.22	0.62	
Uniform Delay, d1	28.6	23.7		30.7	31.1		18.5	27.5		34.2	30.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.9	0.2		7.0	10.7		3.6	1.6		0.7	2.0	
Delay (s)	44.5	23.9		37.8	41.7		22.1	29.1		34.9	32.3	
Level of Service	D	C		D	D		C	C		C	C	
Approach Delay (s)		32.1			40.7			27.7			32.4	
Approach LOS		C			D			C			C	

Intersection Summary					
HCM Average Control Delay	32.8	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.78				
Actuated Cycle Length (s)	80.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	75.2%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

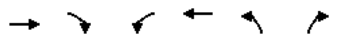
Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.99		1.00	1.00	0.97	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1762		1770	5085	3418	
Flt Permitted	0.96		0.46	1.00	1.00	
Satd. Flow (perm)	1762		860	5085	3418	
Volume (vph)	106	9	13	508	365	109
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	10	14	552	397	118
RTOR Reduction (vph)	5	0	0	0	22	0
Lane Group Flow (vph)	120	0	14	552	493	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	8.8		28.1	28.1	28.1	
Effective Green, g (s)	8.8		28.1	28.1	28.1	
Actuated g/C Ratio	0.20		0.63	0.63	0.63	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	345		538	3182	2139	
v/s Ratio Prot				0.11	c0.15	
v/s Ratio Perm	0.07		0.02			
v/c Ratio	0.35		0.03	0.17	0.23	
Uniform Delay, d1	15.6		3.2	3.5	3.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.6		0.0	0.0	0.1	
Delay (s)	16.2		3.2	3.6	3.7	
Level of Service	B		A	A	A	
Approach Delay (s)	16.2			3.5	3.7	
Approach LOS	B			A	A	

Intersection Summary				
HCM Average Control Delay	4.9	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.27			
Actuated Cycle Length (s)	44.9	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	26.7%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
17: Joshua St & Caliente Rd AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3431		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3431		1770	3539	1770	1583
Volume (vph)	765	197	319	1083	21	118
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	214	347	1177	23	128
RTOR Reduction (vph)	25	0	0	0	0	112
Lane Group Flow (vph)	1021	0	347	1177	23	16
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	23.9		16.3	44.2	7.2	7.2
Effective Green, g (s)	23.9		16.3	44.2	7.2	7.2
Actuated g/C Ratio	0.40		0.27	0.74	0.12	0.12
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1380		486	2633	215	192
v/s Ratio Prot	c0.30		c0.20	0.33	0.01	
v/s Ratio Perm						0.08
v/c Ratio	0.74		0.71	0.45	0.11	0.08
Uniform Delay, d1	15.1		19.4	2.9	23.2	23.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1		4.9	0.1	0.2	0.2
Delay (s)	17.2		24.4	3.0	23.5	23.3
Level of Service	B		C	A	C	C
Approach Delay (s)	17.2			7.9	23.4	
Approach LOS	B			A	C	

Intersection Summary				
HCM Average Control Delay	12.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
18: Joshua St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	5039		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	5039		1770	5085	1583
Volume (vph)	548	296	319	148	1318	357	131	254	17	89	667	440
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	596	322	347	161	1433	388	142	276	18	97	725	478
RTOR Reduction (vph)	0	0	151	0	0	111	0	8	0	0	0	255
Lane Group Flow (vph)	596	322	196	161	1433	277	142	286	0	97	725	223
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	16.0	40.3	40.3	12.7	37.0	37.0	4.0	15.6		5.0	16.6	16.6
Effective Green, g (s)	16.0	40.3	40.3	12.7	37.0	37.0	4.0	15.6		5.0	16.6	16.6
Actuated g/C Ratio	0.18	0.45	0.45	0.14	0.41	0.41	0.04	0.17		0.06	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	613	1592	712	251	1461	654	153	877		99	942	293
v/s Ratio Prot	c0.17	0.09		0.09	c0.40		0.04	0.06		c0.05	0.14	
v/s Ratio Perm			0.22			0.25						0.30
v/c Ratio	0.97	0.20	0.28	0.64	0.98	0.42	0.93	0.33		0.98	0.77	0.76
Uniform Delay, d1	36.6	14.9	15.5	36.3	26.0	18.7	42.7	32.4		42.2	34.7	34.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	29.3	0.1	0.2	5.5	19.0	0.4	51.2	0.2		82.9	3.8	11.1
Delay (s)	65.9	15.0	15.7	41.8	45.0	19.2	93.9	32.6		125.2	38.5	45.7
Level of Service	E	B	B	D	D	B	F	C		F	D	D
Approach Delay (s)		39.2			39.7			52.6			47.6	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM Average Control Delay	42.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	82.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
19: Muscatel St & Escondido Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.92		1.00	0.94		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3251		1770	3327		1770	3530		3433	3399	
Flt Permitted	0.09	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	162	3251		1029	3327		1770	3530		3433	3399	
Volume (vph)	75	134	159	193	818	543	267	795	15	89	356	128
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	146	173	210	889	590	290	864	16	97	387	139
RTOR Reduction (vph)	0	84	0	0	104	0	0	1	0	0	41	0
Lane Group Flow (vph)	82	235	0	210	1375	0	290	879	0	97	485	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	46.0	46.0		46.0	46.0		15.0	27.8		4.0	16.8	
Effective Green, g (s)	46.0	46.0		46.0	46.0		15.0	27.8		4.0	16.8	
Actuated g/C Ratio	0.51	0.51		0.51	0.51		0.17	0.31		0.04	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	83	1665		527	1704		296	1093		153	636	
v/s Ratio Prot		0.10			0.44		c0.16	c0.25		0.03	0.15	
v/s Ratio Perm	c0.51			0.20								
v/c Ratio	0.99	0.14		0.40	0.81		0.98	0.80		0.63	0.76	
Uniform Delay, d1	21.6	11.5		13.4	18.2		37.2	28.5		42.2	34.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	93.9	0.0		0.5	2.9		46.2	4.4		8.3	5.4	
Delay (s)	115.6	11.6		13.9	21.1		83.4	32.9		50.5	40.0	
Level of Service	F	B		B	C		F	C		D	D	
Approach Delay (s)		32.8			20.2			45.4			41.7	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM Average Control Delay	32.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	86.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

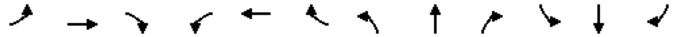
Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. AM Peak Hour



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3355	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3355	
Volume (vph)	277	910	512	198	506	269
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	301	989	557	215	550	292
RTOR Reduction (vph)	0	400	0	0	75	0
Lane Group Flow (vph)	301	589	557	215	767	0
Turn Type		Perm	Prot			
Protected Phases	8		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	30.1	30.1	18.3	43.3	21.0	
Effective Green, g (s)	30.1	30.1	18.3	43.3	21.0	
Actuated g/C Ratio	0.37	0.37	0.22	0.53	0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	655	585	772	1883	866	
v/s Ratio Prot	0.17		c0.16	0.06	c0.25	
v/s Ratio Perm		0.62				
v/c Ratio	0.46	1.01	0.72	0.11	0.89	
Uniform Delay, d1	19.5	25.7	29.2	9.5	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	39.1	3.3	0.0	10.8	
Delay (s)	20.0	64.7	32.5	9.5	39.8	
Level of Service	B	E	C	A	D	
Approach Delay (s)	54.3			26.1	39.8	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	42.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.22			
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.10	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	185	5085	2787	169	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	207	1721	1115	7	1397	196	1083	681	302	908	1361	202
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	1871	1212	8	1518	213	1177	740	328	987	1479	220
RTOR Reduction (vph)	0	0	779	0	0	109	0	0	3	0	0	9
Lane Group Flow (vph)	225	1871	433	8	1518	104	1177	740	325	987	1479	211
Turn Type	Perm		Over	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4	5		8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)	44.0	44.0	13.0	44.0	44.0	44.0	13.0	22.0	22.0	12.0	21.0	21.0
Effective Green, g (s)	44.0	44.0	13.0	44.0	44.0	44.0	13.0	22.0	22.0	12.0	21.0	21.0
Actuated g/C Ratio	0.49	0.49	0.14	0.49	0.49	0.49	0.14	0.24	0.24	0.13	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	90	2486	403	83	2486	774	496	1243	387	458	1187	369
v/s Ratio Prot		0.37	c0.43		0.30		0.34	0.15		0.29	c0.29	
v/s Ratio Perm	c1.22			0.05		0.13			0.21			0.14
v/c Ratio	2.50	0.75	1.08	0.10	0.61	0.13	2.37	0.60	0.84	2.16	1.25	0.57
Uniform Delay, d1	23.0	18.6	38.5	12.3	16.8	12.6	38.5	30.1	32.3	39.0	34.5	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	706.8	1.3	66.5	0.5	0.4	0.1	624.1	0.8	14.7	527.0	117.9	2.1
Delay (s)	729.8	19.9	105.0	12.8	17.2	12.7	662.6	30.8	47.1	566.0	152.4	32.7
Level of Service	F	B	F	B	B	B	F	C	D	F	F	C
Approach Delay (s)		99.4			16.6			364.4			294.6	
Approach LOS		F			B			F			F	

Intersection Summary				
HCM Average Control Delay	197.1	HCM Level of Service	F	
HCM Volume to Capacity ratio	2.24			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	109.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5080		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5080		3433	5085	1583
Volume (vph)	223	1716	679	7	2044	911	302	1866	12	1173	3332	206
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	242	1865	738	8	2222	990	328	2028	13	1275	3622	224
RTOR Reduction (vph)	0	0	236	0	0	384	0	1	0	0	0	76
Lane Group Flow (vph)	242	1865	502	8	2222	606	328	2040	0	1275	3622	148
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.0	34.4	34.4	0.8	28.2	28.2	5.0	26.0		16.0	37.0	37.0
Effective Green, g (s)	7.0	34.4	34.4	0.8	28.2	28.2	5.0	26.0		16.0	37.0	37.0
Actuated g/C Ratio	0.08	0.37	0.37	0.01	0.30	0.30	0.05	0.28		0.17	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	1877	1029	15	1539	843	184	1417		589	2019	628
v/s Ratio Prot	c0.14	0.37		0.00	c0.44		0.10	0.40		c0.37	c0.71	
v/s Ratio Perm			0.26			0.36						0.14
v/c Ratio	1.82	0.99	0.49	0.53	1.44	0.72	1.78	1.44		2.16	1.79	0.24
Uniform Delay, d1	43.1	29.3	22.6	46.0	32.5	29.0	44.1	33.6		38.6	28.1	18.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	396.7	19.2	0.4	31.9	203.4	3.0	373.2	202.0		529.7	359.3	0.2
Delay (s)	439.8	48.4	23.0	77.9	235.9	31.9	417.3	235.6		568.3	387.4	18.9
Level of Service	F	D	C	E	F	C	F	F		F	F	B
Approach Delay (s)		75.1			172.8			260.8			416.3	
Approach LOS		E			F			F			F	

Intersection Summary				
HCM Average Control Delay	259.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.71			
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	138.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
23: Eucalyptus St & Maple Ave AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5004		3433	4893		3433	3539	1583	1770	3497	
Flt Permitted	0.25	1.00		0.95	1.00		0.95	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	466	5004		3433	4893		3433	3539	1583	840	3497	
Volume (vph)	30	613	73	630	1095	368	725	496	74	10	839	72
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	666	79	685	1190	400	788	539	80	11	912	78
RTOR Reduction (vph)	0	15	0	0	63	0	0	0	40	0	6	0
Lane Group Flow (vph)	33	730	0	685	1527	0	788	539	40	11	984	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	16.0	16.0		18.0	38.0		21.0	50.4	50.4	31.0	30.2	
Effective Green, g (s)	16.0	16.0		18.0	38.0		21.0	50.4	50.4	31.0	30.2	
Actuated g/C Ratio	0.16	0.16		0.18	0.38		0.21	0.50	0.50	0.31	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	74	791		611	1837		712	1763	788	265	1044	
v/s Ratio Prot		0.15		c0.20	c0.32		c0.23	0.15		0.00	c0.28	
v/s Ratio Perm	0.07								0.05	0.01		
v/c Ratio	0.45	0.92		1.12	0.83		1.11	0.31	0.05	0.04	0.94	
Uniform Delay, d1	38.6	42.0		41.6	28.7		40.1	15.0	13.1	24.5	34.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.2	16.2		74.5	3.4		66.9	0.1	0.0	0.1	15.8	
Delay (s)	42.8	58.2		116.1	32.1		107.0	15.1	13.1	24.6	50.5	
Level of Service	D	E		F	C		F	B	B	C	D	
Approach Delay (s)		57.5			57.3			66.5			50.2	
Approach LOS		E			E			E			D	

Intersection Summary				
HCM Average Control Delay	58.4	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	101.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	92.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5036		1770	5085	1770	1583
Flt Permitted	1.00		0.23	1.00	0.95	1.00
Satd. Flow (perm)	5036		422	5085	1770	1583
Volume (vph)	1008	69	72	2349	1	32
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1096	75	78	2553	1	35
RTOR Reduction (vph)	7	0	0	0	0	31
Lane Group Flow (vph)	1164	0	78	2553	1	4
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	41.3		41.3	41.3	6.4	6.4
Effective Green, g (s)	41.3		41.3	41.3	6.4	6.4
Actuated g/C Ratio	0.74		0.74	0.74	0.11	0.11
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3734		313	3770	203	182
v/s Ratio Prot	0.23			c0.50	0.00	
v/s Ratio Perm			0.18			0.02
v/c Ratio	0.31		0.25	0.68	0.00	0.02
Uniform Delay, d1	2.4		2.3	3.7	21.8	21.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0		0.4	0.5	0.0	0.0
Delay (s)	2.5		2.7	4.2	21.8	21.9
Level of Service	A		A	A	C	C
Approach Delay (s)	2.5			4.2	21.9	
Approach LOS	A			A	C	

Intersection Summary				
HCM Average Control Delay	3.8	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	55.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	214	1574	3502	173	203	507
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	233	1711	3807	188	221	551
RTOR Reduction (vph)	0	0	0	59	0	73
Lane Group Flow (vph)	233	1711	3807	129	221	478
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	5.0	60.0	51.0	51.0	22.0	22.0
Effective Green, g (s)	5.0	60.0	51.0	51.0	22.0	22.0
Actuated g/C Ratio	0.06	0.67	0.57	0.57	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	191	3390	2882	897	433	387
v/s Ratio Prot	c0.07	0.34	c0.75		0.12	
v/s Ratio Perm				0.12		0.35
v/c Ratio	1.22	0.50	1.32	0.14	0.51	1.23
Uniform Delay, d1	42.5	7.5	19.5	9.2	29.4	34.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	136.8	0.1	147.0	0.1	1.0	126.0
Delay (s)	179.3	7.7	166.5	9.3	30.4	160.0
Level of Service	F	A	F	A	C	F
Approach Delay (s)		28.2	159.1		122.9	
Approach LOS		C	F		F	

Intersection Summary				
HCM Average Control Delay	117.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.34			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	105.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
26: Main St. & I-15 SB Ramp

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		0.99			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5058			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5058			5085	1583			1770	1583	1504
Volume (vph)	0	1639	60	0	2481	288	0	0	140	0	1355
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1782	65	0	2697	313	0	0	152	0	1473
RTOR Reduction (vph)	0	4	0	0	0	139	0	0	0	1	1
Lane Group Flow (vph)	0	1843	0	0	2697	174	0	0	152	735	736
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		49.0			49.0	49.0			33.0	33.0	33.0
Effective Green, g (s)		49.0			49.0	49.0			33.0	33.0	33.0
Actuated g/C Ratio		0.54			0.54	0.54			0.37	0.37	0.37
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		2754			2769	862			649	580	551
v/s Ratio Prot		0.37			c0.53				0.09	0.46	
v/s Ratio Perm						0.20					0.49
v/c Ratio		0.67			0.97	0.20			0.23	1.27	1.34
Uniform Delay, d1		14.7			19.9	10.5			19.7	28.5	28.5
Progression Factor		1.00			0.78	2.18			1.00	1.00	1.00
Incremental Delay, d2		0.6			5.4	0.0			0.2	133.8	163.4
Delay (s)		15.3			21.0	22.9			19.9	162.3	191.9
Level of Service		B			C	C			B	F	F
Approach Delay (s)		15.3			21.2		0.0			162.4	
Approach LOS		B			C		A			F	

Intersection Summary			
HCM Average Control Delay	54.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	79	1282	404	790	1834	126	381	667	648	399	1665	790
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1393	439	859	1993	137	414	725	704	434	1810	859
RTOR Reduction (vph)	0	0	110	0	0	81	0	0	307	0	0	73
Lane Group Flow (vph)	86	1393	329	859	1993	56	414	725	397	434	1810	786
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.2	19.8	19.8	20.0	36.6	36.6	6.0	24.0	24.0	11.0	29.0	29.0
Effective Green, g (s)	3.2	19.8	19.8	20.0	36.6	36.6	6.0	24.0	24.0	11.0	29.0	29.0
Actuated g/C Ratio	0.04	0.22	0.22	0.22	0.40	0.40	0.07	0.26	0.26	0.12	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	121	1109	345	756	2050	638	227	1344	418	416	1624	506
v/s Ratio Prot	0.03	0.27		c0.25	0.39		c0.12	0.14		0.13	0.36	
v/s Ratio Perm			0.28			0.09			0.44			0.54
v/c Ratio	0.71	1.26	0.95	1.14	0.97	0.09	1.82	0.54	0.95	1.04	1.11	1.55
Uniform Delay, d1	43.3	35.5	35.0	35.4	26.6	16.8	42.4	28.7	32.8	39.9	30.9	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.8	122.7	36.0	77.1	13.9	0.1	387.5	0.4	31.5	55.8	60.7	258.8
Delay (s)	61.2	158.2	71.0	112.5	40.5	16.8	429.9	29.1	64.3	95.7	91.6	289.7
Level of Service	E	F	E	F	D	B	F	C	E	F	F	F
Approach Delay (s)		133.9			60.1			132.6			147.0	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	115.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	52	1313	279	238	1864	185	723	761	199	176	523	800
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	1427	303	259	2026	201	786	827	216	191	568	870
RTOR Reduction (vph)	0	0	203	0	0	100	0	0	157	0	0	239
Lane Group Flow (vph)	57	1427	100	259	2026	101	786	827	59	191	568	631
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.6	30.2	30.2	14.0	38.6	38.6	14.0	25.0	25.0	6.0	17.0	17.0
Effective Green, g (s)	5.6	30.2	30.2	14.0	38.6	38.6	14.0	25.0	25.0	6.0	17.0	17.0
Actuated g/C Ratio	0.06	0.33	0.33	0.15	0.42	0.42	0.15	0.27	0.27	0.07	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	1684	524	272	2152	670	527	970	434	226	660	295
v/s Ratio Prot	0.03	0.28		c0.15	c0.40		c0.23	0.23		0.06	0.16	
v/s Ratio Perm			0.19			0.13			0.14			0.55
v/c Ratio	0.52	0.85	0.19	0.95	0.94	0.15	1.49	0.85	0.14	0.85	0.86	2.14
Uniform Delay, d1	41.5	28.4	21.8	38.3	25.2	16.2	38.6	31.4	25.0	42.1	36.0	37.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.5	4.2	0.2	41.4	9.0	0.1	231.1	7.3	0.1	24.0	11.1	523.5
Delay (s)	46.0	32.5	22.0	79.7	34.3	16.3	269.7	38.7	25.1	66.2	47.1	560.6
Level of Service	D	C	C	E	C	B	F	D	C	E	D	F
Approach Delay (s)		31.2			37.5			136.4			323.5	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	119.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	91.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	116.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
29: Bear Valley Rd & I Avenue — AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	1568	418	223	1920	270	316
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1704	454	242	2087	293	343
RTOR Reduction (vph)	0	228	0	0	0	276
Lane Group Flow (vph)	1704	226	242	2087	293	67
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	33.6	33.6	10.2	47.8	11.7	11.7
Effective Green, g (s)	33.6	33.6	10.2	47.8	11.7	11.7
Actuated g/C Ratio	0.50	0.50	0.15	0.71	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2531	788	519	3601	595	274
v/s Ratio Prot	c0.34		0.07	c0.41	0.09	
v/s Ratio Perm		0.29				0.22
v/c Ratio	0.67	0.29	0.47	0.58	0.49	0.24
Uniform Delay, d1	12.8	9.9	26.2	4.9	25.2	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	0.7	0.2	0.6	0.5
Delay (s)	13.5	10.1	26.8	5.1	25.9	24.5
Level of Service	B	B	C	A	C	C
Approach Delay (s)	12.8			7.4	25.2	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
30: Main St. & 3rd Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	136	1666	124	426	2147	51	182	740	220	304	447	193
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	1811	135	463	2334	55	198	804	239	330	486	210
RTOR Reduction (vph)	0	0	61	0	0	19	0	0	156	0	0	106
Lane Group Flow (vph)	148	1811	74	463	2334	36	198	804	83	330	486	104
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	33.0	33.0	7.0	36.0	36.0	12.4	18.1	18.1	13.2	18.9	18.9
Effective Green, g (s)	4.0	33.0	33.0	7.0	36.0	36.0	12.4	18.1	18.1	13.2	18.9	18.9
Actuated g/C Ratio	0.05	0.38	0.38	0.08	0.41	0.41	0.14	0.21	0.21	0.15	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	1338	598	275	1459	653	251	734	578	519	766	343
v/s Ratio Prot	0.04	0.51		c0.13	c0.66		c0.11	c0.23		0.10	0.14	
v/s Ratio Perm			0.09			0.03			0.09			0.13
v/c Ratio	0.94	1.35	0.12	1.68	1.60	0.05	0.79	1.10	0.14	0.64	0.63	0.30
Uniform Delay, d1	41.5	27.1	17.7	40.1	25.6	15.4	36.2	34.6	28.3	34.8	31.1	28.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	54.7	164.1	0.1	323.0	273.1	0.0	15.1	62.3	0.1	2.6	1.7	0.5
Delay (s)	96.2	191.2	17.8	363.1	298.8	15.5	51.3	96.9	28.4	37.3	32.8	29.2
Level of Service	F	F	B	F	F	B	D	F	C	D	C	C
Approach Delay (s)		173.3			303.8			76.4			33.5	
Approach LOS		F			F			E			C	

Intersection Summary			
HCM Average Control Delay	188.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
31: Main St. & C Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	0.85	1.00	0.91	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1631	1504	1770	1619	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1631	1504	1770	1619	1504
Volume (vph)	109	892	896	160	1644	141	399	88	340	81	27	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	970	974	174	1787	153	434	96	370	88	29	98
RTOR Reduction (vph)	0	0	554	0	0	64	0	45	220	0	34	54
Lane Group Flow (vph)	118	970	420	174	1787	89	434	156	45	88	33	6
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.1	33.9	33.9	7.7	36.5	36.5	13.1	13.2	13.2	7.8	7.9	7.9
Effective Green, g (s)	5.1	33.9	33.9	7.7	36.5	36.5	13.1	13.2	13.2	7.8	7.9	7.9
Actuated g/C Ratio	0.06	0.43	0.43	0.10	0.46	0.46	0.17	0.17	0.17	0.10	0.10	0.10
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	115	1526	1202	336	1643	735	572	274	253	176	163	151
v/s Ratio Prot	c0.07	0.27		0.05	c0.50		c0.13	0.12		0.05	0.04	
v/s Ratio Perm			0.35			0.10			0.18			0.04
v/c Ratio	1.03	0.64	0.35	0.52	1.09	0.12	0.76	0.57	0.18	0.50	0.20	0.04
Uniform Delay, d1	36.8	17.5	15.0	33.7	21.0	11.9	31.2	30.1	28.0	33.6	32.5	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	91.1	0.9	0.2	1.3	50.1	0.1	5.7	2.7	0.3	2.2	0.6	0.1
Delay (s)	127.8	18.4	15.1	35.0	71.2	12.0	37.0	32.8	28.4	35.8	33.1	32.0
Level of Service	F	B	B	D	E	B	D	C	C	D	C	C
Approach Delay (s)		23.1			63.9			33.5			33.9	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM Average Control Delay	41.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
32: Main St. & E Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	1770	3535		1770	3506		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.38	1.00		0.36	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	1770	3535		704	3506		674	3539	1583
Volume (vph)	256	865	153	142	1169	10	306	512	34	44	254	264
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	278	940	166	154	1271	11	333	557	37	48	276	287
RTOR Reduction (vph)	0	0	99	0	1	0	0	5	0	0	0	240
Lane Group Flow (vph)	278	940	67	154	1281	0	333	589	0	48	276	47
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	15.0	35.9	35.9	12.1	33.0		28.5	22.2		16.8	14.5	14.5
Effective Green, g (s)	15.0	35.9	35.9	12.1	33.0		28.5	22.2		16.8	14.5	14.5
Actuated g/C Ratio	0.17	0.41	0.41	0.14	0.37		0.32	0.25		0.19	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	300	1436	1131	242	1318		347	879		156	580	259
v/s Ratio Prot	c0.16	c0.27		0.09	c0.36		c0.11	0.17		0.01	0.08	
v/s Ratio Perm			0.06				c0.20			0.05		0.18
v/c Ratio	0.93	0.65	0.06	0.64	0.97		0.96	0.67		0.31	0.48	0.18
Uniform Delay, d1	36.2	21.3	16.0	36.1	27.3		27.5	29.8		29.9	33.6	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.0	1.1	0.0	5.4	18.4		37.2	2.0		1.1	0.6	0.3
Delay (s)	69.2	22.4	16.0	41.5	45.7		64.7	31.8		31.0	34.2	32.2
Level of Service	E	C	B	D	D		E	C		C	C	C
Approach Delay (s)		31.0			45.3			43.6			33.0	
Approach LOS		C			D			D			C	

Intersection Summary				
HCM Average Control Delay	38.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
33: Main St. & I Avenue

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	381	3539	1583
Volume (vph)	52	767	298	166	910	176	284	855	112	91	329	89
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	834	324	180	989	191	309	929	122	99	358	97
RTOR Reduction (vph)	0	0	222	0	0	122	0	0	78	0	0	72
Lane Group Flow (vph)	57	834	102	180	989	69	309	929	44	99	358	25
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	2.0	24.3	24.3	5.7	28.0	28.0	11.4	27.8	27.8	23.6	20.0	20.0
Effective Green, g (s)	2.0	24.3	24.3	5.7	28.0	28.0	11.4	27.8	27.8	23.6	20.0	20.0
Actuated g/C Ratio	0.03	0.31	0.31	0.07	0.36	0.36	0.15	0.36	0.36	0.30	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	89	1111	497	253	1280	573	506	1271	569	181	914	409
v/s Ratio Prot	0.02	0.24		c0.05	c0.28		c0.09	c0.26		0.03	0.10	
v/s Ratio Perm			0.20			0.12			0.08	0.14		0.06
v/c Ratio	0.64	0.75	0.20	0.71	0.77	0.12	0.61	0.73	0.08	0.55	0.39	0.06
Uniform Delay, d1	37.3	23.8	19.5	35.0	21.9	16.5	30.9	21.5	16.3	20.2	23.7	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.7	2.9	0.2	9.1	3.0	0.1	2.2	2.2	0.1	3.4	0.3	0.1
Delay (s)	52.0	26.7	19.7	44.1	24.8	16.6	33.1	23.7	16.4	23.5	24.0	21.7
Level of Service	D	C	B	D	C	B	C	C	B	C	C	C
Approach Delay (s)		26.0			26.2			25.2			23.5	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	25.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	70.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3458		1770	3539	1583	1770	5063		1770	5085	
Flt Permitted	0.19	1.00		0.19	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	345	3458		345	3539	1583	1770	5063		1770	5085	
Volume (vph)	13	569	103	42	664	108	135	780	23	452	2311	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	618	112	46	722	117	147	848	25	491	2512	2
RTOR Reduction (vph)	0	17	0	0	0	89	0	3	0	0	0	0
Lane Group Flow (vph)	14	713	0	46	722	28	147	870	0	491	2514	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	21.6	21.6		21.6	21.6	21.6	8.0	27.8		27.3	47.1	
Effective Green, g (s)	21.6	21.6		21.6	21.6	21.6	8.0	27.8		27.3	47.1	
Actuated g/C Ratio	0.24	0.24		0.24	0.24	0.24	0.09	0.31		0.31	0.53	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	84	842		84	862	385	160	1587		545	2700	
v/s Ratio Prot		c0.21			0.20		0.08	0.17		c0.28	c0.49	
v/s Ratio Perm	0.04			0.13		0.07						
v/c Ratio	0.17	0.85		0.55	0.84	0.07	0.92	0.55		0.90	0.93	
Uniform Delay, d1	26.5	32.0		29.3	31.9	25.8	40.0	25.2		29.4	19.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	7.9		7.1	7.1	0.1	47.4	0.4		18.0	6.6	
Delay (s)	27.4	39.9		36.4	39.0	25.9	87.4	25.6		47.4	25.9	
Level of Service	C	D		D	D	C	F	C		D	C	
Approach Delay (s)		39.7			37.2			34.5			29.4	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM Average Control Delay	32.9	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	87.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
35: Smoketree & Hwy 395 AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.06	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	113	5085	5085	1583
Volume (vph)	518	270	81	2042	4330	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	563	293	88	2220	4707	1404
RTOR Reduction (vph)	0	0	0	0	0	291
Lane Group Flow (vph)	563	293	88	2220	4707	1113
Turn Type		custom	Perm			Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	16.0	16.0	66.0	66.0	66.0	66.0
Effective Green, g (s)	16.0	16.0	66.0	66.0	66.0	66.0
Actuated g/C Ratio	0.18	0.18	0.73	0.73	0.73	0.73
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	610	281	83	3729	3729	1161
v/s Ratio Prot				0.44	c0.93	
v/s Ratio Perm	0.16	0.19	0.78			0.89
v/c Ratio	0.92	1.04	1.06	0.60	1.26	0.96
Uniform Delay, d1	36.4	37.0	12.0	5.7	12.0	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.7	65.3	116.2	0.3	120.3	17.2
Delay (s)	56.1	102.3	128.2	5.9	132.3	28.0
Level of Service	E	F	F	A	F	C
Approach Delay (s)	71.9			10.6	108.3	
Approach LOS	E			B	F	

Intersection Summary				
HCM Average Control Delay	80.6	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.22			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	107.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
36: Mojave St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5083		3433	5030		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.43	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5083		3433	5030		799	5085	2787
Volume (vph)	853	710	1409	180	2351	6	808	483	38	11	1041	684
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	927	772	1532	196	2555	7	878	525	41	12	1132	743
RTOR Reduction (vph)	0	0	412	0	0	0	0	10	0	0	0	291
Lane Group Flow (vph)	927	772	1120	196	2562	0	878	556	0	12	1132	452
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	32.0	32.0	10.0	29.0		13.0	36.0		19.0	19.0	19.0
Effective Green, g (s)	13.0	32.0	32.0	10.0	29.0		13.0	36.0		19.0	19.0	19.0
Actuated g/C Ratio	0.14	0.36	0.36	0.11	0.32		0.14	0.40		0.21	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	496	1808	991	197	1638		496	2012		169	1074	588
v/s Ratio Prot	c0.27	0.15		0.11	0.50		c0.26	0.11			0.22	
v/s Ratio Perm			0.55							0.02		0.27
v/c Ratio	1.87	0.43	1.13	0.99	1.56		1.77	0.28		0.07	1.05	0.77
Uniform Delay, d1	38.5	22.0	29.0	40.0	30.5		38.5	18.2		28.4	35.5	33.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	398.7	0.2	71.6	62.3	256.9		354.7	0.1		0.2	42.9	6.0
Delay (s)	437.2	22.2	100.6	102.3	287.4		393.2	18.3		28.6	78.4	39.4
Level of Service	F	C	F	F	F		F	B		C	E	D
Approach Delay (s)		178.4			274.2			246.3			62.7	
Approach LOS		F			F			F			E	

Intersection Summary				
HCM Average Control Delay	193.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.59			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	126.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
37: Live Oak & Escondido Ave — AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1504	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1504	5085	1583	3433	5085
Volume (vph)	1080	407	747	101	641	1874
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1174	442	812	110	697	2037
RTOR Reduction (vph)	0	166	0	89	0	0
Lane Group Flow (vph)	1174	276	812	21	697	2037
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	44.0	44.0	17.0	17.0	17.0	38.0
Effective Green, g (s)	44.0	44.0	17.0	17.0	17.0	38.0
Actuated g/C Ratio	0.49	0.49	0.19	0.19	0.19	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	865	735	961	299	648	2147
v/s Ratio Prot			0.16		c0.20	c0.40
v/s Ratio Perm	0.66	0.29		0.07		
v/c Ratio	1.36	0.38	0.84	0.07	1.08	0.95
Uniform Delay, d1	23.0	14.4	35.2	30.0	36.5	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	168.3	0.3	6.9	0.1	57.4	9.8
Delay (s)	191.3	14.7	42.1	30.1	93.9	34.9
Level of Service	F	B	D	C	F	C
Approach Delay (s)	143.0		40.7			49.9
Approach LOS	F		D			D

Intersection Summary				
HCM Average Control Delay	76.9	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.18			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	111.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
38: Mojave & I-15 SB Ramps

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	2049	327	883	2525	0	0	0	776	0	369
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2227	355	960	2745	0	0	0	843	0	401
RTOR Reduction (vph)	0	0	191	0	0	0	0	0	0	0	3
Lane Group Flow (vph)	0	2227	164	960	2745	0	0	0	843	0	398
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		35.0	35.0	22.0	61.0				21.0		21.0
Effective Green, g (s)		35.0	35.0	22.0	61.0				21.0		21.0
Actuated g/C Ratio		0.39	0.39	0.24	0.68				0.23		0.23
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1978	616	839	3447				801		369
v/s Ratio Prot		c0.44		c0.28	0.54						
v/s Ratio Perm			0.22						0.25		0.25
v/c Ratio		1.13	0.27	1.14	0.80				1.05		1.08
Uniform Delay, d1		27.5	18.7	34.0	10.2				34.5		34.5
Progression Factor		1.00	1.00	0.83	2.10				1.00		1.00
Incremental Delay, d2		63.9	0.2	66.4	0.1				46.5		69.4
Delay (s)		91.4	19.0	94.5	21.4				81.0		103.9
Level of Service		F	B	F	C				F		F
Approach Delay (s)		81.4			40.3		0.0			88.4	
Approach LOS		F			D		A			F	

Intersection Summary			
HCM Average Control Delay	62.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	526	2299	0	0	3205	638	0	0	202	0	673
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	572	2499	0	0	3484	693	0	0	220	0	732
RTOR Reduction (vph)	0	0	0	0	0	239	0	0	0	0	9
Lane Group Flow (vph)	572	2499	0	0	3484	454	0	0	220	0	723
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	11.0	61.0			46.0	46.0			21.0		21.0
Effective Green, g (s)	11.0	61.0			46.0	46.0			21.0		21.0
Actuated g/C Ratio	0.12	0.68			0.51	0.51			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	420	3447			2599	809			413		650
v/s Ratio Prot	c0.17	0.49			c0.69						
v/s Ratio Perm						0.44			0.12		0.26
v/c Ratio	1.36	0.72			1.34	0.56			0.53		1.11
Uniform Delay, d1	39.5	9.2			22.0	15.1			30.2		34.5
Progression Factor	0.80	2.62			1.00	1.00			1.00		1.00
Incremental Delay, d2	164.3	0.1			155.9	0.9			4.9		70.2
Delay (s)	195.9	24.1			177.9	16.0			35.1		104.7
Level of Service	F	C			F	B			D		F
Approach Delay (s)		56.1			151.0		0.0			88.6	
Approach LOS		E			F		A			F	

Intersection Summary			
HCM Average Control Delay	108.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3538		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.38	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	702	5085	1583	1770	3538		3433	3539	1583
Volume (vph)	76	638	169	15	1517	749	279	1110	3	133	437	524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	693	184	16	1649	814	303	1207	3	145	475	570
RTOR Reduction (vph)	0	0	101	0	0	86	0	0	0	0	0	78
Lane Group Flow (vph)	83	693	83	16	1649	728	303	1210	0	145	475	492
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	3.1	40.1	40.1	33.0	33.0	33.0	12.0	33.0		4.0	25.0	25.0
Effective Green, g (s)	3.1	40.1	40.1	33.0	33.0	33.0	12.0	33.0		4.0	25.0	25.0
Actuated g/C Ratio	0.03	0.45	0.45	0.37	0.37	0.37	0.13	0.37		0.04	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	119	2289	712	260	1883	586	238	1310		154	993	444
v/s Ratio Prot	c0.02	0.14			0.32		c0.17	0.34		0.04	0.13	
v/s Ratio Perm			0.12	0.02		0.51						0.36
v/c Ratio	0.70	0.30	0.12	0.06	0.88	1.24	1.27	0.92		0.94	0.48	1.11
Uniform Delay, d1	42.5	15.6	14.2	18.1	26.1	28.0	38.5	26.8		42.4	26.6	32.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.3	0.1	0.1	0.1	4.9	122.8	151.5	11.0		55.0	0.4	75.7
Delay (s)	58.9	15.7	14.3	18.2	31.0	150.9	190.0	37.8		97.5	27.0	107.7
Level of Service	E	B	B	B	C	F	F	D		F	C	F
Approach Delay (s)		19.1			70.3			68.3			74.3	
Approach LOS		B			E			E			E	

Intersection Summary				
HCM Average Control Delay	62.6	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.30			
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	90.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3474	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3474	
Volume (vph)	159	1591	229	346	1810	39	187	993	318	248	796	112
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	173	1729	249	376	1967	42	203	1079	346	270	865	122
RTOR Reduction (vph)	0	0	12	0	0	4	0	0	111	0	12	0
Lane Group Flow (vph)	173	1729	237	376	1967	38	203	1079	235	270	975	0
Turn Type	Prot		pt+ov	Prot		pt+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	8 1	5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	5.0	30.0	40.0	10.0	35.0	46.0	6.0	27.0	27.0	7.0	28.0	
Effective Green, g (s)	5.0	30.0	40.0	10.0	35.0	46.0	6.0	27.0	27.0	7.0	28.0	
Actuated g/C Ratio	0.06	0.33	0.44	0.11	0.39	0.51	0.07	0.30	0.30	0.08	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1695	704	381	1978	809	229	1062	475	267	1081	
v/s Ratio Prot	0.05	0.34	0.16	c0.11	c0.39	0.03	0.06	c0.30		c0.08	0.28	
v/s Ratio Perm									0.22			
v/c Ratio	0.91	1.02	0.34	0.99	0.99	0.05	0.89	1.02	0.50	1.01	0.90	
Uniform Delay, d1	42.3	30.0	16.3	39.9	27.4	11.0	41.7	31.5	25.9	41.5	29.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	39.4	27.0	0.3	42.2	18.8	0.0	30.9	31.7	0.8	58.0	10.4	
Delay (s)	81.7	57.0	16.6	82.1	46.2	11.0	72.6	63.2	26.7	99.5	40.1	
Level of Service	F	E	B	F	D	B	E	E	C	F	D	
Approach Delay (s)		54.3			51.3			56.6			52.8	
Approach LOS		D			D			E			D	

Intersection Summary				
HCM Average Control Delay	53.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
42: Lemon St & E Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.88			0.97	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085		3433	2787			3433	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.71	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085		3433	2787			2559	1583
Volume (vph)	96	811	412	63	1543	0	409	288	99	93	190	309
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	882	448	68	1677	0	445	313	108	101	207	336
RTOR Reduction (vph)	0	0	279	0	0	0	0	34	0	0	0	137
Lane Group Flow (vph)	104	882	169	68	1677	0	445	387	0	0	308	199
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	5.8	30.4	30.4	6.2	30.8		13.1	32.2			15.1	15.1
Effective Green, g (s)	5.8	30.4	30.4	6.2	30.8		13.1	32.2			15.1	15.1
Actuated g/C Ratio	0.07	0.38	0.38	0.08	0.38		0.16	0.40			0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	127	1913	596	136	1938		557	1111			478	296
v/s Ratio Prot	c0.06	0.17		0.04	c0.33		c0.13	0.15				
v/s Ratio Perm			0.28								0.12	0.21
v/c Ratio	0.82	0.46	0.28	0.50	0.87		0.80	0.35			0.64	0.67
Uniform Delay, d1	37.0	19.0	17.6	35.8	23.1		32.6	17.0			30.4	30.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	32.0	0.2	0.3	2.9	4.3		7.9	0.2			3.0	5.9
Delay (s)	69.0	19.2	17.9	38.7	27.4		40.4	17.2			33.3	36.5
Level of Service	E	B	B	D	C		D	B			C	D
Approach Delay (s)		22.4			27.8		29.1				35.0	
Approach LOS		C			C		C				C	

Intersection Summary				
HCM Average Control Delay	27.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	80.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	68.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
43: Lemon St & I Avenue

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5054		1770	5063		1770	3539	1583	1770	3472	
Flt Permitted	0.13	1.00		0.31	1.00		0.34	1.00	1.00	0.17	1.00	
Satd. Flow (perm)	251	5054		586	5063		632	3539	1583	323	3472	
Volume (vph)	14	699	29	118	1471	45	150	871	61	17	503	73
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	760	32	128	1599	49	163	947	66	18	547	79
RTOR Reduction (vph)	0	5	0	0	3	0	0	0	30	0	5	0
Lane Group Flow (vph)	15	787	0	128	1645	0	163	947	36	18	621	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	29.7	29.7		29.7	29.7		24.5	24.5	24.5	24.5	24.5	
Effective Green, g (s)	29.7	29.7		29.7	29.7		24.5	24.5	24.5	24.5	24.5	
Actuated g/C Ratio	0.48	0.48		0.48	0.48		0.39	0.39	0.39	0.39	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	120	2413		280	2418		249	1394	624	127	1368	
v/s Ratio Prot		0.16			c0.33			c0.27			0.18	
v/s Ratio Perm	0.06			0.22			0.26		0.04	0.06		
v/c Ratio	0.12	0.33		0.46	0.68		0.65	0.68	0.06	0.14	0.45	
Uniform Delay, d1	9.0	10.1		10.9	12.6		15.4	15.6	11.7	12.1	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.1		1.2	0.8		6.1	1.3	0.0	0.5	0.2	
Delay (s)	9.5	10.1		12.0	13.4		21.5	16.9	11.7	12.6	14.2	
Level of Service	A	B		B	B		C	B	B	B	B	
Approach Delay (s)		10.1			13.3			17.3			14.1	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM Average Control Delay	13.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	73.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	1173	565	415	1192	0	0	0	780	0	48
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1275	614	451	1296	0	0	0	848	0	52
RTOR Reduction (vph)	0	0	369	0	0	0	0	0	0	0	39
Lane Group Flow (vph)	0	1275	245	451	1296	0	0	0	848	0	13
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		34.0	34.0	22.0	60.0				22.0		22.0
Effective Green, g (s)		34.0	34.0	22.0	60.0				22.0		22.0
Actuated g/C Ratio		0.38	0.38	0.24	0.67				0.24		0.24
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1281	544	433	2359				839		387
v/s Ratio Prot		0.38		c0.25	0.37						
v/s Ratio Perm			0.43						0.25		0.03
v/c Ratio		1.00	0.45	1.04	0.55				1.01		0.03
Uniform Delay, d1		27.9	21.0	34.0	7.9				34.0		25.9
Progression Factor		1.00	1.00	1.14	1.58				1.00		1.00
Incremental Delay, d2		23.9	0.6	43.5	0.1				33.7		0.2
Delay (s)		51.8	21.6	82.3	12.6				67.7		26.1
Level of Service		D	C	F	B				E		C
Approach Delay (s)		42.0			30.6		0.0			65.3	
Approach LOS		D			C		A			E	

Intersection Summary			
HCM Average Control Delay	42.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	100	1853	0	0	1498	719	0	0	108	0	484
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	2014	0	0	1628	782	0	0	117	0	526
RTOR Reduction (vph)	0	0	0	0	0	362	0	0	0	0	26
Lane Group Flow (vph)	109	2014	0	0	1628	420	0	0	117	0	500
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	7.3	59.6			48.3	48.3			22.4		22.4
Effective Green, g (s)	7.3	59.6			48.3	48.3			22.4		22.4
Actuated g/C Ratio	0.08	0.66			0.54	0.54			0.25		0.25
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	144	2344			1899	850			441		694
v/s Ratio Prot	0.06	c0.57			0.46						
v/s Ratio Perm						0.49			0.07		0.19
v/c Ratio	0.76	0.86			0.86	0.49			0.27		0.72
Uniform Delay, d1	40.5	11.9			17.9	13.1			27.2		30.9
Progression Factor	0.92	1.85			1.00	1.00			1.00		1.00
Incremental Delay, d2	2.1	0.3			4.1	0.5			1.5		6.4
Delay (s)	39.3	22.4			22.0	13.6			28.6		37.3
Level of Service	D	C			C	B			C		D
Approach Delay (s)		23.3			19.2		0.0			35.7	
Approach LOS		C			B		A			D	

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	340	536	1462	310	1556	13	452	248	84	57	835	209
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	583	1589	337	1691	14	491	270	91	62	908	227
RTOR Reduction (vph)	0	0	155	0	0	9	0	0	66	0	0	1
Lane Group Flow (vph)	370	583	1434	337	1691	5	491	270	25	62	908	226
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.4	35.0	35.0	9.0	29.6	29.6	12.0	24.6	24.6	6.2	18.8	33.2
Effective Green, g (s)	14.4	35.0	35.0	9.0	29.6	29.6	12.0	24.6	24.6	6.2	18.8	33.2
Actuated g/C Ratio	0.16	0.39	0.39	0.10	0.33	0.33	0.13	0.27	0.27	0.07	0.21	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	544	1960	610	175	1658	516	454	1378	429	121	1053	649
v/s Ratio Prot	0.11	0.11		c0.19	0.33		c0.14	0.05		0.04	c0.18	0.06
v/s Ratio Perm			1.00			0.01			0.06			0.09
v/c Ratio	0.68	0.30	2.35	1.93	1.02	0.01	1.08	0.20	0.06	0.51	0.86	0.35
Uniform Delay, d1	36.0	19.4	27.9	40.9	30.6	20.7	39.4	25.5	24.5	40.8	34.8	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.1	612.6	437.0	27.2	0.0	65.9	0.1	0.1	3.6	7.4	0.3
Delay (s)	39.5	19.5	640.5	477.9	57.8	20.7	105.3	25.6	24.6	44.5	42.2	21.3
Level of Service	D	B	F	F	E	C	F	C	C	D	D	C
Approach Delay (s)		410.6			126.9			71.4			38.3	
Approach LOS		F			F			E			D	

Intersection Summary				
HCM Average Control Delay	212.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.84			
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	133.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.98		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3486		3433	3406		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3486		3433	3406		1770	3539	1583	3433	3539	1583
Volume (vph)	47	595	66	124	770	258	31	1243	263	140	974	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	647	72	135	837	280	34	1351	286	152	1059	85
RTOR Reduction (vph)	0	9	0	0	37	0	0	0	102	0	0	48
Lane Group Flow (vph)	51	710	0	135	1080	0	34	1351	184	152	1059	37
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	3.1	25.4		6.8	29.1		2.3	37.0	37.0	5.0	39.7	39.7
Effective Green, g (s)	3.1	25.4		6.8	29.1		2.3	37.0	37.0	5.0	39.7	39.7
Actuated g/C Ratio	0.03	0.28		0.08	0.32		0.03	0.41	0.41	0.06	0.44	0.44
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	61	982		259	1099		45	1452	649	190	1558	697
v/s Ratio Prot	c0.03	0.21		0.04	c0.33		0.02	c0.38		c0.04	c0.30	
v/s Ratio Perm									0.18			0.05
v/c Ratio	0.84	0.72		0.52	0.98		0.76	0.93	0.28	0.80	0.68	0.05
Uniform Delay, d1	43.3	29.2		40.1	30.3		43.7	25.4	17.8	42.1	20.2	14.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.3	2.7		1.9	23.0		51.4	10.9	0.2	20.9	1.2	0.0
Delay (s)	103.6	31.9		42.0	53.3		95.1	36.3	18.0	63.0	21.4	14.5
Level of Service	F	C		D	D		F	D	B	E	C	B
Approach Delay (s)		36.6			52.0			34.4			25.8	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM Average Control Delay	36.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	84.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
48: E Ave & I Avenue
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1844		1770	1860		1770	3473		1770	3447	
Flt Permitted	0.49	1.00		0.65	1.00		0.43	1.00		0.26	1.00	
Satd. Flow (perm)	916	1844		1205	1860		800	3473		487	3447	
Volume (vph)	85	150	11	137	287	3	13	729	103	1	444	93
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	163	12	149	312	3	14	792	112	1	483	101
RTOR Reduction (vph)	0	3	0	0	1	0	0	12	0	0	20	0
Lane Group Flow (vph)	92	172	0	149	314	0	14	892	0	1	564	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.9	11.9		11.9	11.9		18.5	18.5		18.5	18.5	
Effective Green, g (s)	11.9	11.9		11.9	11.9		18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.48	0.48		0.48	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	571		373	576		385	1673		235	1661	
v/s Ratio Prot		0.09			c0.17			c0.26			0.17	
v/s Ratio Perm	0.10			0.12			0.02			0.00		
v/c Ratio	0.32	0.30		0.40	0.55		0.04	0.53		0.00	0.34	
Uniform Delay, d1	10.2	10.1		10.4	11.0		5.2	6.9		5.2	6.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3		0.7	1.1		0.0	0.3		0.0	0.1	
Delay (s)	10.8	10.4		11.1	12.1		5.3	7.3		5.2	6.3	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		10.5			11.8			7.2			6.3	
Approach LOS		B			B			A			A	

Intersection Summary					
HCM Average Control Delay	8.3	HCM Level of Service		A	
HCM Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	38.4	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	53.4%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
49: Eucalyptus St & I Avenue
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	1.00		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3429		1770	3536		1770	3535		1770	3335	
Flt Permitted	0.95	1.00		0.41	1.00		0.95	1.00		0.46	1.00	
Satd. Flow (perm)	1770	3429		770	3536		1770	3535		860	3335	
Volume (vph)	384	459	120	95	677	5	291	470	4	16	402	252
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	417	499	130	103	736	5	316	511	4	17	437	274
RTOR Reduction (vph)	0	26	0	0	1	0	0	1	0	0	111	0
Lane Group Flow (vph)	417	603	0	103	740	0	316	514	0	17	600	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	21.0	43.0		18.0	18.0		16.0	38.3		18.3	18.3	
Effective Green, g (s)	21.0	43.0		18.0	18.0		16.0	38.3		18.3	18.3	
Actuated g/C Ratio	0.24	0.48		0.20	0.20		0.18	0.43		0.20	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	416	1651		155	713		317	1516		176	683	
v/s Ratio Prot	c0.24	0.18			c0.21		c0.18	0.15			c0.21	
v/s Ratio Perm				0.13						0.02		
v/c Ratio	1.00	0.37		0.66	1.04		1.00	0.34		0.10	0.88	
Uniform Delay, d1	34.1	14.6		32.9	35.6		36.6	17.0		28.8	34.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	44.7	0.1		10.3	44.0		49.4	0.1		0.2	12.4	
Delay (s)	78.9	14.7		43.1	79.6		86.0	17.2		29.0	46.8	
Level of Service	E	B		D	E		F	B		C	D	
Approach Delay (s)		40.3			75.2			43.3			46.4	
Approach LOS		D			E			D			D	

Intersection Summary					
HCM Average Control Delay	50.8	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.02				
Actuated Cycle Length (s)	89.3	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	88.8%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5071		3433	4863		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.32	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5071		3433	4863		589	3539	1583
Volume (vph)	208	545	638	380	1451	28	1587	562	232	10	438	330
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	592	693	413	1577	30	1725	611	252	11	476	359
RTOR Reduction (vph)	0	0	559	0	2	0	0	84	0	0	0	135
Lane Group Flow (vph)	226	592	134	413	1605	0	1725	779	0	11	476	224
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	8.0	17.2	17.2	12.8	22.0		27.0	46.9		15.9	15.9	15.9
Effective Green, g (s)	8.0	17.2	17.2	12.8	22.0		27.0	46.9		15.9	15.9	15.9
Actuated g/C Ratio	0.09	0.19	0.19	0.14	0.25		0.30	0.53		0.18	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	159	984	539	494	1255		1043	2566		105	633	283
v/s Ratio Prot	c0.13	0.12		0.12	c0.32		c0.50	0.18			0.13	
v/s Ratio Perm			0.25							0.02		0.23
v/c Ratio	1.42	0.60	0.25	0.84	1.28		1.65	0.30		0.10	0.75	0.79
Uniform Delay, d1	40.5	32.7	30.4	37.0	33.5		31.0	11.8		30.5	34.6	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	222.2	1.0	0.2	11.7	131.7		298.5	0.1		0.4	5.0	13.6
Delay (s)	262.7	33.8	30.6	48.7	165.1		329.5	11.9		31.0	39.7	48.5
Level of Service	F	C	C	D	F		F	B		C	D	D
Approach Delay (s)		66.6			141.3			223.6			43.3	
Approach LOS		E			F			F			D	

Intersection Summary					
HCM Average Control Delay	143.8	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.43				
Actuated Cycle Length (s)	88.9	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	110.9%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
55: Sultana St & E Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.95		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3177		1770	3345		1770	3527		1770	3337	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3177		1770	3345		1770	3527		1770	3337	
Volume (vph)	113	132	283	59	494	284	283	896	21	23	281	172
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	143	308	64	537	309	308	974	23	25	305	187
RTOR Reduction (vph)	0	212	0	0	91	0	0	2	0	0	102	0
Lane Group Flow (vph)	123	239	0	64	755	0	308	995	0	25	390	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.9	24.5		4.0	21.6		17.0	32.4		1.3	16.7	
Effective Green, g (s)	6.9	24.5		4.0	21.6		17.0	32.4		1.3	16.7	
Actuated g/C Ratio	0.09	0.31		0.05	0.28		0.22	0.41		0.02	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	995		91	924		385	1461		29	713	
v/s Ratio Prot	c0.07	c0.14		0.04	c0.25		c0.17	c0.28		0.01	0.15	
v/s Ratio Perm												
v/c Ratio	0.79	0.24		0.70	0.82		0.80	0.68		0.86	0.55	
Uniform Delay, d1	34.9	19.9		36.5	26.5		29.0	18.7		38.4	27.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	22.7	0.1		21.8	5.7		11.3	1.3		109.1	0.9	
Delay (s)	57.6	20.1		58.3	32.1		40.3	20.0		147.5	28.2	
Level of Service	E	C		E	C		D	C		F	C	
Approach Delay (s)		28.1			34.0			24.8			34.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	29.3	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.82				
Actuated Cycle Length (s)	78.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	71.3%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
56: Sultana St & I Avenue AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	288	179	611	1373	788	330
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	313	195	664	1492	857	359
RTOR Reduction (vph)	0	157	0	0	0	259
Lane Group Flow (vph)	313	38	664	1492	857	100
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	17.5	17.5	35.1	64.0	24.9	24.9
Effective Green, g (s)	17.5	17.5	35.1	64.0	24.9	24.9
Actuated g/C Ratio	0.20	0.20	0.39	0.72	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	346	310	694	2531	985	440
v/s Ratio Prot			c0.38	0.42	c0.24	
v/s Ratio Perm	0.18	0.12				0.23
v/c Ratio	0.90	0.12	0.96	0.59	0.87	0.23
Uniform Delay, d1	35.2	29.7	26.5	6.3	30.8	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.9	0.2	23.8	1.0	10.4	1.2
Delay (s)	61.0	29.9	50.2	7.3	41.1	26.1
Level of Service	E	C	D	A	D	C
Approach Delay (s)	49.1			20.5	36.7	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	29.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	89.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	81.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
57: Joshua St & Hwy 395 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3525		1770	3539	1583	1770	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3525		1770	3539	1583	1770	5085	1583	3433	5085	1583
Volume (vph)	190	888	24	120	1278	594	8	780	69	302	1715	246
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	965	26	130	1389	646	9	848	75	328	1864	267
RTOR Reduction (vph)	0	2	0	0	0	145	0	0	54	0	0	173
Lane Group Flow (vph)	207	989	0	130	1389	501	9	848	21	328	1864	94
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		custom
Protected Phases	7			3	8		5	2		1	6	
Permitted Phases		4				8			2			1
Actuated Green, G (s)	8.7	31.0		8.8	31.1	31.1	0.8	26.2	26.2	10.9	36.3	10.9
Effective Green, g (s)	8.7	31.0		8.8	31.1	31.1	0.8	26.2	26.2	10.9	36.3	10.9
Actuated g/C Ratio	0.09	0.33		0.09	0.33	0.33	0.01	0.28	0.28	0.12	0.39	0.12
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	321	1176		168	1185	530	15	1434	446	403	1987	186
v/s Ratio Prot	0.06			c0.07	0.39		0.01	0.17		0.10	c0.37	
v/s Ratio Perm		0.28				0.41			0.05			0.17
v/c Ratio	0.64	0.84		0.77	1.17	0.95	0.60	0.59	0.05	0.81	0.94	0.51
Uniform Delay, d1	40.6	28.7		41.1	30.9	30.1	45.9	28.7	24.3	40.0	27.2	38.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	5.6		19.6	86.7	25.9	51.0	1.8	0.2	11.9	10.1	2.2
Delay (s)	45.0	34.3		60.7	117.6	55.9	96.9	30.5	24.5	51.9	37.3	40.6
Level of Service	D	C		E	F	E	F	C	C	D	D	D
Approach Delay (s)		36.1			95.8			30.7			39.6	
Approach LOS		D			F			C			D	

Intersection Summary				
HCM Average Control Delay	55.8	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.03			
Actuated Cycle Length (s)	92.9	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	90.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	1231	650	0	2612	386	0	0	219	0	537
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1338	707	0	2839	420	0	0	238	0	584
RTOR Reduction (vph)	0	0	306	0	0	178	0	0	0	0	30
Lane Group Flow (vph)	0	1338	401	0	2839	242	0	0	238	0	554
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		51.0	51.0		51.0	51.0			31.0		31.0
Effective Green, g (s)		51.0	51.0		51.0	51.0			31.0		31.0
Actuated g/C Ratio		0.57	0.57		0.57	0.57			0.34		0.34
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		2882	897		2882	897			610		545
v/s Ratio Prot		0.26			c0.56						
v/s Ratio Perm			0.45			0.27			0.13		0.37
v/c Ratio		0.46	0.45		0.99	0.27			0.39		1.02
Uniform Delay, d1		11.5	11.3		19.1	10.0			22.3		29.5
Progression Factor		0.67	2.84		1.00	1.00			1.00		1.00
Incremental Delay, d2		0.1	0.3		13.4	0.2			1.9		42.7
Delay (s)		7.8	32.5		32.5	10.1			24.2		72.2
Level of Service		A	C		C	B			C		E
Approach Delay (s)		16.3			29.6		0.0			58.3	
Approach LOS		B			C		A			E	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	619	221	440	1164	0	0	0	444	0	207
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	673	240	478	1265	0	0	0	483	0	225
RTOR Reduction (vph)	0	0	179	0	0	0	0	0	0	0	69
Lane Group Flow (vph)	0	673	61	478	1265	0	0	0	483	0	156
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		22.8	22.8	27.6	54.4				27.6		27.6
Effective Green, g (s)		22.8	22.8	27.6	54.4				27.6		27.6
Actuated g/C Ratio		0.25	0.25	0.31	0.60				0.31		0.31
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		859	365	543	2139				1053		485
v/s Ratio Prot		c0.20		c0.27	0.36						
v/s Ratio Perm			0.17						0.14		0.14
v/c Ratio		0.78	0.17	0.88	0.59				0.46		0.32
Uniform Delay, d1		31.3	26.2	29.6	11.0				25.2		24.0
Progression Factor		1.00	1.00	1.00	1.00				1.00		1.00
Incremental Delay, d2		4.7	0.2	15.3	0.4				1.4		1.8
Delay (s)		36.0	26.4	45.0	11.4				26.6		25.8
Level of Service		D	C	D	B				C		C
Approach Delay (s)		33.5			20.6		0.0			26.3	
Approach LOS		C			C		A			C	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	125	939	0	0	1446	635	0	0	158	0	161
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1021	0	0	1572	690	0	0	172	0	175
RTOR Reduction (vph)	0	0	0	0	0	327	0	0	0	0	135
Lane Group Flow (vph)	136	1021	0	0	1572	363	0	0	172	0	40
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	11.8	67.4			51.6	51.6			22.6		22.6
Effective Green, g (s)	11.8	67.4			51.6	51.6			22.6		22.6
Actuated g/C Ratio	0.12	0.69			0.53	0.53			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	213	2434			1863	833			408		365
v/s Ratio Prot	c0.08	0.29			c0.44						
v/s Ratio Perm						0.44			0.10		0.11
v/c Ratio	0.64	0.42			0.84	0.44			0.42		0.11
Uniform Delay, d1	41.1	6.7			19.8	14.3			32.1		29.8
Progression Factor	1.00	1.00			1.00	1.00			1.00		1.00
Incremental Delay, d2	6.2	0.1			3.7	0.4			3.2		0.6
Delay (s)	47.2	6.8			23.5	14.6			35.3		30.4
Level of Service	D	A			C	B			D		C
Approach Delay (s)		11.6			20.8		0.0			32.8	
Approach LOS		B			C		A			C	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395 — AM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5057		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5057		3433	5085
Volume (vph)	76	403	1593	61	223	2231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	438	1732	66	242	2425
RTOR Reduction (vph)	0	306	4	0	0	0
Lane Group Flow (vph)	83	132	1794	0	242	2425
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	10.9	10.9	35.1		8.1	47.2
Effective Green, g (s)	10.9	10.9	35.1		8.1	47.2
Actuated g/C Ratio	0.16	0.16	0.53		0.12	0.71
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	292	261	2685		421	3631
v/s Ratio Prot	0.05		0.36		0.07	c0.48
v/s Ratio Perm		0.28				
v/c Ratio	0.28	0.51	0.67		0.57	0.67
Uniform Delay, d1	24.2	25.2	11.3		27.4	5.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	1.6	0.6		1.9	0.5
Delay (s)	24.7	26.7	11.9		29.3	5.6
Level of Service	C	C	B		C	A
Approach Delay (s)	26.4		11.9			7.8
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.99		1.00	1.00		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3357		1770	3497		1770	3529		1770	3308	
Flt Permitted	0.25	1.00		0.59	1.00		0.27	1.00		0.27	1.00	
Satd. Flow (perm)	460	3357		1101	3497		509	3529		499	3308	
Volume (vph)	43	133	70	42	518	45	318	874	17	32	495	381
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	145	76	46	563	49	346	950	18	35	538	414
RTOR Reduction (vph)	0	61	0	0	7	0	0	1	0	0	6	0
Lane Group Flow (vph)	47	160	0	46	605	0	346	967	0	35	946	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.2	16.2		16.2	16.2		58.6	58.6		58.6	58.6	
Effective Green, g (s)	16.2	16.2		16.2	16.2		58.6	58.6		58.6	58.6	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.71	0.71		0.71	0.71	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	90	657		215	684		360	2498		353	2341	
v/s Ratio Prot		0.07			c0.18			0.27			0.29	
v/s Ratio Perm	0.10			0.04			c0.68			0.07		
v/c Ratio	0.52	0.24		0.21	0.88		0.96	0.39		0.10	0.40	
Uniform Delay, d1	29.8	28.1		28.0	32.4		11.1	4.9		3.8	5.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	0.2		0.5	13.0		37.1	0.1		0.1	0.1	
Delay (s)	35.2	28.3		28.5	45.4		48.1	5.0		3.9	5.1	
Level of Service	D	C		C	D		D	A		A	A	
Approach Delay (s)		29.5			44.2			16.3			5.0	
Approach LOS		C			D			B			A	

Intersection Summary					
HCM Average Control Delay	19.7	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	82.8	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	75.9%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
74: Main St. & Cottonwood Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5072		1770	5085	1583	1770	1863	1583	3433	3282	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5072		1770	5085	1583	1770	1863	1583	3433	3282	
Volume (vph)	78	1628	29	50	1771	283	61	337	52	377	273	257
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	1770	32	54	1925	308	66	366	57	410	297	279
RTOR Reduction (vph)	0	2	0	0	0	182	0	0	44	0	128	0
Lane Group Flow (vph)	85	1800	0	54	1925	126	66	366	13	410	448	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.0	37.9		3.9	36.8	36.8	6.2	21.0	21.0	11.0	25.8	
Effective Green, g (s)	5.0	37.9		3.9	36.8	36.8	6.2	21.0	21.0	11.0	25.8	
Actuated g/C Ratio	0.06	0.42		0.04	0.41	0.41	0.07	0.23	0.23	0.12	0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	99	2141		77	2084	649	122	436	370	421	943	
v/s Ratio Prot	c0.05	0.36		0.03	c0.38		0.04	c0.20		c0.12	0.18	
v/s Ratio Perm						0.19			0.04			
v/c Ratio	0.86	0.84		0.70	0.92	0.19	0.54	0.84	0.04	0.97	0.47	
Uniform Delay, d1	42.0	23.2		42.4	25.2	17.0	40.4	32.8	26.6	39.3	26.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	47.9	3.2		25.0	7.5	0.1	4.8	13.3	0.0	36.8	0.4	
Delay (s)	89.9	26.4		67.4	32.7	17.1	45.2	46.1	26.6	76.0	26.8	
Level of Service	F	C		E	C	B	D	D	C	E	C	
Approach Delay (s)		29.3			31.4			43.7			47.3	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM Average Control Delay	34.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.90				
Actuated Cycle Length (s)	89.8	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	80.4%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
75: Main St. & 7th Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	212	1664	192	5	1561	51	346	559	5	102	252	338
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	1809	209	5	1697	55	376	608	5	111	274	367
RTOR Reduction (vph)	0	0	86	0	0	26	0	0	4	0	0	129
Lane Group Flow (vph)	230	1809	123	5	1697	29	376	608	1	111	274	238
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	50.4	50.4	0.8	45.2	45.2	10.0	17.6	17.6	7.8	15.4	15.4
Effective Green, g (s)	6.0	50.4	50.4	0.8	45.2	45.2	10.0	17.6	17.6	7.8	15.4	15.4
Actuated g/C Ratio	0.06	0.54	0.54	0.01	0.49	0.49	0.11	0.19	0.19	0.08	0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	222	1926	862	15	1727	773	371	673	301	149	589	463
v/s Ratio Prot	c0.07	c0.51		0.00	0.48		c0.11	c0.17		0.06	0.08	
v/s Ratio Perm			0.13			0.03			0.00			0.13
v/c Ratio	1.04	0.94	0.14	0.33	0.98	0.04	1.01	0.90	0.00	0.74	0.47	0.51
Uniform Delay, d1	43.3	19.7	10.4	45.6	23.3	12.4	41.3	36.7	30.4	41.4	34.9	35.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	70.1	9.5	0.1	12.7	17.6	0.0	50.2	15.5	0.0	18.2	0.6	1.0
Delay (s)	113.4	29.2	10.5	58.3	40.9	12.4	91.5	52.2	30.4	59.6	35.5	36.2
Level of Service	F	C	B	E	D	B	F	D	C	E	D	D
Approach Delay (s)		36.1			40.0			67.0			39.4	
Approach LOS		D			D			E			D	

Intersection Summary				
HCM Average Control Delay	43.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	92.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	83.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
76: Main St. & Peach Ave

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5019		1770	4946		1770	3539	1583	1770	3278	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5019		1770	4946		1770	3539	1583	1770	3278	
Volume (vph)	59	452	43	274	1032	231	88	174	348	94	121	118
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	491	47	298	1122	251	96	189	378	102	132	128
RTOR Reduction (vph)	0	11	0	0	37	0	0	0	309	0	100	0
Lane Group Flow (vph)	64	527	0	298	1336	0	96	189	69	102	160	0
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	3.8	16.6		12.4	25.2		4.6	11.5	11.5	6.7	13.6	
Effective Green, g (s)	3.8	16.6		12.4	25.2		4.6	11.5	11.5	6.7	13.6	
Actuated g/C Ratio	0.06	0.26		0.20	0.40		0.07	0.18	0.18	0.11	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	106	1318		347	1972		129	644	288	188	705	
v/s Ratio Prot	0.04	0.11		c0.17	c0.28		c0.05	0.05		0.06	0.08	
v/s Ratio Perm									0.24			
v/c Ratio	0.60	0.40		0.86	0.68		0.74	0.29	0.24	0.54	0.23	
Uniform Delay, d1	29.0	19.2		24.6	15.7		28.7	22.3	22.1	26.8	20.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.3	0.2		18.6	0.9		20.5	0.3	0.4	3.2	0.2	
Delay (s)	38.3	19.4		43.1	16.6		49.3	22.6	22.5	30.0	20.6	
Level of Service	D	B		D	B		D	C	C	C	C	
Approach Delay (s)		21.4			21.3			26.4			23.3	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	22.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	63.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	53.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
77: Danbury Ave & I Avenue — AM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.85	
Flt Protected	0.95	0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3417		1770	3532		1770	3511		1770	2787	
Flt Permitted	0.44	0.96		0.51	1.00		0.95	1.00		0.41	1.00	
Satd. Flow (perm)	812	3417		946	3532		1770	3511		772	2787	
Volume (vph)	39	464	34	5	839	12	28	363	20	239	416	8
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	504	37	5	912	13	30	395	22	260	452	9
RTOR Reduction (vph)	0	7	0	0	1	0	0	4	0	0	2	0
Lane Group Flow (vph)	42	534	0	5	924	0	30	413	0	260	459	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	24.6	24.6		20.8	20.8		1.0	25.8		24.6	24.6	
Effective Green, g (s)	24.6	24.6		20.8	20.8		1.0	25.8		24.6	24.6	
Actuated g/C Ratio	0.42	0.42		0.36	0.36		0.02	0.44		0.42	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	342	1439		337	1258		30	1551		325	1174	
v/s Ratio Prot		0.16			c0.26		c0.02	0.12				
v/s Ratio Perm	0.05			0.01						c0.34	0.17	
v/c Ratio	0.12	0.37		0.01	0.73		1.00	0.27		0.80	0.39	
Uniform Delay, d1	10.3	11.6		12.2	16.4		28.7	10.3		14.8	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2		0.0	2.3		164.3	0.1		13.1	0.2	
Delay (s)	10.5	11.8		12.2	18.6		193.0	10.4		27.9	11.9	
Level of Service	B	B		B	B		F	B		C	B	
Approach Delay (s)		11.7			18.6			22.7		17.7		
Approach LOS		B			B			C		B		

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
78: Ranchero Rd & Danbury Ave — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.97		1.00	0.96		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	4824		1770	4931		1770	3399		1770	3069	
Flt Permitted	0.95	1.00		0.95	1.00		0.13	1.00		0.46	1.00	
Satd. Flow (perm)	3433	4824		1770	4931		242	3399		848	3069	
Volume (vph)	421	371	193	101	582	147	343	359	129	19	107	831
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	458	403	210	110	633	160	373	390	140	21	116	903
RTOR Reduction (vph)	0	100	0	0	49	0	0	39	0	0	256	0
Lane Group Flow (vph)	458	513	0	110	744	0	373	491	0	21	763	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	13.6	21.4		8.5	16.3		47.6	42.1		28.3	26.8	
Effective Green, g (s)	13.6	21.4		8.5	16.3		47.6	42.1		28.3	26.8	
Actuated g/C Ratio	0.15	0.24		0.09	0.18		0.53	0.47		0.32	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	522	1153		168	898		416	1599		284	919	
v/s Ratio Prot	c0.13	0.13		0.06	c0.16		c0.17	0.16		0.00	c0.33	
v/s Ratio Perm							0.31			0.02		
v/c Ratio	0.88	0.45		0.65	0.83		0.90	0.31		0.07	1.27dr	
Uniform Delay, d1	37.1	29.0		39.1	35.3		23.9	14.7		21.2	29.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.3	0.3		8.8	6.4		21.2	0.1		0.1	6.4	
Delay (s)	52.4	29.3		47.9	41.6		45.1	14.8		21.3	35.7	
Level of Service	D	C		D	D		D	B		C	D	
Approach Delay (s)		39.2			42.4			27.3			35.4	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	89.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

Hesperia GP Update
1: Highway 138 & Summit Valley Rd PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	0.88
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	2787
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	3433	5085	5085	1583	159	2787
Volume (vph)	1180	1753	432	54	311	1180
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1283	1905	470	59	338	1283
RTOR Reduction (vph)	0	0	0	49	0	1069
Lane Group Flow (vph)	1283	1905	470	10	338	214
Turn Type	Prot			Perm		Over
Protected Phases	7	4	8			7
Permitted Phases				8	6	
Actuated Green, G (s)	15.0	35.0	16.0	16.0	47.0	15.0
Effective Green, g (s)	15.0	35.0	16.0	16.0	47.0	15.0
Actuated g/C Ratio	0.17	0.39	0.18	0.18	0.52	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	572	1978	904	281	83	465
v/s Ratio Prot	0.37	c0.37	0.09			c0.46
v/s Ratio Perm				0.04	c2.13	
v/c Ratio	2.24	0.96	0.52	0.04	4.07	0.46
Uniform Delay, d1	37.5	26.9	33.5	30.6	21.5	33.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	565.0	12.6	0.5	0.1	1410.7	0.7
Delay (s)	602.5	39.5	34.0	30.7	1432.2	34.6
Level of Service	F	D	C	C	F	C
Approach Delay (s)		266.1	33.7		326.0	
Approach LOS		F	C		F	

Intersection Summary				
HCM Average Control Delay	261.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	3.06			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	69.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
5: Oak Hill Rd & I-15 SB Ramp PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0		4.0
Lane Util. Factor		0.95		0.91	0.91				1.00		1.00
Frt		0.97		1.00	1.00				1.00		0.85
Flt Protected		1.00		0.95	0.99				0.95		1.00
Satd. Flow (prot)		3423		1610	3344				1770		1583
Flt Permitted		1.00		0.95	0.46				0.95		1.00
Satd. Flow (perm)		3423		1610	1543				1770		1583
Volume (vph)	0	1008	282	676	655	0	0	0	345	0	622
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1096	307	735	712	0	0	0	375	0	676
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	0	48
Lane Group Flow (vph)	0	1373	0	466	981	0	0	0	375	0	628
Turn Type				Prot					custom		custom
Protected Phases		6		3	8						
Permitted Phases									6		6
Actuated Green, G (s)		45.1		36.9	36.9				45.1		45.1
Effective Green, g (s)		45.1		36.9	36.9				45.1		45.1
Actuated g/C Ratio		0.50		0.41	0.41				0.50		0.50
Clearance Time (s)		4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1715		660	1371				887		793
v/s Ratio Prot		0.41		0.29	c0.29						
v/s Ratio Perm									0.21		0.43
v/c Ratio		0.80		0.71	0.72				0.42		0.79
Uniform Delay, d1		18.7		22.0	22.2				14.2		18.6
Progression Factor		1.00		1.00	1.00				1.00		1.00
Incremental Delay, d2		4.0		3.4	1.8				1.5		8.0
Delay (s)		22.7		25.5	24.0				15.7		26.5
Level of Service		C		C	C				B		C
Approach Delay (s)		22.7			24.5		0.0			22.7	
Approach LOS		C			C		A			C	

Intersection Summary				
HCM Average Control Delay	23.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	91.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
6: I-15 NB Ramp & Mariposa Ave — PM Peak Hour

Movement	EBL	SBR	SBR2	SEL	SER
Lane Configurations					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		
Lane Util. Factor	0.97		1.00		
Frt	1.00		0.86		
Flt Protected	0.95		1.00		
Satd. Flow (prot)	3433		1611		
Flt Permitted	0.95		1.00		
Satd. Flow (perm)	3433		1611		
Volume (vph)	1883	0	235	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2047	0	255	0	0
RTOR Reduction (vph)	0	0	204	0	0
Lane Group Flow (vph)	2047	0	51	0	0
Turn Type			custom		
Protected Phases	4				
Permitted Phases			6		
Actuated Green, G (s)	64.1		17.9		
Effective Green, g (s)	64.1		17.9		
Actuated g/C Ratio	0.71		0.20		
Clearance Time (s)	4.0		4.0		
Vehicle Extension (s)	3.0		3.0		
Lane Grp Cap (vph)	2445		320		
v/s Ratio Prot	c0.60				
v/s Ratio Perm			0.16		
v/c Ratio	0.84		0.16		
Uniform Delay, d1	9.2		29.8		
Progression Factor	1.00		1.00		
Incremental Delay, d2	2.7		1.1		
Delay (s)	11.9		30.9		
Level of Service	B		C		
Approach Delay (s)	11.9	30.9		0.0	
Approach LOS	B	C		A	

Intersection Summary				
HCM Average Control Delay	14.0	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
9: Ranchero Rd & Caliente Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	2787	3433	1863	1583
Volume (vph)	138	1451	547	1084	2029	445	994	300	1219	426	74	143
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	1577	595	1178	2205	484	1080	326	1325	463	80	155
RTOR Reduction (vph)	0	0	429	0	0	251	0	0	434	0	0	91
Lane Group Flow (vph)	150	1577	166	1178	2205	233	1080	326	891	463	80	64
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	22.0	22.0	18.0	35.0	35.0	17.0	26.0	26.0	8.0	17.0	17.0
Effective Green, g (s)	5.0	22.0	22.0	18.0	35.0	35.0	17.0	26.0	26.0	8.0	17.0	17.0
Actuated g/C Ratio	0.06	0.24	0.24	0.20	0.39	0.39	0.19	0.29	0.29	0.09	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	98	1243	387	687	1978	616	648	538	805	305	352	299
v/s Ratio Prot	0.08	0.31		c0.34	0.43		c0.31	0.18		0.13	0.04	
v/s Ratio Perm			0.38			0.31			0.48			0.10
v/c Ratio	1.53	1.27	0.43	1.71	1.11	0.38	1.67	0.61	1.11	1.52	0.23	0.21
Uniform Delay, d1	42.5	34.0	28.7	36.0	27.5	19.7	36.5	27.6	32.0	41.0	30.9	30.9
Progression Factor	1.00	1.00	1.00	1.12	0.95	1.18	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	283.4	127.4	0.8	322.2	52.4	0.0	306.8	5.0	64.9	249.3	1.5	1.6
Delay (s)	325.9	161.4	29.5	362.6	78.4	23.2	343.3	32.6	96.9	290.3	32.4	32.5
Level of Service	F	F	C	F	E	C	F	C	F	F	C	C
Approach Delay (s)		138.2			158.1			186.7			203.5	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	164.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.60			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	104.5%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
10: Ranchero Rd & I-15 SB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.86	0.86	0.97	0.91				1.00		0.88
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		4806	1362	3433	5085				1770		2787
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		4806	1362	3433	5085				1770		2787
Volume (vph)	0	2361	736	356	2351	0	0	0	186	0	1207
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2566	800	387	2555	0	0	0	202	0	1312
RTOR Reduction (vph)	0	0	354	0	0	0	0	0	0	0	2
Lane Group Flow (vph)	0	2566	446	387	2555	0	0	0	202	0	1310
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		37.0	37.0	8.0	49.0				33.0		33.0
Effective Green, g (s)		37.0	37.0	8.0	49.0				33.0		33.0
Actuated g/C Ratio		0.41	0.41	0.09	0.54				0.37		0.37
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1976	560	305	2769				649		1022
v/s Ratio Prot		0.53		c0.11	0.50						
v/s Ratio Perm			0.59						0.11		0.47
v/c Ratio		1.30	0.80	1.27	0.92				0.31		1.28
Uniform Delay, d1		26.5	23.2	41.0	18.8				20.4		28.5
Progression Factor		0.73	1.63	0.81	1.91				1.00		1.00
Incremental Delay, d2		134.7	0.7	123.4	0.6				1.2		134.4
Delay (s)		154.1	38.5	156.7	36.4				21.6		162.9
Level of Service		F	D	F	D				C		F
Approach Delay (s)		126.7			52.2		0.0			144.1	
Approach LOS		F			D		A			F	

Intersection Summary			
HCM Average Control Delay	102.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
11: Ranchero Rd & I-15 NB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			0.97		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			3433		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			3433		1583
Volume (vph)	904	1643	0	0	1307	806	0	0	1401	0	709
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	983	1786	0	0	1421	876	0	0	1523	0	771
RTOR Reduction (vph)	0	0	0	0	0	544	0	0	0	0	5
Lane Group Flow (vph)	983	1786	0	0	1421	332	0	0	1523	0	766
Turn Type	Prot					Perm			Prot		custom
Protected Phases	7	4			8				5		
Permitted Phases						8					2
Actuated Green, G (s)	20.0	45.0			21.0	21.0			37.0		37.0
Effective Green, g (s)	20.0	45.0			21.0	21.0			37.0		37.0
Actuated g/C Ratio	0.22	0.50			0.23	0.23			0.41		0.41
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	763	2543			1187	369			1411		651
v/s Ratio Prot	c0.29	0.35			0.28				0.44		
v/s Ratio Perm						0.55					0.49
v/c Ratio	1.29	0.70			1.20	0.90			1.08		1.18
Uniform Delay, d1	35.0	17.3			34.5	33.5			26.5		26.5
Progression Factor	1.43	1.43			0.59	2.58			1.00		1.00
Incremental Delay, d2	130.7	0.1			89.5	3.1			48.5		95.1
Delay (s)	180.6	24.9			109.7	89.6			75.0		121.6
Level of Service	F	C			F	F			E		F
Approach Delay (s)		80.2			102.1		0.0			90.7	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	90.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
12: Ranchero Rd & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00		0.91	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5070		3433	5085	1583		4690	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5070		3433	5085	1583		4690	
Volume (vph)	806	1194	352	767	593	12	1182	534	1145	0	373	401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	876	1298	383	834	645	13	1285	580	1245	0	405	436
RTOR Reduction (vph)	0	0	302	0	2	0	0	0	315	0	215	0
Lane Group Flow (vph)	876	1298	81	834	656	0	1285	580	930	0	626	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Perm		
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	21.0	19.0	19.0	18.0	16.0		20.0	41.0	41.0		17.0	
Effective Green, g (s)	21.0	19.0	19.0	18.0	16.0		20.0	41.0	41.0		17.0	
Actuated g/C Ratio	0.23	0.21	0.21	0.20	0.18		0.22	0.46	0.46		0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	801	1074	334	687	901		763	2317	721		886	
v/s Ratio Prot	0.26	c0.26		c0.24	0.13		0.37	0.11			0.18	
v/s Ratio Perm			0.24						0.79			
v/c Ratio	1.09	1.21	0.24	1.21	0.73		1.68	0.25	1.29		0.71	
Uniform Delay, d1	34.5	35.5	29.5	36.0	34.9		35.0	15.1	24.5		34.2	
Progression Factor	0.97	1.12	2.64	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	52.7	98.5	0.2	109.4	3.0		313.6	0.3	140.9		4.7	
Delay (s)	86.4	138.4	78.2	145.4	37.9		348.6	15.3	165.4		38.9	
Level of Service	F	F	E	F	D		F	B	F		D	
Approach Delay (s)		111.6			98.0			213.1			38.9	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	140.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
13: Ranchero Rd & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5022		1770	4942		1770	3481		1770	3443	
Flt Permitted	0.10	1.00		0.10	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	177	5022		177	4942		1770	3481		1770	3443	
Volume (vph)	55	2184	199	30	1218	282	112	180	22	393	247	54
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	2374	216	33	1324	307	122	196	24	427	268	59
RTOR Reduction (vph)	0	11	0	0	40	0	0	11	0	0	21	0
Lane Group Flow (vph)	60	2579	0	33	1591	0	122	209	0	427	306	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	42.0	42.0		42.0	42.0		8.7	11.1		20.0	22.4	
Effective Green, g (s)	42.0	42.0		42.0	42.0		8.7	11.1		20.0	22.4	
Actuated g/C Ratio	0.49	0.49		0.49	0.49		0.10	0.13		0.24	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	87	2479		87	2439		181	454		416	906	
v/s Ratio Prot		c0.52			0.33		0.07	c0.06		c0.24	0.09	
v/s Ratio Perm	0.34			0.19								
v/c Ratio	0.69	1.04		0.38	0.65		0.67	0.46		1.03	0.34	
Uniform Delay, d1	16.5	21.5		13.4	16.1		36.8	34.2		32.5	25.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.4	29.6		2.8	0.6		9.5	0.7		51.0	0.2	
Delay (s)	36.9	51.2		16.2	16.7		46.3	35.0		83.6	25.6	
Level of Service	D	D		B	B		D	C		F	C	
Approach Delay (s)		50.8			16.7			39.0			58.4	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
14: Ranchero Rd & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5008		1770	3505		1770	3446	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5085	1583	1770	5008		1770	3505		1770	3446	
Volume (vph)	98	2090	574	7	1329	149	190	379	26	196	442	94
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	2272	624	8	1445	162	207	412	28	213	480	102
RTOR Reduction (vph)	0	0	245	0	14	0	0	6	0	0	20	0
Lane Group Flow (vph)	107	2272	379	8	1593	0	207	434	0	213	562	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.2	45.2	45.2	0.8	39.8		11.0	16.9		11.0	16.9	
Effective Green, g (s)	6.2	45.2	45.2	0.8	39.8		11.0	16.9		11.0	16.9	
Actuated g/C Ratio	0.07	0.50	0.50	0.01	0.44		0.12	0.19		0.12	0.19	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	122	2557	796	16	2217		217	659		217	648	
v/s Ratio Prot	c0.06	c0.45		0.00	0.32		0.12	0.13		c0.12	c0.17	
v/s Ratio Perm			0.39									
v/c Ratio	0.88	0.89	0.48	0.50	0.72		0.95	0.66		0.98	0.87	
Uniform Delay, d1	41.5	20.1	14.6	44.4	20.5		39.2	33.8		39.3	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	45.7	4.2	0.5	22.5	1.1		47.8	2.4		55.6	11.7	
Delay (s)	87.1	24.3	15.1	66.9	21.6		87.0	36.2		94.9	47.1	
Level of Service	F	C	B	E	C		F	D		F	D	
Approach Delay (s)		24.6			21.8			52.5			59.9	
Approach LOS		C			C			D			E	

Intersection Summary					
HCM Average Control Delay	31.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	89.9	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	82.8%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
15: Ranchero Rd & I Avenue — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.94		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4769		1770	3460		1770	4826		1770	3449	
Flt Permitted	0.95	1.00		0.95	1.00		0.13	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4769		1770	3460		241	4826		1770	3449	
Volume (vph)	88	518	366	288	380	66	346	528	272	28	757	155
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	563	398	313	413	72	376	574	296	30	823	168
RTOR Reduction (vph)	0	141	0	0	15	0	0	90	0	0	19	0
Lane Group Flow (vph)	96	820	0	313	470	0	376	780	0	30	972	0
Turn Type	Prot			Prot			pm+pt			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2					
Actuated Green, G (s)	7.7	16.8		16.0	25.1		45.9	35.0		6.9	26.9	
Effective Green, g (s)	7.7	16.8		16.0	25.1		45.9	35.0		6.9	26.9	
Actuated g/C Ratio	0.08	0.19		0.18	0.28		0.51	0.39		0.08	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	883		312	958		375	1862		135	1023	
v/s Ratio Prot	0.05	c0.20		c0.18	0.14		c0.17	0.18		0.02	0.29	
v/s Ratio Perm							c0.34					
v/c Ratio	0.64	0.93		1.00	0.49		1.00	0.42		0.22	0.95	
Uniform Delay, d1	40.2	36.4		37.4	27.4		25.9	20.4		39.4	31.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.0	15.6		51.8	0.4		47.1	0.2		0.8	17.4	
Delay (s)	49.1	51.9		89.1	27.8		73.0	20.6		40.2	48.6	
Level of Service	D	D		F	C		E	C		D	D	
Approach Delay (s)		51.7			51.9			36.4			48.4	
Approach LOS		D			D			D			D	

Intersection Summary					
HCM Average Control Delay	46.3	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.00				
Actuated Cycle Length (s)	90.7	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	92.5%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

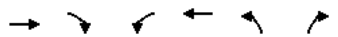
Hesperia GP Update
16: Ranchero Rd & Arrowhead Lake Rd PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.98		1.00	1.00	0.97	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1751		1770	5085	3441	
Flt Permitted	0.96		0.30	1.00	1.00	
Satd. Flow (perm)	1751		551	5085	3441	
Volume (vph)	146	25	21	594	666	152
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	27	23	646	724	165
RTOR Reduction (vph)	9	0	0	0	18	0
Lane Group Flow (vph)	177	0	23	646	871	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	8.9		25.8	25.8	25.8	
Effective Green, g (s)	8.9		25.8	25.8	25.8	
Actuated g/C Ratio	0.21		0.60	0.60	0.60	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	365		333	3072	2079	
v/s Ratio Prot				0.13	c0.26	
v/s Ratio Perm	0.11		0.04			
v/c Ratio	0.49		0.07	0.21	0.42	
Uniform Delay, d1	14.9		3.5	3.8	4.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.0		0.1	0.0	0.1	
Delay (s)	15.9		3.6	3.9	4.6	
Level of Service	B		A	A	A	
Approach Delay (s)	15.9			3.9	4.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	42.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
17: Joshua St & Caliente Rd PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3517		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3517		1770	3539	1770	1583
Volume (vph)	971	42	179	1121	158	731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1055	46	195	1218	172	795
RTOR Reduction (vph)	3	0	0	0	0	169
Lane Group Flow (vph)	1098	0	195	1218	172	626
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	28.4		10.1	42.5	35.8	35.8
Effective Green, g (s)	28.4		10.1	42.5	35.8	35.8
Actuated g/C Ratio	0.33		0.12	0.49	0.41	0.41
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1157		207	1743	734	657
v/s Ratio Prot	c0.31		c0.11	0.34	0.10	
v/s Ratio Perm						0.50
v/c Ratio	0.95		0.94	0.70	0.23	0.95
Uniform Delay, d1	28.2		37.8	16.9	16.4	24.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	15.5		46.1	1.2	0.2	23.9
Delay (s)	43.8		83.9	18.2	16.5	48.3
Level of Service	D		F	B	B	D
Approach Delay (s)	43.8			27.3	42.7	
Approach LOS	D			C	D	

Intersection Summary			
HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
18: Joshua St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	4946		1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	4946		1770	5085	1583
Volume (vph)	568	1296	304	65	689	198	418	1007	225	341	703	524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	617	1409	330	71	749	215	454	1095	245	371	764	570
RTOR Reduction (vph)	0	0	171	0	0	160	0	40	0	0	0	275
Lane Group Flow (vph)	617	1409	159	71	749	55	454	1300	0	371	764	295
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	18.2	33.6	33.6	7.5	22.9	22.9	12.0	20.0		12.0	20.0	20.0
Effective Green, g (s)	18.2	33.6	33.6	7.5	22.9	22.9	12.0	20.0		12.0	20.0	20.0
Actuated g/C Ratio	0.20	0.38	0.38	0.08	0.26	0.26	0.13	0.22		0.13	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	701	1335	597	149	910	407	462	1110		238	1141	355
v/s Ratio Prot	c0.18	c0.40		0.04	0.21		0.13	0.27		c0.21	0.15	
v/s Ratio Perm			0.21			0.14						0.36
v/c Ratio	0.88	1.06	0.27	0.48	0.82	0.14	0.98	1.17		1.56	0.67	0.83
Uniform Delay, d1	34.4	27.7	19.2	38.9	31.2	25.5	38.4	34.5		38.5	31.5	33.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	40.7	0.2	2.4	6.1	0.2	37.1	87.0		271.0	1.5	15.2
Delay (s)	46.8	68.4	19.5	41.3	37.3	25.6	75.6	121.6		309.6	33.0	48.2
Level of Service	D	E	B	D	D	C	E	F		F	C	D
Approach Delay (s)		55.9			35.1			109.9			98.3	
Approach LOS		E			D			F			F	

Intersection Summary				
HCM Average Control Delay	77.3	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.29			
Actuated Cycle Length (s)	89.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	96.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
19: Muscatel St & Escondido Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.97	0.95	
Frt	1.00	0.95		1.00	0.93		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3379		1770	3297		1770	3445		3433	3492	
Flt Permitted	0.23	1.00		0.12	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	434	3379		226	3297		1770	3445		3433	3492	
Volume (vph)	90	767	333	75	376	315	290	674	145	631	875	86
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	834	362	82	409	342	315	733	158	686	951	93
RTOR Reduction (vph)	0	54	0	0	169	0	0	21	0	0	8	0
Lane Group Flow (vph)	98	1142	0	82	582	0	315	870	0	686	1036	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.0	33.0		33.0	33.0		17.0	26.0		19.0	28.0	
Effective Green, g (s)	33.0	33.0		33.0	33.0		17.0	26.0		19.0	28.0	
Actuated g/C Ratio	0.37	0.37		0.37	0.37		0.19	0.29		0.21	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	1239		83	1209		334	995		725	1086	
v/s Ratio Prot		0.35			0.23		0.18	0.26		c0.20	c0.30	
v/s Ratio Perm	0.23			c0.36								
v/c Ratio	0.62	0.92		0.99	0.48		0.94	0.87		0.95	0.95	
Uniform Delay, d1	23.3	27.3		28.3	21.9		36.0	30.5		35.0	30.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.9	11.3		93.9	0.3		34.4	8.7		21.1	17.2	
Delay (s)	30.2	38.5		122.2	22.2		70.5	39.1		56.1	47.6	
Level of Service	C	D		F	C		E	D		E	D	
Approach Delay (s)		37.9			32.1			47.3			50.9	
Approach LOS		D			C			D			D	

Intersection Summary				
HCM Average Control Delay	43.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	92.3%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
20: Rock Springs Road & Arrowhead Lake Rd. PM Peak Hour

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.92	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	3539	3246	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	3539	3246	
Volume (vph)	451	782	1009	597	352	434
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	490	850	1097	649	383	472
RTOR Reduction (vph)	0	595	0	0	243	0
Lane Group Flow (vph)	490	255	1097	649	612	0
Turn Type		custom	Prot			
Protected Phases	3		1	6	2	
Permitted Phases		8				
Actuated Green, G (s)	19.2	19.2	31.2	52.5	17.3	
Effective Green, g (s)	19.2	19.2	31.2	52.5	17.3	
Actuated g/C Ratio	0.24	0.24	0.39	0.66	0.22	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	426	381	1344	2331	705	
v/s Ratio Prot	0.28		c0.32	0.18	c0.26	
v/s Ratio Perm		0.54				
v/c Ratio	1.15	0.67	0.82	0.28	0.87	
Uniform Delay, d1	30.3	27.4	21.7	5.7	30.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	91.5	4.4	4.0	0.1	10.9	
Delay (s)	121.8	31.8	25.6	5.7	41.0	
Level of Service	F	C	C	A	D	
Approach Delay (s)	64.7			18.2	41.0	
Approach LOS	E			B	D	

Intersection Summary				
HCM Average Control Delay	39.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	79.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	87.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
21: Main St. & Baldy Mesa Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.10	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	177	5085	2787	177	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	152	1603	1115	45	2023	673	1340	1655	45	329	1110	199
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	1742	1212	49	2199	732	1457	1799	49	358	1207	216
RTOR Reduction (vph)	0	0	416	0	0	109	0	0	4	0	0	1
Lane Group Flow (vph)	165	1742	796	49	2199	623	1457	1799	45	358	1207	215
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	42.0	42.0	42.0	42.0	42.0	42.0	17.0	30.0	30.0	6.0	19.0	19.0
Effective Green, g (s)	42.0	42.0	42.0	42.0	42.0	42.0	17.0	30.0	30.0	6.0	19.0	19.0
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47	0.47	0.19	0.33	0.33	0.07	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	83	2373	1301	83	2373	739	648	1695	528	229	1074	334
v/s Ratio Prot		0.34			0.43		c0.42	c0.35		0.10	0.24	
v/s Ratio Perm	c0.93		0.43	0.28		0.46			0.03			0.14
v/c Ratio	1.99	0.73	0.61	0.59	0.93	0.84	2.25	1.06	0.09	1.56	1.12	0.64
Uniform Delay, d1	24.0	19.5	17.9	17.7	22.6	21.1	36.5	30.0	20.6	42.0	35.5	32.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	484.6	1.2	0.9	10.7	6.9	8.6	566.8	40.2	0.1	273.7	68.2	4.2
Delay (s)	508.6	20.7	18.8	28.4	29.5	29.7	603.3	70.2	20.7	315.7	103.7	36.6
Level of Service	F	C	B	C	C	C	F	E	C	F	F	D
Approach Delay (s)		45.7			29.5			304.5			138.2	
Approach LOS		D			C			F			F	

Intersection Summary				
HCM Average Control Delay	132.6	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.77			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	120.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
22: Main St. & Hwy 395 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	1.00	0.91	0.88	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	1770	5085	2787	3433	5083		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	1770	5085	2787	3433	5083		3433	5085	1583
Volume (vph)	283	1779	617	3	1995	1430	800	4148	14	1195	2908	221
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	308	1934	671	3	2168	1554	870	4509	15	1299	3161	240
RTOR Reduction (vph)	0	0	349	0	0	272	0	1	0	0	0	77
Lane Group Flow (vph)	308	1934	322	3	2168	1282	870	4523	0	1299	3161	163
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.0	30.4	30.4	0.8	24.2	24.2	9.0	34.0		12.0	37.0	37.0
Effective Green, g (s)	7.0	30.4	30.4	0.8	24.2	24.2	9.0	34.0		12.0	37.0	37.0
Actuated g/C Ratio	0.08	0.33	0.33	0.01	0.26	0.26	0.10	0.36		0.13	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	133	1659	909	15	1320	724	332	1854		442	2019	628
v/s Ratio Prot	c0.17	0.38		0.00	0.43		0.25	c0.89		c0.38	c0.62	
v/s Ratio Perm			0.24			0.56						0.15
v/c Ratio	2.32	1.17	0.35	0.20	1.64	1.77	2.62	2.44		2.94	1.57	0.26
Uniform Delay, d1	43.1	31.4	23.9	45.9	34.5	34.5	42.1	29.6		40.6	28.1	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	615.0	81.6	0.2	6.5	292.5	352.2	737.9	649.5		878.6	257.0	0.2
Delay (s)	658.1	113.0	24.2	52.4	327.0	386.7	780.0	679.1		919.2	285.1	19.1
Level of Service	F	F	C	D	F	F	F	F		F	F	B
Approach Delay (s)		150.2			351.7			695.4			446.8	
Approach LOS		F			F			F			F	

Intersection Summary					
HCM Average Control Delay	454.1	HCM Level of Service		F	
HCM Volume to Capacity ratio	2.50				
Actuated Cycle Length (s)	93.2	Sum of lost time (s)		20.0	
Intersection Capacity Utilization	182.1%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
23: Eucalyptus St & Maple Ave PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		0.97	0.95	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4952		3433	4995		3433	3539	1583	1770	3507	
Flt Permitted	0.22	1.00		0.95	1.00		0.95	1.00	1.00	0.12	1.00	
Satd. Flow (perm)	410	4952		3433	4995		3433	3539	1583	219	3507	
Volume (vph)	80	1098	232	237	926	125	181	973	628	339	703	46
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	1193	252	258	1007	136	197	1058	683	368	764	50
RTOR Reduction (vph)	0	37	0	0	19	0	0	0	141	0	6	0
Lane Group Flow (vph)	87	1408	0	258	1124	0	197	1058	542	368	808	0
Turn Type	Perm			Prot			Prot		Perm	pm+pt		
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	24.0	24.0		7.0	35.0		8.7	30.0	30.0	47.0	34.3	
Effective Green, g (s)	24.0	24.0		7.0	35.0		8.7	30.0	30.0	47.0	34.3	
Actuated g/C Ratio	0.27	0.27		0.08	0.39		0.10	0.33	0.33	0.52	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	109	1321		267	1943		332	1180	528	338	1337	
v/s Ratio Prot		c0.29		c0.08	0.23		0.06	0.30		c0.16	0.23	
v/s Ratio Perm	0.21								0.43	0.41		
v/c Ratio	0.80	1.07		0.97	0.58		0.59	0.90	1.03	1.09	0.60	
Uniform Delay, d1	30.7	33.0		41.4	21.7		39.0	28.5	30.0	25.5	22.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	32.1	44.5		45.3	0.4		2.8	9.1	46.3	74.8	0.8	
Delay (s)	62.9	77.5		86.7	22.1		41.8	37.6	76.3	100.3	23.2	
Level of Service	E	E		F	C		D	D	E	F	C	
Approach Delay (s)		76.6			34.0			51.7			47.2	
Approach LOS		E			C			D			D	

Intersection Summary					
HCM Average Control Delay	53.0	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.16				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	94.1%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085		1770	5085	1770	1583
Flt Permitted	1.00		0.16	1.00	0.95	1.00
Satd. Flow (perm)	5085		297	5085	1770	1583
Volume (vph)	1586	0	40	1268	10	179
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1724	0	43	1378	11	195
RTOR Reduction (vph)	0	0	0	0	0	22
Lane Group Flow (vph)	1724	0	43	1378	11	173
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	25.1		25.1	25.1	10.4	10.4
Effective Green, g (s)	25.1		25.1	25.1	10.4	10.4
Actuated g/C Ratio	0.58		0.58	0.58	0.24	0.24
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2934		171	2934	423	378
v/s Ratio Prot	c0.34			0.27	0.01	
v/s Ratio Perm			0.14			0.12
v/c Ratio	0.59		0.25	0.47	0.03	0.46
Uniform Delay, d1	5.9		4.6	5.3	12.7	14.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3		0.8	0.1	0.0	0.9
Delay (s)	6.2		5.3	5.5	12.7	15.0
Level of Service	A		A	A	B	B
Approach Delay (s)	6.2			5.5	14.9	
Approach LOS	A			A	B	

Intersection Summary				
HCM Average Control Delay	6.4	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	43.5	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	48.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	5085	5085	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	5085	5085	1583	1770	1583
Volume (vph)	903	3326	2946	127	148	557
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	982	3615	3202	138	161	605
RTOR Reduction (vph)	0	0	0	52	0	275
Lane Group Flow (vph)	982	3615	3202	86	161	330
Turn Type	Prot			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	19.0	66.0	43.0	43.0	16.0	16.0
Effective Green, g (s)	19.0	66.0	43.0	43.0	16.0	16.0
Actuated g/C Ratio	0.21	0.73	0.48	0.48	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	725	3729	2430	756	315	281
v/s Ratio Prot	c0.29	0.71	c0.63		0.09	
v/s Ratio Perm				0.09		0.38
v/c Ratio	1.35	0.97	1.32	0.11	0.51	1.18
Uniform Delay, d1	35.5	11.1	23.5	13.0	33.5	37.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	168.5	8.8	146.0	0.1	1.4	109.9
Delay (s)	204.0	19.8	169.5	13.0	34.9	146.9
Level of Service	F	B	F	B	C	F
Approach Delay (s)		59.2	163.0		123.4	
Approach LOS		E	F		F	

Intersection Summary				
HCM Average Control Delay	104.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.50			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	100.9%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
26: Main St. & I-15 SB Ramp

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Lane Util. Factor		0.91			0.91	1.00			1.00	1.00	0.95
Frt		1.00			1.00	0.85			1.00	0.85	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (prot)		5080			5085	1583			1770	1583	1504
Flt Permitted		1.00			1.00	1.00			0.95	1.00	1.00
Satd. Flow (perm)		5080			5085	1583			1770	1583	1504
Volume (vph)	0	3502	24	0	2186	725	0	0	91	0	1411
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3807	26	0	2376	788	0	0	99	0	1534
RTOR Reduction (vph)	0	1	0	0	0	315	0	0	0	3	3
Lane Group Flow (vph)	0	3832	0	0	2376	473	0	0	99	764	764
Turn Type						Perm			Prot		Perm
Protected Phases		4			8				1	6	
Permitted Phases						8					6
Actuated Green, G (s)		54.0			54.0	54.0			28.0	28.0	28.0
Effective Green, g (s)		54.0			54.0	54.0			28.0	28.0	28.0
Actuated g/C Ratio		0.60			0.60	0.60			0.31	0.31	0.31
Clearance Time (s)		4.0			4.0	4.0			4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)		3048			3051	950			551	492	468
v/s Ratio Prot		c0.75			0.47				0.06	0.48	
v/s Ratio Perm						0.50					0.51
v/c Ratio		1.26			0.78	0.50			0.18	1.55	1.63
Uniform Delay, d1		18.0			13.5	10.3			22.6	31.0	31.0
Progression Factor		1.00			1.04	3.85			1.00	1.00	1.00
Incremental Delay, d2		118.6			0.3	0.1			0.2	258.9	294.4
Delay (s)		136.6			14.3	39.7			22.8	289.9	325.4
Level of Service		F			B	D			C	F	F
Approach Delay (s)		136.6			20.6		0.0			290.4	
Approach LOS		F			C		A			F	

Intersection Summary			
HCM Average Control Delay	123.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	676	1112	468	921	2082	541	228	1702	977	499	1752	251
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	735	1209	509	1001	2263	588	248	1850	1062	542	1904	273
RTOR Reduction (vph)	0	0	94	0	0	90	0	0	1	0	0	0
Lane Group Flow (vph)	735	1209	415	1001	2263	498	248	1850	1061	542	1904	273
Turn Type	Prot		Perm	Prot		Perm	Prot		pm+ov	Prot		pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.0	25.0	25.0	15.0	28.0	28.0	5.0	25.0	40.0	9.0	29.0	41.0
Effective Green, g (s)	12.0	25.0	25.0	15.0	28.0	28.0	5.0	25.0	40.0	9.0	29.0	41.0
Actuated g/C Ratio	0.13	0.28	0.28	0.17	0.31	0.31	0.06	0.28	0.44	0.10	0.32	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	458	1413	440	572	1582	492	191	1413	774	343	1639	792
v/s Ratio Prot	0.21	0.24		c0.29	c0.45		0.07	0.36	c0.23	c0.16	c0.37	0.05
v/s Ratio Perm			0.32			0.37			0.44			0.13
v/c Ratio	1.60	0.86	0.94	1.75	1.43	1.01	1.30	1.31	1.37	1.58	1.16	0.34
Uniform Delay, d1	39.0	30.8	31.8	37.5	31.0	31.0	42.5	32.5	25.0	40.5	30.5	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	282.2	5.3	28.9	344.7	197.4	43.9	167.2	144.4	175.0	274.7	79.9	0.3
Delay (s)	321.2	36.1	60.7	382.2	228.4	74.9	209.7	176.9	200.0	315.2	110.4	16.1
Level of Service	F	D	E	F	F	E	F	F	F	F	F	B
Approach Delay (s)		126.6			244.9			187.2			141.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	183.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	120.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	400	2401	868	202	2164	231	620	701	226	269	1041	305
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	435	2610	943	220	2352	251	674	762	246	292	1132	332
RTOR Reduction (vph)	0	0	146	0	0	128	0	0	124	0	0	162
Lane Group Flow (vph)	435	2610	797	220	2352	123	674	762	122	292	1132	170
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	34.0	34.0	7.0	28.0	28.0	10.0	25.0	25.0	8.0	23.0	23.0
Effective Green, g (s)	13.0	34.0	34.0	7.0	28.0	28.0	10.0	25.0	25.0	8.0	23.0	23.0
Actuated g/C Ratio	0.14	0.38	0.38	0.08	0.31	0.31	0.11	0.28	0.28	0.09	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	1921	598	138	1582	492	381	983	440	305	904	405
v/s Ratio Prot	c0.25	0.51		0.12	0.46		c0.20	0.22		0.09	c0.32	
v/s Ratio Perm			0.60			0.16			0.16			0.21
v/c Ratio	1.70	1.36	1.33	1.59	1.49	0.25	1.77	0.78	0.28	0.96	1.25	0.42
Uniform Delay, d1	38.5	28.0	28.0	41.5	31.0	23.2	40.0	29.9	25.4	40.8	33.5	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	330.9	164.9	160.8	298.7	222.4	0.3	356.6	3.9	0.3	39.7	122.6	0.7
Delay (s)	369.4	192.9	188.8	340.2	253.4	23.4	396.6	33.8	25.8	80.5	156.1	28.6
Level of Service	F	F	F	F	F	C	F	C	C	F	F	C
Approach Delay (s)		211.2			239.8			178.0			119.5	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	197.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
29: Bear Valley Rd & I Avenue — PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	3433	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	3433	1583
Volume (vph)	2837	337	343	2175	597	435
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3084	366	373	2364	649	473
RTOR Reduction (vph)	0	139	0	0	0	231
Lane Group Flow (vph)	3084	227	373	2364	649	242
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	46.0	46.0	14.0	64.0	16.0	16.0
Effective Green, g (s)	46.0	46.0	14.0	64.0	16.0	16.0
Actuated g/C Ratio	0.52	0.52	0.16	0.73	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2658	827	546	3698	624	288
v/s Ratio Prot	c0.61		0.11	c0.46	0.19	
v/s Ratio Perm		0.23				0.30
v/c Ratio	1.16	0.27	0.68	0.64	1.04	0.84
Uniform Delay, d1	21.0	11.7	34.9	6.1	36.0	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	76.7	0.2	3.5	0.4	46.8	19.4
Delay (s)	97.7	11.9	38.4	6.5	82.8	54.2
Level of Service	F	B	D	A	F	D
Approach Delay (s)	88.6			10.8	70.8	
Approach LOS	F			B	E	

Intersection Summary			
HCM Average Control Delay	56.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
30: Main St. & 3rd Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	1770	3539	2787	3433	3539	1583
Volume (vph)	316	2849	180	544	2983	218	273	684	500	370	888	321
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	343	3097	196	591	3242	237	297	743	543	402	965	349
RTOR Reduction (vph)	0	0	53	0	0	61	0	0	168	0	0	86
Lane Group Flow (vph)	343	3097	143	591	3242	176	297	743	375	402	965	263
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	33.0	33.0	7.0	35.0	35.0	7.0	19.2	19.2	14.5	26.7	26.7
Effective Green, g (s)	5.0	33.0	33.0	7.0	35.0	35.0	7.0	19.2	19.2	14.5	26.7	26.7
Actuated g/C Ratio	0.06	0.37	0.37	0.08	0.39	0.39	0.08	0.21	0.21	0.16	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	191	1302	582	268	1381	618	138	758	597	555	1053	471
v/s Ratio Prot	0.10	0.88		c0.17	c0.92		c0.17	0.21		0.12	c0.27	
v/s Ratio Perm			0.12			0.15			0.19			0.22
v/c Ratio	1.80	2.38	0.25	2.21	2.35	0.28	2.15	0.98	0.63	0.72	0.92	0.56
Uniform Delay, d1	42.4	28.4	19.7	41.4	27.4	18.8	41.4	35.1	32.0	35.7	30.4	26.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	378.2	622.8	0.2	554.4	608.7	0.3	541.8	27.7	2.1	4.7	12.1	1.4
Delay (s)	420.6	651.1	19.9	595.7	636.0	19.0	583.1	62.8	34.1	40.4	42.6	28.0
Level of Service	F	F	B	F	F	B	F	E	C	D	D	C
Approach Delay (s)		595.3			594.2			150.6			39.1	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	444.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.75		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	147.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
31: Main St. & C Ave
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	0.85	1.00	0.91	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	2787	3433	3539	1583	3433	1586	1504	1770	1612	1504
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	1770	3539	2787	3433	3539	1583	3433	1586	1504	1138	1612	1504
Volume (vph)	140	2359	785	311	1995	161	806	44	235	262	111	426
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	2564	853	338	2168	175	876	48	255	285	121	463
RTOR Reduction (vph)	0	0	274	0	0	66	0	86	117	0	60	100
Lane Group Flow (vph)	152	2564	579	338	2168	109	876	70	30	285	237	187
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	6.0	38.0	38.0	6.0	38.0	38.0	12.0	17.9	17.9	25.9	15.9	15.9
Effective Green, g (s)	6.0	38.0	38.0	6.0	38.0	38.0	12.0	17.9	17.9	25.9	15.9	15.9
Actuated g/C Ratio	0.07	0.43	0.43	0.07	0.43	0.43	0.14	0.20	0.20	0.29	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	121	1530	1205	234	1530	684	469	323	306	407	292	272
v/s Ratio Prot	0.09	c0.72		c0.10	0.61		c0.26	0.10		0.08	0.18	
v/s Ratio Perm			0.31			0.11			0.10	0.13		0.19
v/c Ratio	1.26	1.68	0.48	1.44	1.42	0.16	1.87	0.22	0.10	0.70	0.81	0.69
Uniform Delay, d1	41.0	25.0	17.9	41.0	25.0	15.2	38.0	29.2	28.4	26.3	34.6	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	166.0	307.0	0.3	222.5	191.6	0.1	398.6	0.3	0.1	5.4	15.7	7.1
Delay (s)	206.9	332.0	18.2	263.4	216.5	15.3	436.6	29.5	28.6	31.7	50.2	40.7
Level of Service	F	F	B	F	F	B	F	C	C	C	D	D
Approach Delay (s)		251.6			209.3			331.8			41.0	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	227.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	124.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
32: Main St. & E Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3538		1770	3402		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.17	1.00		0.37	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3538		308	3402		680	3539	1583
Volume (vph)	446	1682	297	52	1451	4	267	349	121	29	700	463
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	485	1828	323	57	1577	4	290	379	132	32	761	503
RTOR Reduction (vph)	0	0	98	0	0	0	0	37	0	0	0	246
Lane Group Flow (vph)	485	1828	225	57	1581	0	290	474	0	32	761	257
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	18.0	46.6	46.6	3.2	31.8		30.2	24.2		23.0	20.6	20.6
Effective Green, g (s)	18.0	46.6	46.6	3.2	31.8		30.2	24.2		23.0	20.6	20.6
Actuated g/C Ratio	0.19	0.50	0.50	0.03	0.34		0.33	0.26		0.25	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	345	1785	798	61	1218		196	891		198	789	353
v/s Ratio Prot	c0.27	0.52		0.03	c0.45		c0.10	0.15		0.00	0.22	
v/s Ratio Perm			0.20				c0.39			0.04		0.32
v/c Ratio	1.41	1.02	0.28	0.93	1.30		1.48	0.53		0.16	0.96	0.73
Uniform Delay, d1	37.2	22.9	13.2	44.5	30.3		29.4	29.2		26.7	35.5	33.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	199.2	27.6	0.2	91.2	140.3		241.2	0.6		0.4	23.5	7.4
Delay (s)	236.4	50.5	13.4	135.7	170.6		270.6	29.9		27.0	59.0	40.7
Level of Service	F	D	B	F	F		F	C		C	E	D
Approach Delay (s)		80.2			169.4			117.0			51.1	
Approach LOS		F			F			F			D	

Intersection Summary				
HCM Average Control Delay	101.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.44			
Actuated Cycle Length (s)	92.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	112.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
33: Main St. & I Avenue

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	287	3539	1583
Volume (vph)	115	1686	329	192	1027	74	348	688	246	324	1301	12
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	1833	358	209	1116	80	378	748	267	352	1414	13
RTOR Reduction (vph)	0	0	133	0	0	51	0	0	88	0	0	7
Lane Group Flow (vph)	125	1833	225	209	1116	29	378	748	179	352	1414	6
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2	6		6
Actuated Green, G (s)	5.0	34.0	34.0	4.0	33.0	33.0	7.0	22.0	22.0	40.0	29.0	29.0
Effective Green, g (s)	5.0	34.0	34.0	4.0	33.0	33.0	7.0	22.0	22.0	40.0	29.0	29.0
Actuated g/C Ratio	0.06	0.38	0.38	0.04	0.37	0.37	0.08	0.24	0.24	0.44	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	191	1337	598	153	1298	580	267	865	387	358	1140	510
v/s Ratio Prot	0.04	c0.52		c0.06	0.32		c0.11	0.21		c0.15	c0.40	
v/s Ratio Perm			0.23			0.05			0.17	0.28		0.01
v/c Ratio	0.65	1.37	0.38	1.37	0.86	0.05	1.42	0.86	0.46	0.98	1.24	0.01
Uniform Delay, d1	41.7	28.0	20.3	43.0	26.4	18.4	41.5	32.6	29.0	23.7	30.5	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.8	171.8	0.4	200.7	5.9	0.0	207.8	9.0	0.9	42.8	115.8	0.0
Delay (s)	49.5	199.8	20.7	243.7	32.3	18.4	249.3	41.6	29.8	66.4	146.3	20.8
Level of Service	D	F	C	F	C	B	F	D	C	E	F	C
Approach Delay (s)		164.0			62.9			95.7			129.6	
Approach LOS		F			E			F			F	

Intersection Summary				
HCM Average Control Delay	120.7	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.20			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	111.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
34: Smoketree & Baldy Mesa Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3491		1770	3539	1583	1770	5078		1770	5082	
Flt Permitted	0.21	1.00		0.21	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	392	3491		392	3539	1583	1770	5078		1770	5082	
Volume (vph)	3	599	60	10	773	471	85	2411	24	215	1561	6
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	651	65	11	840	512	92	2621	26	234	1697	7
RTOR Reduction (vph)	0	9	0	0	0	165	0	1	0	0	0	0
Lane Group Flow (vph)	3	707	0	11	840	347	92	2646	0	234	1704	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	19.0	19.0		19.0	19.0	19.0	7.5	41.8		10.0	44.3	
Effective Green, g (s)	19.0	19.0		19.0	19.0	19.0	7.5	41.8		10.0	44.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.23	0.09	0.50		0.12	0.54	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	90	801		90	812	363	160	2564		214	2719	
v/s Ratio Prot		0.21			0.24		0.05	c0.52		c0.13	0.34	
v/s Ratio Perm	0.01			0.03		0.32						
v/c Ratio	0.03	0.88		0.12	1.03	0.96	0.57	1.03		1.09	0.63	
Uniform Delay, d1	24.8	30.8		25.3	31.9	31.5	36.1	20.5		36.4	13.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	11.2		0.6	40.8	35.5	4.9	26.6		88.7	0.5	
Delay (s)	24.9	42.1		25.9	72.7	67.0	41.0	47.1		125.1	13.9	
Level of Service	C	D		C	E	E	D	D		F	B	
Approach Delay (s)		42.0			70.2			46.9			27.3	
Approach LOS		D			E			D			C	

Intersection Summary					
HCM Average Control Delay	45.5	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.13				
Actuated Cycle Length (s)	82.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	90.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
35: Smoketree & Hwy 395 PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	5085	5085	1583
Volume (vph)	954	129	289	5726	3770	786
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1037	140	314	6224	4098	854
RTOR Reduction (vph)	0	107	0	0	0	250
Lane Group Flow (vph)	1037	33	314	6224	4098	604
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	21.0	21.0	10.0	61.0	47.0	47.0
Effective Green, g (s)	21.0	21.0	10.0	61.0	47.0	47.0
Actuated g/C Ratio	0.23	0.23	0.11	0.68	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	801	369	197	3447	2656	827
v/s Ratio Prot			0.18	c1.22	0.81	
v/s Ratio Perm	0.30	0.09				0.54
v/c Ratio	1.29	0.09	1.59	1.81	1.54	0.73
Uniform Delay, d1	34.5	27.0	40.0	14.5	21.5	16.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	141.8	0.1	289.9	363.7	246.2	3.3
Delay (s)	176.3	27.1	329.9	378.2	267.7	19.9
Level of Service	F	C	F	F	F	B
Approach Delay (s)	158.6			375.9	225.0	
Approach LOS	F			F	F	

Intersection Summary					
HCM Average Control Delay	296.7	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.67				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization	144.5%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
36: Mojave St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	1.00	0.91		0.97	0.91		1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	1770	5085		3433	4953		1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.17	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	1770	5085		3433	4953		324	5085	2787
Volume (vph)	982	1933	1406	166	1309	1	1551	1282	270	4	1331	1282
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1067	2101	1528	180	1423	1	1686	1393	293	4	1447	1393
RTOR Reduction (vph)	0	0	545	0	0	0	0	36	0	0	0	274
Lane Group Flow (vph)	1067	2101	983	180	1424	0	1686	1650	0	4	1447	1119
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	26.0	26.0	6.0	19.0		19.0	46.0		23.0	23.0	23.0
Effective Green, g (s)	13.0	26.0	26.0	6.0	19.0		19.0	46.0		23.0	23.0	23.0
Actuated g/C Ratio	0.14	0.29	0.29	0.07	0.21		0.21	0.51		0.26	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	496	1469	805	118	1074		725	2532		83	1300	712
v/s Ratio Prot	c0.31	0.41		0.10	0.28		c0.49	0.34			0.28	
v/s Ratio Perm			0.55							0.01		0.50
v/c Ratio	2.15	1.43	1.22	1.53	1.33		2.33	0.65		0.05	1.11	1.57
Uniform Delay, d1	38.5	32.0	32.0	42.0	35.5		35.5	16.1		25.2	33.5	33.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	524.7	197.6	110.8	274.6	153.2		600.8	0.6		0.2	62.1	264.0
Delay (s)	563.2	229.6	142.8	316.6	188.7		636.3	16.7		25.5	95.6	297.5
Level of Service	F	F	F	F	F		F	B		C	F	F
Approach Delay (s)		277.1			203.0			326.5			194.4	
Approach LOS		F			F			F			F	

Intersection Summary					
HCM Average Control Delay	262.1	HCM Level of Service		F	
HCM Volume to Capacity ratio	2.03				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	136.6%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
37: Live Oak & Escondido Ave — PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	0.99	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1763	1504	5085	1583	3433	5085
Flt Permitted	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1763	1504	5085	1583	3433	5085
Volume (vph)	418	619	2157	885	564	2126
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	454	673	2345	962	613	2311
RTOR Reduction (vph)	2	222	0	368	0	0
Lane Group Flow (vph)	481	422	2345	594	613	2311
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	23.0	23.0	40.0	40.0	15.0	59.0
Effective Green, g (s)	23.0	23.0	40.0	40.0	15.0	59.0
Actuated g/C Ratio	0.26	0.26	0.44	0.44	0.17	0.66
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	451	384	2260	704	572	3334
v/s Ratio Prot			0.46		c0.18	0.45
v/s Ratio Perm	0.27	0.43		0.61		
v/c Ratio	1.07	1.10	1.04	0.84	1.07	0.69
Uniform Delay, d1	33.5	33.5	25.0	22.2	37.5	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	61.1	75.4	29.5	9.1	58.3	0.6
Delay (s)	94.6	108.9	54.5	31.3	95.8	10.4
Level of Service	F	F	D	C	F	B
Approach Delay (s)	102.8		47.8			28.3
Approach LOS	F		D			C

Intersection Summary					
HCM Average Control Delay	48.5	HCM Level of Service		D	
HCM Volume to Capacity ratio	1.40				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	103.5%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
38: Mojave & I-15 SB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	1.00	0.97	0.91				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		5085	1583	3433	5085				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		5085	1583	3433	5085				3433		1583
Volume (vph)	0	3099	361	764	3259	0	0	0	762	0	503
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3368	392	830	3542	0	0	0	828	0	547
RTOR Reduction (vph)	0	0	140	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	3368	252	830	3542	0	0	0	828	0	547
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		39.0	39.0	14.0	57.0				25.0		25.0
Effective Green, g (s)		39.0	39.0	14.0	57.0				25.0		25.0
Actuated g/C Ratio		0.43	0.43	0.16	0.63				0.28		0.28
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		2204	686	534	3221				954		440
v/s Ratio Prot		c0.66		c0.24	0.70						
v/s Ratio Perm			0.25						0.24		0.35
v/c Ratio		1.53	0.37	1.55	1.10				0.87		1.24
Uniform Delay, d1		25.5	17.2	38.0	16.5				30.9		32.5
Progression Factor		1.00	1.00	0.81	1.82				1.00		1.00
Incremental Delay, d2		240.0	0.3	250.3	45.4				10.5		127.4
Delay (s)		265.5	17.5	281.0	75.4				41.5		159.9
Level of Service		F	B	F	E				D		F
Approach Delay (s)		239.6			114.4		0.0			88.6	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	160.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
39: Mojave & I-15 NB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	0.97	0.91			0.91	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	3433	5085			5085	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	3433	5085			5085	1583			1770		2787
Volume (vph)	425	3436	0	0	3318	824	0	0	704	0	884
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	462	3735	0	0	3607	896	0	0	765	0	961
RTOR Reduction (vph)	0	0	0	0	0	298	0	0	0	0	0
Lane Group Flow (vph)	462	3735	0	0	3607	598	0	0	765	0	961
Turn Type	Prot				custom	custom			custom		
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	8.0	53.0			41.0	41.0			29.0		29.0
Effective Green, g (s)	8.0	53.0			41.0	41.0			29.0		29.0
Actuated g/C Ratio	0.09	0.59			0.46	0.46			0.32		0.32
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	305	2995			2317	721			570		898
v/s Ratio Prot	c0.13	0.73			c0.71						
v/s Ratio Perm						0.57			0.43		0.34
v/c Ratio	1.51	1.25			1.56	0.83			1.34		1.07
Uniform Delay, d1	41.0	18.5			24.5	21.4			30.5		30.5
Progression Factor	0.77	1.81			1.00	1.00			1.00		1.00
Incremental Delay, d2	233.2	111.5			252.7	7.8			165.5		50.6
Delay (s)	264.7	144.9			277.2	29.2			196.0		81.1
Level of Service	F	F			F	C			F		F
Approach Delay (s)		158.0			227.9		0.0			132.0	
Approach LOS		F			F		A			F	

Intersection Summary			
HCM Average Control Delay	183.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
40: Mojave St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	1770	3502		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.20	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	373	5085	1583	1770	3502		3433	3539	1583
Volume (vph)	326	1486	282	35	1200	282	285	881	67	810	1289	159
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	354	1615	307	38	1304	307	310	958	73	880	1401	173
RTOR Reduction (vph)	0	0	198	0	0	239	0	2	0	0	0	103
Lane Group Flow (vph)	354	1615	109	38	1304	68	310	1029	0	880	1401	70
Turn Type	Prot		Perm	Perm		Perm	Prot			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						6
Actuated Green, G (s)	8.0	32.0	32.0	20.0	20.0	20.0	12.0	25.0		21.0	34.0	34.0
Effective Green, g (s)	8.0	32.0	32.0	20.0	20.0	20.0	12.0	25.0		21.0	34.0	34.0
Actuated g/C Ratio	0.09	0.36	0.36	0.22	0.22	0.22	0.13	0.28		0.23	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	305	1808	563	83	1130	352	236	973		801	1337	598
v/s Ratio Prot	c0.10	0.32			c0.26		c0.18	0.29		c0.26	c0.40	
v/s Ratio Perm			0.19	0.10		0.19						0.11
v/c Ratio	1.16	0.89	0.19	0.46	1.15	0.19	1.31	1.06		1.10	1.05	0.12
Uniform Delay, d1	41.0	27.4	20.1	30.3	35.0	28.4	39.0	32.5		34.5	28.0	18.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	102.4	6.1	0.2	4.0	79.7	0.3	167.9	45.3		62.2	38.2	0.1
Delay (s)	143.4	33.5	20.2	34.3	114.7	28.7	206.9	77.8		96.7	66.2	18.3
Level of Service	F	C	C	C	F	C	F	E		F	E	B
Approach Delay (s)		48.8			96.8			107.6			73.8	
Approach LOS		D			F			F			E	

Intersection Summary				
HCM Average Control Delay	77.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.09			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	97.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3497	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3497	
Volume (vph)	195	2159	273	339	1863	96	273	1026	542	186	1249	107
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	2347	297	368	2025	104	297	1115	589	202	1358	116
RTOR Reduction (vph)	0	0	2	0	0	6	0	0	88	0	7	0
Lane Group Flow (vph)	212	2347	295	368	2025	98	297	1115	501	202	1467	0
Turn Type	Prot		pt+ov	Prot		pm+ov	Prot		Perm	Prot		
Protected Phases	7	4	4 5	3	8	1	5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.0	31.0	41.0	7.0	33.0	39.0	6.0	30.0	30.0	6.0	30.0	
Effective Green, g (s)	5.0	31.0	41.0	7.0	33.0	39.0	6.0	30.0	30.0	6.0	30.0	
Actuated g/C Ratio	0.06	0.34	0.46	0.08	0.37	0.43	0.07	0.33	0.33	0.07	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1752	721	267	1865	756	229	1180	528	229	1166	
v/s Ratio Prot	0.06	c0.46	0.19	c0.11	0.40	0.01	c0.09	0.32		0.06	c0.42	
v/s Ratio Perm						0.06			0.37			
v/c Ratio	1.11	1.34	0.41	1.38	1.09	0.13	1.30	0.94	0.95	0.88	1.26	
Uniform Delay, d1	42.5	29.5	16.4	41.5	28.5	15.3	42.0	29.2	29.3	41.6	30.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	97.7	156.8	0.4	192.0	48.4	0.1	162.0	14.8	26.6	30.3	123.1	
Delay (s)	140.2	186.3	16.8	233.5	76.9	15.4	204.0	44.0	55.8	71.9	153.1	
Level of Service	F	F	B	F	E	B	F	D	E	E	F	
Approach Delay (s)		165.2			97.4			71.2			143.3	
Approach LOS		F			F			E			F	

Intersection Summary				
HCM Average Control Delay	121.6	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.30			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	110.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
42: Lemon St & E Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.88			0.97	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	3433	2787			3433	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.92	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	3433	2787			3337	1583
Volume (vph)	388	1621	618	138	1270	10	517	321	137	15	384	224
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	422	1762	672	150	1380	11	562	349	149	16	417	243
RTOR Reduction (vph)	0	0	266	0	0	8	0	45	0	0	0	200
Lane Group Flow (vph)	422	1762	406	150	1380	3	562	453	0	0	433	43
Turn Type	Prot		Perm	Prot		Perm	Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8				6		6
Actuated Green, G (s)	20.0	35.0	35.0	8.0	23.0	23.0	14.0	33.5			15.5	15.5
Effective Green, g (s)	20.0	35.0	35.0	8.0	23.0	23.0	14.0	33.5			15.5	15.5
Actuated g/C Ratio	0.23	0.40	0.40	0.09	0.26	0.26	0.16	0.38			0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	400	2011	626	160	1322	411	543	1055			584	277
v/s Ratio Prot	c0.24	0.35		0.08	0.27		c0.16	0.18				
v/s Ratio Perm			0.42			0.01					0.13	0.15
v/c Ratio	1.05	0.88	0.65	0.94	1.04	0.01	1.03	0.43			0.74	0.15
Uniform Delay, d1	34.2	24.7	21.7	40.0	32.8	24.3	37.2	20.4			34.6	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	60.2	4.6	2.3	52.4	37.0	0.0	47.9	0.3			5.0	0.3
Delay (s)	94.5	29.4	24.1	92.4	69.8	24.3	85.2	20.7			39.6	31.2
Level of Service	F	C	C	F	E	C	F	C			D	C
Approach Delay (s)		37.7			71.6		54.9				36.6	
Approach LOS		D			E		D				D	

Intersection Summary				
HCM Average Control Delay	49.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
43: Lemon St & I Avenue

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5028		1770	5059		1770	3539	1583	1770	3516	
Flt Permitted	0.16	1.00		0.10	1.00		0.13	1.00	1.00	0.25	1.00	
Satd. Flow (perm)	298	5028		185	5059		234	3539	1583	467	3516	
Volume (vph)	98	1574	129	141	1114	40	54	701	180	66	979	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	1711	140	153	1211	43	59	762	196	72	1064	49
RTOR Reduction (vph)	0	9	0	0	3	0	0	0	3	0	4	0
Lane Group Flow (vph)	107	1842	0	153	1251	0	59	762	193	72	1109	0
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	40.3	40.3		40.3	40.3		31.9	31.9	31.9	31.9	31.9	
Effective Green, g (s)	40.3	40.3		40.3	40.3		31.9	31.9	31.9	31.9	31.9	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.40	0.40	0.40	0.40	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	150	2527		93	2542		93	1408	630	186	1399	
v/s Ratio Prot		0.37			0.25			0.22			c0.32	
v/s Ratio Perm	0.36			c0.83			0.25		0.12	0.15		
v/c Ratio	0.71	0.73		1.65	0.49		0.63	0.54	0.31	0.39	0.79	
Uniform Delay, d1	15.5	15.7		20.0	13.2		19.5	18.5	16.6	17.2	21.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.8	1.1		333.3	0.2		13.3	0.4	0.3	1.3	3.2	
Delay (s)	30.3	16.7		353.3	13.3		32.8	19.0	16.8	18.5	24.4	
Level of Service	C	B		F	B		C	B	B	B	C	
Approach Delay (s)		17.5			50.3			19.4			24.0	
Approach LOS		B			D			B			C	

Intersection Summary				
HCM Average Control Delay	27.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.27			
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	86.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
44: Eucalyptus St & I-15 SB Ramps

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	1126	356	445	1949	0	0	0	435	0	80
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1224	387	484	2118	0	0	0	473	0	87
RTOR Reduction (vph)	0	0	230	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	0	1224	157	484	2118	0	0	0	473	0	70
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		36.5	36.5	26.1	66.6				15.4		15.4
Effective Green, g (s)		36.5	36.5	26.1	66.6				15.4		15.4
Actuated g/C Ratio		0.41	0.41	0.29	0.74				0.17		0.17
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1375	584	513	2619				587		271
v/s Ratio Prot		c0.36		c0.27	0.60						
v/s Ratio Perm			0.27						0.14		0.05
v/c Ratio		0.89	0.27	0.94	0.81				0.81		0.26
Uniform Delay, d1		24.9	17.8	31.2	7.6				35.9		32.3
Progression Factor		1.00	1.00	0.96	1.35				1.00		1.00
Incremental Delay, d2		7.6	0.2	4.1	0.2				11.3		2.3
Delay (s)		32.5	18.1	34.1	10.4				47.1		34.6
Level of Service		C	B	C	B				D		C
Approach Delay (s)		29.0			14.8		0.0			45.2	
Approach LOS		C			B		A			D	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
45: Eucalyptus St & I-15 NB

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		0.88
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		2787
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		2787
Volume (vph)	44	1516	0	0	2033	915	0	0	361	0	734
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	1648	0	0	2210	995	0	0	392	0	798
RTOR Reduction (vph)	0	0	0	0	0	360	0	0	0	0	57
Lane Group Flow (vph)	48	1648	0	0	2210	635	0	0	392	0	741
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	3.2	61.8			54.6	54.6			20.2		20.2
Effective Green, g (s)	3.2	61.8			54.6	54.6			20.2		20.2
Actuated g/C Ratio	0.04	0.69			0.61	0.61			0.22		0.22
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	63	2430			2147	960			397		626
v/s Ratio Prot	0.03	c0.47			0.62						
v/s Ratio Perm						0.63			0.22		0.29
v/c Ratio	0.76	0.68			1.03	0.66			0.99		1.18
Uniform Delay, d1	43.0	8.3			17.7	11.6			34.8		34.9
Progression Factor	0.85	2.35			1.00	1.00			1.00		1.00
Incremental Delay, d2	22.8	0.4			27.4	1.7			42.1		98.5
Delay (s)	59.3	19.8			45.1	13.3			76.9		133.4
Level of Service	E	B			D	B			E		F
Approach Delay (s)		20.9			35.2		0.0			114.8	
Approach LOS		C			D		A			F	

Intersection Summary			
HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
46: Eucalyptus St & Mariposa Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	5085	1583	1770	5085	1583
Volume (vph)	290	1208	751	208	839	53	1695	1211	148	9	1014	415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	1313	816	226	912	58	1842	1316	161	10	1102	451
RTOR Reduction (vph)	0	0	5	0	0	47	0	0	76	0	0	1
Lane Group Flow (vph)	315	1313	811	226	912	11	1842	1316	85	10	1102	450
Turn Type	Prot		pm+ov	Prot		Perm	Prot		Perm	Prot		pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	19.0	48.0	8.0	18.0	18.0	29.0	49.4	49.4	0.8	21.2	30.2
Effective Green, g (s)	9.0	19.0	48.0	8.0	18.0	18.0	29.0	49.4	49.4	0.8	21.2	30.2
Actuated g/C Ratio	0.10	0.20	0.52	0.09	0.19	0.19	0.31	0.53	0.53	0.01	0.23	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	332	1037	883	152	982	306	1068	2695	839	15	1157	581
v/s Ratio Prot	0.09	c0.26	c0.29	c0.13	0.18		c0.54	0.26		0.01	c0.22	0.07
v/s Ratio Perm			0.23			0.04			0.10			0.21
v/c Ratio	0.95	1.27	0.92	1.49	0.93	0.04	1.72	0.49	0.10	0.67	0.95	0.78
Uniform Delay, d1	41.9	37.1	20.8	42.6	37.0	30.6	32.1	13.9	10.9	46.1	35.5	28.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.7	127.5	14.1	250.7	14.4	0.0	330.1	0.1	0.1	75.9	16.3	6.4
Delay (s)	77.5	164.6	34.9	293.3	51.3	30.6	362.2	14.0	10.9	121.9	51.8	34.8
Level of Service	E	F	C	F	D	C	F	B	B	F	D	C
Approach Delay (s)		110.1			96.1			207.1			47.3	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM Average Control Delay	134.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
47: Eucalyptus St & Hesperia Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3515		3433	3434		1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3515		3433	3434		1770	3539	1583	3433	3539	1583
Volume (vph)	160	895	42	284	847	211	68	1233	206	226	1199	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	973	46	309	921	229	74	1340	224	246	1303	65
RTOR Reduction (vph)	0	4	0	0	25	0	0	0	140	0	0	40
Lane Group Flow (vph)	174	1016	0	309	1126	0	74	1340	84	246	1303	25
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	9.0	27.0		9.0	27.0		4.0	32.0	32.0	6.0	34.0	34.0
Effective Green, g (s)	9.0	27.0		9.0	27.0		4.0	32.0	32.0	6.0	34.0	34.0
Actuated g/C Ratio	0.10	0.30		0.10	0.30		0.04	0.36	0.36	0.07	0.38	0.38
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	177	1055		343	1030		79	1258	563	229	1337	598
v/s Ratio Prot	c0.10	0.29		0.09	c0.33		0.04	c0.38		c0.07	0.37	
v/s Ratio Perm									0.14			0.04
v/c Ratio	0.98	0.96		0.90	1.09		0.94	1.07	0.15	1.07	0.97	0.04
Uniform Delay, d1	40.4	31.0		40.1	31.5		42.9	29.0	19.7	42.0	27.6	17.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	62.3	19.2		25.5	56.8		79.2	44.7	0.1	80.6	18.7	0.0
Delay (s)	102.7	50.2		65.6	88.3		122.1	73.7	19.9	122.6	46.2	17.7
Level of Service	F	D		E	F		F	E	B	F	D	B
Approach Delay (s)		57.9			83.5			68.5			56.7	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM Average Control Delay	66.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
48: E Ave & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1844		1770	1860		1770	3419		1770	3479	
Flt Permitted	0.61	1.00		0.35	1.00		0.18	1.00		0.22	1.00	
Satd. Flow (perm)	1127	1844		647	1860		328	3419		401	3479	
Volume (vph)	170	365	27	133	204	2	8	696	203	1	911	116
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	397	29	145	222	2	9	757	221	1	990	126
RTOR Reduction (vph)	0	3	0	0	1	0	0	29	0	0	10	0
Lane Group Flow (vph)	185	423	0	145	223	0	9	949	0	1	1106	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.0	17.0		17.0	17.0		22.7	22.7		22.7	22.7	
Effective Green, g (s)	17.0	17.0		17.0	17.0		22.7	22.7		22.7	22.7	
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.48	0.48		0.48	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	657		231	663		156	1627		191	1656	
v/s Ratio Prot		c0.23			0.12			0.29			c0.32	
v/s Ratio Perm	0.16			0.22			0.03			0.00		
v/c Ratio	0.46	0.64		0.63	0.34		0.06	0.58		0.01	0.67	
Uniform Delay, d1	11.8	12.8		12.7	11.2		6.7	9.1		6.6	9.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	2.2		5.2	0.3		0.2	0.5		0.0	1.0	
Delay (s)	12.7	15.0		18.0	11.5		6.9	9.6		6.6	10.6	
Level of Service	B	B		B	B		A	A		A	B	
Approach Delay (s)		14.3			14.1			9.6			10.6	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
49: Eucalyptus St & I Avenue
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3409		1770	3505		1770	3474		1770	3369	
Flt Permitted	0.95	1.00		0.22	1.00		0.95	1.00		0.34	1.00	
Satd. Flow (perm)	1770	3409		414	3505		1770	3474		639	3369	
Volume (vph)	322	842	272	6	638	44	206	661	92	12	716	337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	350	915	296	7	693	48	224	718	100	13	778	366
RTOR Reduction (vph)	0	35	0	0	6	0	0	12	0	0	62	0
Lane Group Flow (vph)	350	1176	0	7	735	0	224	806	0	13	1082	0
Turn Type	Prot			Perm			Prot			Perm		
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8						6		
Actuated Green, G (s)	17.0	39.0		18.0	18.0		11.0	43.0		28.0	28.0	
Effective Green, g (s)	17.0	39.0		18.0	18.0		11.0	43.0		28.0	28.0	
Actuated g/C Ratio	0.19	0.43		0.20	0.20		0.12	0.48		0.31	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	1477		83	701		216	1660		199	1048	
v/s Ratio Prot	c0.20	0.36			c0.21		c0.13	0.24			c0.34	
v/s Ratio Perm				0.02						0.02		
v/c Ratio	1.05	0.80		0.08	1.05		1.04	0.49		0.07	1.03	
Uniform Delay, d1	36.5	22.1		29.3	36.0		39.5	16.0		21.8	31.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	62.3	3.1		0.4	47.6		71.2	0.2		0.1	36.5	
Delay (s)	98.8	25.1		29.7	83.6		110.7	16.2		21.9	67.5	
Level of Service	F	C		C	F		F	B		C	E	
Approach Delay (s)		41.7			83.1			36.5			67.0	
Approach LOS		D			F			D			E	

Intersection Summary			
HCM Average Control Delay	53.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
54: Ranchero Rd & Santa Fe Ave E — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5062		3433	4787		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.21	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5062		3433	4787		398	3539	1583
Volume (vph)	347	1702	1884	303	1008	31	1257	695	445	46	704	302
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	377	1850	2048	329	1096	34	1366	755	484	50	765	328
RTOR Reduction (vph)	0	0	646	0	3	0	0	115	0	0	0	135
Lane Group Flow (vph)	377	1850	1402	329	1127	0	1366	1124	0	50	765	193
Turn Type	Prot		Perm	Prot			Prot			Perm		Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4							6		6
Actuated Green, G (s)	13.0	31.0	31.0	7.0	25.0		25.0	48.0		19.0	19.0	19.0
Effective Green, g (s)	13.0	31.0	31.0	7.0	25.0		25.0	48.0		19.0	19.0	19.0
Actuated g/C Ratio	0.13	0.32	0.32	0.07	0.26		0.26	0.49		0.19	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	235	1609	882	245	1291		876	2345		77	686	307
v/s Ratio Prot	c0.21	0.36		0.10	0.22		c0.40	0.26			c0.22	
v/s Ratio Perm			0.73							0.13		0.21
v/c Ratio	1.60	1.15	1.59	1.34	0.87		1.56	0.48		0.65	1.12	0.63
Uniform Delay, d1	42.5	33.5	33.5	45.5	35.0		36.5	16.7		36.4	39.5	36.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	290.9	75.1	270.7	179.1	6.8		257.3	0.2		17.3	70.5	4.0
Delay (s)	333.4	108.6	304.2	224.6	41.8		293.8	16.8		53.7	110.0	40.2
Level of Service	F	F	F	F	D		F	B		D	F	D
Approach Delay (s)		222.1			83.0			162.1			87.5	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	168.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.78			
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	110.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
55: Sultana St & E Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3349		1770	3454		1770	3489		1770	3422	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3349		1770	3454		1770	3489		1770	3422	
Volume (vph)	245	614	341	37	344	66	282	552	57	251	831	235
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	667	371	40	374	72	307	600	62	273	903	255
RTOR Reduction (vph)	0	82	0	0	17	0	0	8	0	0	29	0
Lane Group Flow (vph)	266	956	0	40	429	0	307	654	0	273	1129	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.0	27.0		2.4	16.4		15.0	28.4		16.6	30.0	
Effective Green, g (s)	13.0	27.0		2.4	16.4		15.0	28.4		16.6	30.0	
Actuated g/C Ratio	0.14	0.30		0.03	0.18		0.17	0.31		0.18	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	1000		47	627		294	1096		325	1136	
v/s Ratio Prot	c0.15	c0.31		0.02	0.13		c0.17	0.19		0.15	c0.34	
v/s Ratio Perm												
v/c Ratio	1.04	0.96		0.85	0.68		1.04	0.60		0.84	0.99	
Uniform Delay, d1	38.7	31.1		43.8	34.6		37.7	26.2		35.6	30.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	68.1	18.6		77.3	3.1		64.5	0.9		17.1	25.1	
Delay (s)	106.8	49.7		121.1	37.7		102.2	27.0		52.7	55.2	
Level of Service	F	D		F	D		F	C		D	E	
Approach Delay (s)		61.3			44.5			50.9			54.7	
Approach LOS		E			D			D			D	

Intersection Summary				
HCM Average Control Delay	54.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	90.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
56: Sultana St & I Avenue

PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Volume (vph)	246	643	323	1124	1608	238
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	267	699	351	1222	1748	259
RTOR Reduction (vph)	0	464	0	0	0	101
Lane Group Flow (vph)	267	235	351	1222	1748	158
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	15.7	15.7	21.2	66.0	40.8	40.8
Effective Green, g (s)	15.7	15.7	21.2	66.0	40.8	40.8
Actuated g/C Ratio	0.18	0.18	0.24	0.74	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	310	277	418	2604	1610	720
v/s Ratio Prot			c0.20	0.35	c0.49	
v/s Ratio Perm	0.15	0.44				0.16
v/c Ratio	0.86	0.85	0.84	0.47	1.09	0.22
Uniform Delay, d1	35.9	35.8	32.6	4.8	24.5	14.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.9	20.6	13.8	0.6	49.6	0.7
Delay (s)	56.9	56.4	46.4	5.4	74.0	15.5
Level of Service	E	E	D	A	E	B
Approach Delay (s)	56.5			14.5	66.5	
Approach LOS	E			B	E	

Intersection Summary				
HCM Average Control Delay	46.4	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.31			
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	90.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
57: Joshua St & Hwy 395

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539		1770	3539	1583	1770	5085		3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539		1770	3539	1583	1770	5085		3433	5085	1583
Volume (vph)	540	1355	1	116	1198	375	52	2087	0	712	1173	337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	1473	1	126	1302	408	57	2268	0	774	1275	366
RTOR Reduction (vph)	0	0	0	0	0	130	0	0	0	0	0	224
Lane Group Flow (vph)	587	1474	0	126	1302	278	57	2268	0	774	1275	142
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7			3	8		5	2		1	6	
Permitted Phases		4				8			2			6
Actuated Green, G (s)	16.0	27.0		7.0	18.0	18.0	5.6	29.8		11.0	35.2	35.2
Effective Green, g (s)	16.0	27.0		7.0	18.0	18.0	5.6	29.8		11.0	35.2	35.2
Actuated g/C Ratio	0.18	0.30		0.08	0.20	0.20	0.06	0.33		0.12	0.39	0.39
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	312	1052		136	702	314	109	1669		416	1971	614
v/s Ratio Prot	c0.33			0.07	c0.37		0.03	c0.45		c0.23	0.25	
v/s Ratio Perm		0.42				0.26						0.23
v/c Ratio	1.88	1.40		0.93	1.85	0.89	0.52	1.36		1.86	0.65	0.23
Uniform Delay, d1	37.4	31.9		41.6	36.4	35.4	41.3	30.5		39.9	22.7	18.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	408.6	186.3		54.8	390.1	24.4	4.5	165.5		396.4	1.7	0.9
Delay (s)	446.0	218.2		96.4	426.5	59.8	45.8	196.0		436.3	24.4	19.6
Level of Service	F	F		F	F	E	D	F		F	C	B
Approach Delay (s)		283.1			322.3			192.3			155.7	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	231.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.66			
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	137.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
58: Main St. & I-15 NB Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Lane Util. Factor		0.91	1.00		0.91	1.00			1.00		1.00
Frt		1.00	0.85		1.00	0.85			1.00		0.85
Flt Protected		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (prot)		5085	1583		5085	1583			1770		1583
Flt Permitted		1.00	1.00		1.00	1.00			0.95		1.00
Satd. Flow (perm)		5085	1583		5085	1583			1770		1583
Volume (vph)	0	2512	285	0	2333	285	0	0	603	0	683
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2730	310	0	2536	310	0	0	655	0	742
RTOR Reduction (vph)	0	0	136	0	0	147	0	0	0	0	0
Lane Group Flow (vph)	0	2730	174	0	2536	163	0	0	655	0	742
Turn Type			Perm			Perm			custom		custom
Protected Phases		4			8						
Permitted Phases			4			8			2		2
Actuated Green, G (s)		44.0	44.0		44.0	44.0			38.0		38.0
Effective Green, g (s)		44.0	44.0		44.0	44.0			38.0		38.0
Actuated g/C Ratio		0.49	0.49		0.49	0.49			0.42		0.42
Clearance Time (s)		4.0	4.0		4.0	4.0			4.0		4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0			3.0		3.0
Lane Grp Cap (vph)		2486	774		2486	774			747		668
v/s Ratio Prot		c0.54			0.50						
v/s Ratio Perm			0.20			0.20			0.37		0.47
v/c Ratio		1.10	0.22		1.02	0.21			0.88		1.11
Uniform Delay, d1		23.0	13.2		23.0	13.1			23.9		26.0
Progression Factor		0.80	1.37		1.00	1.00			1.00		1.00
Incremental Delay, d2		44.9	0.0		23.3	0.1			13.7		69.3
Delay (s)		63.3	18.1		46.3	13.2			37.6		95.3
Level of Service		E	B		D	B			D		F
Approach Delay (s)		58.7			42.7		0.0			68.2	
Approach LOS		E			D		A			E	

Intersection Summary			
HCM Average Control Delay	54.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
59: Muscatel St & I-15 SB Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL2	SWL	SWR
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Lane Util. Factor		0.91	0.91	1.00	0.95				0.97		1.00
Frt		1.00	0.85	1.00	1.00				1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (prot)		3390	1441	1770	3539				3433		1583
Flt Permitted		1.00	1.00	0.95	1.00				0.95		1.00
Satd. Flow (perm)		3390	1441	1770	3539				3433		1583
Volume (vph)	0	1757	314	250	1466	0	0	0	599	0	254
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1910	341	272	1593	0	0	0	651	0	276
RTOR Reduction (vph)	0	0	143	0	0	0	0	0	0	0	46
Lane Group Flow (vph)	0	1910	198	272	1593	0	0	0	651	0	230
Turn Type			Perm	Prot					custom		custom
Protected Phases		4		3	8						
Permitted Phases			4						6		6
Actuated Green, G (s)		49.0	49.0	12.0	65.0				17.0		17.0
Effective Green, g (s)		49.0	49.0	12.0	65.0				17.0		17.0
Actuated g/C Ratio		0.54	0.54	0.13	0.72				0.19		0.19
Clearance Time (s)		4.0	4.0	4.0	4.0				4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0				3.0		3.0
Lane Grp Cap (vph)		1846	785	236	2556				648		299
v/s Ratio Prot		c0.56		c0.15	0.45						
v/s Ratio Perm			0.24						0.19		0.17
v/c Ratio		1.03	0.25	1.15	0.62				1.00		0.77
Uniform Delay, d1		20.5	10.8	39.0	6.3				36.5		34.6
Progression Factor		1.00	1.00	0.81	1.71				1.00		1.00
Incremental Delay, d2		30.5	0.2	89.3	0.2				36.5		17.2
Delay (s)		51.0	11.0	121.0	11.0				73.0		51.8
Level of Service		D	B	F	B				E		D
Approach Delay (s)		44.9			27.1		0.0			66.7	
Approach LOS		D			C		A			E	

Intersection Summary			
HCM Average Control Delay	42.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
60: Muscatel St & I-15 NB Ramp — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL2	NEL	NER
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Lane Util. Factor	1.00	0.95			0.95	1.00			1.00		1.00
Frt	1.00	1.00			1.00	0.85			1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (prot)	1770	3539			3539	1583			1770		1583
Flt Permitted	0.95	1.00			1.00	1.00			0.95		1.00
Satd. Flow (perm)	1770	3539			3539	1583			1770		1583
Volume (vph)	290	2050	0	0	1303	769	0	0	363	0	526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	2228	0	0	1416	836	0	0	395	0	572
RTOR Reduction (vph)	0	0	0	0	0	362	0	0	0	0	9
Lane Group Flow (vph)	315	2228	0	0	1416	474	0	0	395	0	563
Turn Type	Prot					Perm			custom		custom
Protected Phases	7	4			8						
Permitted Phases						8			2		2
Actuated Green, G (s)	16.0	61.0			41.0	41.0			21.0		21.0
Effective Green, g (s)	16.0	61.0			41.0	41.0			21.0		21.0
Actuated g/C Ratio	0.18	0.68			0.46	0.46			0.23		0.23
Clearance Time (s)	4.0	4.0			4.0	4.0			4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	315	2399			1612	721			413		369
v/s Ratio Prot	0.18	c0.63			0.40						
v/s Ratio Perm						0.53			0.22		0.36
v/c Ratio	1.00	0.93			0.88	0.66			0.96		1.53
Uniform Delay, d1	37.0	12.6			22.2	19.1			34.0		34.5
Progression Factor	0.78	1.16			1.00	1.00			1.00		1.00
Incremental Delay, d2	15.2	0.7			5.8	2.2			34.6		249.7
Delay (s)	44.2	15.3			28.0	21.2			68.6		284.2
Level of Service	D	B			C	C			E		F
Approach Delay (s)		18.9			25.5		0.0			196.2	
Approach LOS		B			C		A			F	

Intersection Summary			
HCM Average Control Delay	51.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
70: Poplar St & Hwy 395 — PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.91		0.97	0.91
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5060		3433	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5060		3433	5085
Volume (vph)	181	291	3065	104	586	2217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	316	3332	113	637	2410
RTOR Reduction (vph)	0	193	4	0	0	0
Lane Group Flow (vph)	197	123	3441	0	637	2410
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	13.6	13.6	49.1		13.0	66.1
Effective Green, g (s)	13.6	13.6	49.1		13.0	66.1
Actuated g/C Ratio	0.16	0.16	0.56		0.15	0.75
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	274	245	2833		509	3833
v/s Ratio Prot	0.11		c0.68		c0.19	0.47
v/s Ratio Perm		0.20				
v/c Ratio	0.72	0.50	1.21		1.25	0.63
Uniform Delay, d1	35.2	33.9	19.3		37.4	5.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	8.7	1.6	100.1		128.6	0.3
Delay (s)	43.9	35.5	119.4		166.0	5.4
Level of Service	D	D	F		F	A
Approach Delay (s)	38.8		119.4			39.0
Approach LOS	D		F			D

Intersection Summary			
HCM Average Control Delay	78.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
73: Muscatel St & Maple Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3356		1770	3474		1770	3503		1770	3455	
Flt Permitted	0.41	1.00		0.15	1.00		0.13	1.00		0.26	1.00	
Satd. Flow (perm)	764	3356		282	3474		233	3503		489	3455	
Volume (vph)	306	542	285	31	372	52	183	747	54	60	1007	189
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	333	589	310	34	404	57	199	812	59	65	1095	205
RTOR Reduction (vph)	0	51	0	0	12	0	0	6	0	0	17	0
Lane Group Flow (vph)	333	848	0	34	449	0	199	865	0	65	1283	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.0	32.0		32.0	32.0		50.0	50.0		50.0	50.0	
Effective Green, g (s)	32.0	32.0		32.0	32.0		50.0	50.0		50.0	50.0	
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.56	0.56		0.56	0.56	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	272	1193		100	1235		129	1946		272	1919	
v/s Ratio Prot		0.27			0.13			0.25			0.38	
v/s Ratio Perm	c0.44			0.12			c0.85			0.13		
v/c Ratio	1.22	0.71		0.34	0.36		1.54	0.44		0.24	0.67	
Uniform Delay, d1	29.0	25.0		21.3	21.5		20.0	11.8		10.2	14.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	129.1	2.0		2.0	0.2		278.9	0.2		0.5	0.9	
Delay (s)	158.1	27.0		23.3	21.6		298.9	12.0		10.7	15.0	
Level of Service	F	C		C	C		F	B		B	B	
Approach Delay (s)		62.5			21.8			65.3			14.8	
Approach LOS		E			C			E			B	

Intersection Summary				
HCM Average Control Delay	42.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.42			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	86.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
74: Main St. & Cottonwood Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	1.00	1.00	0.97	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5064		1770	5085	1583	1770	1863	1583	3433	3424	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.44	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	5064		1770	5085	1583	815	1863	1583	3433	3424	
Volume (vph)	356	2459	72	101	2373	344	43	435	120	485	410	114
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	387	2673	78	110	2579	374	47	473	130	527	446	124
RTOR Reduction (vph)	0	3	0	0	0	174	0	0	86	0	28	0
Lane Group Flow (vph)	387	2748	0	110	2579	200	47	473	44	527	542	0
Turn Type	Prot			Prot		Perm	Perm		Perm	Prot		
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases						8	2		2			
Actuated Green, G (s)	12.0	39.0		5.0	32.0	32.0	21.0	21.0	21.0	9.0	34.0	
Effective Green, g (s)	12.0	39.0		5.0	32.0	32.0	21.0	21.0	21.0	9.0	34.0	
Actuated g/C Ratio	0.13	0.43		0.06	0.36	0.36	0.23	0.23	0.23	0.10	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	236	2194		98	1808	563	190	435	369	343	1294	
v/s Ratio Prot	c0.22	0.54		0.06	c0.51			c0.25		c0.15	0.17	
v/s Ratio Perm						0.24	0.06		0.08			
v/c Ratio	1.64	1.25		1.12	1.43	0.36	0.25	1.09	0.12	1.54	0.42	
Uniform Delay, d1	39.0	25.5		42.5	29.0	21.4	28.1	34.5	27.2	40.5	20.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	306.3	117.5		127.7	195.2	0.4	0.7	68.8	0.1	255.6	0.2	
Delay (s)	345.3	143.0		170.2	224.2	21.8	28.8	103.3	27.4	296.1	20.9	
Level of Service	F	F		F	F	C	C	F	C	F	C	
Approach Delay (s)		167.9			197.5			82.7			153.1	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	170.3	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.38			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	115.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
75: Main St. & 7th Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	2787
Volume (vph)	301	2069	526	9	1862	116	360	469	7	90	600	383
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	327	2249	572	10	2024	126	391	510	8	98	652	416
RTOR Reduction (vph)	0	0	178	0	0	50	0	0	6	0	0	122
Lane Group Flow (vph)	327	2249	394	10	2024	76	391	510	2	98	652	294
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	51.4	51.4	0.8	45.2	45.2	8.0	18.0	18.0	7.0	17.0	17.0
Effective Green, g (s)	7.0	51.4	51.4	0.8	45.2	45.2	8.0	18.0	18.0	7.0	17.0	17.0
Actuated g/C Ratio	0.08	0.55	0.55	0.01	0.48	0.48	0.09	0.19	0.19	0.08	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	1952	873	15	1716	768	295	683	306	133	646	508
v/s Ratio Prot	c0.10	c0.64		0.01	0.57		c0.11	0.14		0.06	c0.18	
v/s Ratio Perm			0.36			0.08			0.01			0.15
v/c Ratio	1.27	1.15	0.45	0.67	1.18	0.10	1.33	0.75	0.01	0.74	1.01	0.58
Uniform Delay, d1	43.1	20.9	12.5	46.1	24.0	13.0	42.6	35.5	30.4	42.2	38.1	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	147.4	74.9	0.4	75.9	87.2	0.1	168.1	4.5	0.0	19.0	37.7	1.6
Delay (s)	190.5	95.8	12.9	121.9	111.2	13.0	210.7	39.9	30.4	61.2	75.8	36.4
Level of Service	F	F	B	F	F	B	F	D	C	E	E	D
Approach Delay (s)		90.5			105.5			113.3			60.5	
Approach LOS		F			F			F			E	

Intersection Summary				
HCM Average Control Delay	93.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.13			
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	100.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
76: Main St. & Peach Ave

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5014		1770	4952		1770	3539	1583	1770	3366	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	1770	5014		1770	4952		1770	3539	1583	823	3366	
Volume (vph)	145	1385	142	434	958	202	81	210	455	331	275	133
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	1505	154	472	1041	220	88	228	495	360	299	145
RTOR Reduction (vph)	0	13	0	0	34	0	0	0	330	0	65	0
Lane Group Flow (vph)	158	1646	0	472	1227	0	88	228	165	360	379	0
Turn Type	Prot			Prot			Prot		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)	12.3	27.1		22.0	36.8		5.5	13.9	13.9	26.4	17.4	
Effective Green, g (s)	12.3	27.1		22.0	36.8		5.5	13.9	13.9	26.4	17.4	
Actuated g/C Ratio	0.14	0.31		0.25	0.42		0.06	0.16	0.16	0.30	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	247	1544		443	2071		111	559	250	344	666	
v/s Ratio Prot	0.09	c0.33		c0.27	0.25		0.05	0.06		c0.11	0.13	
v/s Ratio Perm									0.31	0.21		
v/c Ratio	0.64	1.07		1.07	0.59		0.79	0.41	0.66	1.05	0.57	
Uniform Delay, d1	35.8	30.4		33.0	19.8		40.7	33.3	34.8	29.5	31.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.4	42.8		61.3	0.5		31.0	0.5	6.2	61.2	1.1	
Delay (s)	41.1	73.2		94.3	20.3		71.7	33.8	41.0	90.7	33.0	
Level of Service	D	E		F	C		E	C	D	F	C	
Approach Delay (s)		70.4			40.4			42.3			58.9	
Approach LOS		E			D			D			E	

Intersection Summary				
HCM Average Control Delay	54.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	91.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
77: Danbury Ave & I Avenue — PM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.97		1.00	0.95		1.00	0.95		1.00	0.88	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.85	
Flt Protected	0.95	0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3409		1770	3514		1770	3475		1770	2787	
Flt Permitted	0.20	0.96		0.15	1.00		0.95	1.00		0.25	1.00	
Satd. Flow (perm)	378	3409		276	3514		1770	3475		457	2787	
Volume (vph)	18	639	64	14	789	39	51	1102	151	54	689	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	695	70	15	858	42	55	1198	164	59	749	18
RTOR Reduction (vph)	0	11	0	0	3	0	0	10	0	0	2	0
Lane Group Flow (vph)	20	754	0	15	897	0	55	1352	0	59	765	0
Turn Type	Perm			Perm			Prot			custom		
Protected Phases		8			2		1	6				
Permitted Phases	8			2						4	4	
Actuated Green, G (s)	22.6	22.6		27.0	27.0		2.0	33.0		22.6	22.6	
Effective Green, g (s)	22.6	22.6		27.0	27.0		2.0	33.0		22.6	22.6	
Actuated g/C Ratio	0.36	0.36		0.42	0.42		0.03	0.52		0.36	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	1211		117	1492		56	1803		162	990	
v/s Ratio Prot		0.22			0.26		0.03	c0.39				
v/s Ratio Perm	0.05			0.05						0.13	0.28	
v/c Ratio	0.15	0.62		0.13	0.60		0.98	0.75		0.36	0.77	
Uniform Delay, d1	14.0	17.0		11.1	14.1		30.8	12.0		15.2	18.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.0		0.5	0.7		113.3	1.8		1.4	3.8	
Delay (s)	14.5	18.0		11.6	14.8		144.1	13.8		16.6	22.0	
Level of Service	B	B		B	B		F	B		B	C	
Approach Delay (s)		17.9			14.8			18.9		21.6		
Approach LOS		B			B			B		C		

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

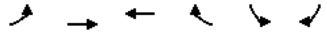
Hesperia GP Update
78: Ranchero Rd & Danbury Ave — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.99		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	4821		1770	5014		1770	3285		1770	3221	
Flt Permitted	0.95	1.00		0.95	1.00		0.15	1.00		0.46	1.00	
Satd. Flow (perm)	3433	4821		1770	5014		282	3285		848	3221	
Volume (vph)	858	786	417	208	523	54	321	212	194	144	420	627
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	933	854	453	226	568	59	349	230	211	157	457	682
RTOR Reduction (vph)	0	107	0	0	14	0	0	149	0	0	299	0
Lane Group Flow (vph)	933	1200	0	226	613	0	349	292	0	157	840	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	23.0	26.2		12.0	15.2		38.4	26.4		31.6	23.0	
Effective Green, g (s)	23.0	26.2		12.0	15.2		38.4	26.4		31.6	23.0	
Actuated g/C Ratio	0.26	0.29		0.13	0.17		0.43	0.30		0.35	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	885	1416		238	854		322	972		389	831	
v/s Ratio Prot	c0.27	c0.27		0.13	0.13		c0.15	0.13		0.04	c0.35	
v/s Ratio Perm							0.32			0.10		
v/c Ratio	1.05	0.85		0.95	0.72		1.08	0.30		0.40	1.01	
Uniform Delay, d1	33.1	29.6		38.3	35.0		40.8	24.3		20.4	33.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	45.6	4.9		43.9	2.9		74.4	0.2		0.7	33.9	
Delay (s)	78.7	34.5		82.2	37.9		115.2	24.4		21.1	67.0	
Level of Service	E	C		F	D		F	C		C	E	
Approach Delay (s)		52.9			49.6			64.5			61.4	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM Average Control Delay	56.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

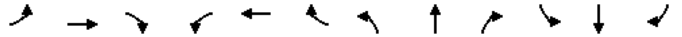
Appendix B-5

- **Preferred Scenario**



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0
Lane Util. Factor		0.91	0.91	1.00		1.00
Frt		1.00	1.00	0.85		0.86
Flt Protected		1.00	1.00	1.00		1.00
Satd. Flow (prot)		5085	5085	1583		1611
Flt Permitted		1.00	1.00	1.00		1.00
Satd. Flow (perm)		5085	5085	1583		1611
Volume (vph)	0	254	2227	26	0	1588
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	276	2421	28	0	1726
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	276	2421	28	0	1726
Turn Type				Free		Free
Protected Phases		4	8			
Permitted Phases				Free		Free
Actuated Green, G (s)		34.2	34.2	34.2		34.2
Effective Green, g (s)		34.2	34.2	34.2		34.2
Actuated g/C Ratio		1.00	1.00	1.00		1.00
Clearance Time (s)		4.0	4.0			
Vehicle Extension (s)		3.0	3.0			
Lane Grp Cap (vph)		5085	5085	1583		1611
v/s Ratio Prot		0.05	0.48			
v/s Ratio Perm				0.02		1.07
v/c Ratio		0.05	0.48	0.02		1.07
Uniform Delay, d1		0.0	0.0	0.0		17.1
Progression Factor		1.00	1.00	1.00		1.00
Incremental Delay, d2		0.0	0.1	0.0		44.3
Delay (s)		0.0	0.1	0.0		61.4
Level of Service		A	A	A		E
Approach Delay (s)		0.0	0.1		61.4	
Approach LOS		A	A		E	

Intersection Summary				
HCM Average Control Delay	23.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	34.2	Sum of lost time (s)	0.0	
Intersection Capacity Utilization	46.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



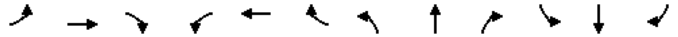
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		0.97	0.95					1.00		1.00
Frt		0.91		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3213		3433	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3213		3433	3539					1770		1583
Volume (vph)	0	168	269	1987	182	0	0	0	0	38	0	131
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	183	292	2160	198	0	0	0	0	41	0	142
RTOR Reduction (vph)	0	192	0	0	0	0	0	0	0	0	0	129
Lane Group Flow (vph)	0	283	0	2160	198	0	0	0	0	41	0	13
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		13.5		74.1	91.6					10.4		10.4
Effective Green, g (s)		13.5		74.1	91.6					10.4		10.4
Actuated g/C Ratio		0.12		0.67	0.83					0.09		0.09
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		394		2313	2947					167		150
v/s Ratio Prot		c0.15		c0.63	0.06					0.02		
v/s Ratio Perm												0.09
v/c Ratio		0.72		0.93	0.07					0.25		0.09
Uniform Delay, d1		46.4		15.8	1.6					46.2		45.5
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		6.1		7.7	0.0					0.8		1.2
Delay (s)		52.6		23.5	1.6					46.9		46.7
Level of Service		D		C	A					D		D
Approach Delay (s)		52.6			21.7			0.0			46.7	
Approach LOS		D			C			A			D	

Intersection Summary				
HCM Average Control Delay	28.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	83.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	5085	5085	1583
Volume (vph)	272	47	29	89	80	96
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	51	32	97	87	104
RTOR Reduction (vph)	0	41	0	0	0	50
Lane Group Flow (vph)	296	10	32	97	87	54
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	9.4	9.4	2.6	32.6	26.0	26.0
Effective Green, g (s)	9.4	9.4	2.6	32.6	26.0	26.0
Actuated g/C Ratio	0.19	0.19	0.05	0.65	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	645	298	179	3315	2644	823
v/s Ratio Prot	c0.09		c0.01	0.02	0.02	
v/s Ratio Perm		0.03				0.07
v/c Ratio	0.46	0.03	0.18	0.03	0.03	0.07
Uniform Delay, d1	18.0	16.6	22.7	3.1	5.9	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.0	0.5	0.0	0.0	0.2
Delay (s)	18.6	16.6	23.2	3.1	5.9	6.1
Level of Service	B	B	C	A	A	A
Approach Delay (s)	18.3			8.1	6.0	
Approach LOS	B			A	A	

Intersection Summary				
HCM Average Control Delay	12.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.21			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	21.9%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		0.97	0.86	0.86	0.97	0.95	0.95	0.97	0.95	0.95
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.89	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	4953		3433	4801	1362	3433	1579	1504	3433	1770	1504
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	4953		3433	4801	1362	3433	1579	1504	3433	1770	1504
Volume (vph)	131	2094	441	756	1495	596	143	41	303	410	63	68
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	2276	479	822	1625	648	155	45	329	446	68	74
RTOR Reduction (vph)	0	22	0	0	0	238	0	63	196	0	0	65
Lane Group Flow (vph)	142	2733	0	822	1637	398	155	96	19	446	68	9
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	16.4	70.0		34.6	88.2	88.2	10.5	13.4	13.4	16.0	18.9	18.9
Effective Green, g (s)	16.4	70.0		34.6	88.2	88.2	10.5	13.4	13.4	16.0	18.9	18.9
Actuated g/C Ratio	0.11	0.47		0.23	0.59	0.59	0.07	0.09	0.09	0.11	0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	2311		792	2823	801	240	141	134	366	223	190
v/s Ratio Prot	0.08	c0.56		c0.24	0.34		0.05	0.10		c0.13	0.04	
v/s Ratio Perm						0.47			0.14			0.05
v/c Ratio	0.73	1.18		1.04	0.58	0.50	0.65	0.68	0.14	1.22	0.30	0.05
Uniform Delay, d1	64.7	40.0		57.7	19.3	18.0	67.9	66.2	63.0	67.0	59.6	57.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	87.0		42.2	0.3	0.5	5.9	23.5	2.2	120.7	3.5	0.5
Delay (s)	78.0	127.0		99.9	19.6	18.5	73.8	89.7	65.2	187.7	63.1	58.1
Level of Service	E	F		F	B	B	E	F	E	F	E	E
Approach Delay (s)		124.6			40.7			75.1			157.0	
Approach LOS		F			D			E			F	

Intersection Summary				
HCM Average Control Delay	87.1	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.20			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	105.3%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91	0.88	0.97	0.91					0.95	0.91	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		5085	2787	3433	5085					1681	1441	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		5085	2787	3433	5085					1681	1441	1504
Volume (vph)	0	974	1833	368	1952	0	0	0	0	276	0	895
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1059	1992	400	2122	0	0	0	0	300	0	973
RTOR Reduction (vph)	0	0	892	0	0	0	0	0	0	0	3	3
Lane Group Flow (vph)	0	1059	1100	400	2122	0	0	0	0	300	483	484
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases			4									6
Actuated Green, G (s)		31.0	31.0	9.3	44.3					27.7	27.7	27.7
Effective Green, g (s)		31.0	31.0	9.3	44.3					27.7	27.7	27.7
Actuated g/C Ratio		0.39	0.39	0.12	0.55					0.35	0.35	0.35
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1970	1080	399	2816					582	499	521
v/s Ratio Prot		0.21		c0.12	0.42					0.18	c0.34	
v/s Ratio Perm			0.71									0.32
v/c Ratio		0.54	1.02	1.00	0.75					0.52	0.97	0.93
Uniform Delay, d1		19.0	24.5	35.4	13.7					20.8	25.7	25.2
Progression Factor		1.00	1.00	0.75	1.95					1.00	1.00	1.00
Incremental Delay, d2		0.3	32.2	31.4	0.6					0.8	33.0	25.2
Delay (s)		19.2	56.7	57.8	27.2					21.6	58.7	50.4
Level of Service		B	E	E	C					C	E	D
Approach Delay (s)		43.7			32.1			0.0			46.8	
Approach LOS		D			C			A			D	

Intersection Summary				
HCM Average Control Delay	40.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.37			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	101.4%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	0.97	0.91			0.91	1.00	0.95	0.91	0.95			
Frt	1.00	1.00			1.00	0.85	1.00	0.97	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (prot)	3433	5085			5085	1583	1681	1583	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (perm)	3433	5085			5085	1583	1681	1583	1504			
Volume (vph)	464	786	0	0	2052	384	269	0	234	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	504	854	0	0	2230	417	292	0	254	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	219	0	10	169	0	0	0
Lane Group Flow (vph)	504	854	0	0	2230	198	156	158	53	0	0	0
Turn Type	Prot					Perm	Prot		Perm			
Protected Phases	7	4			8		5	2				
Permitted Phases						8			2			
Actuated Green, G (s)	13.0	55.0			38.0	38.0	17.0	17.0	17.0			
Effective Green, g (s)	13.0	55.0			38.0	38.0	17.0	17.0	17.0			
Actuated g/C Ratio	0.16	0.69			0.48	0.48	0.21	0.21	0.21			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	558	3496			2415	752	357	336	320			
v/s Ratio Prot	c0.15	0.17			c0.44		0.09	0.11				
v/s Ratio Perm						0.26			0.15			
v/c Ratio	0.90	0.24			0.92	0.26	0.44	0.47	0.16			
Uniform Delay, d1	32.9	4.7			19.6	12.6	27.3	27.6	25.7			
Progression Factor	1.06	0.71			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	15.9	0.0			6.6	0.2	0.9	1.0	1.1			
Delay (s)	50.7	3.4			26.2	12.8	28.2	28.6	26.8			
Level of Service	D	A			C	B	C	C	C			
Approach Delay (s)		20.9			24.1			27.8			0.0	
Approach LOS		C			C			C			A	

Intersection Summary				
HCM Average Control Delay	23.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	101.4%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91		0.97	0.86	0.86	0.97	0.91	1.00
Frt	1.00	0.92	0.85	1.00	1.00		1.00	0.90	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	4438	1362	3433	5085		3433	4306	1362	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	4438	1362	3433	5085		3433	4306	1362	3433	5085	1583
Volume (vph)	97	299	625	891	1689	0	477	56	254	4	1304	354
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	325	679	968	1836	0	518	61	276	4	1417	385
RTOR Reduction (vph)	0	155	155	0	0	0	0	81	81	0	0	294
Lane Group Flow (vph)	105	509	185	968	1836	0	518	118	57	4	1417	91
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			
Actuated Green, G (s)	7.0	16.0	16.0	26.0	35.0		14.0	41.2	41.2	0.8	28.0	7.0
Effective Green, g (s)	7.0	16.0	16.0	26.0	35.0		14.0	41.2	41.2	0.8	28.0	7.0
Actuated g/C Ratio	0.07	0.16	0.16	0.26	0.35		0.14	0.41	0.41	0.01	0.28	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	710	218	893	1780		481	1774	561	27	1424	111
v/s Ratio Prot	0.03	0.15		c0.28	0.36		c0.15	0.05		0.00	c0.28	c0.24
v/s Ratio Perm			0.25						0.10			
v/c Ratio	0.44	0.86dr	0.85	1.08	1.03		1.08	0.07	0.10	0.15	1.00	0.82
Uniform Delay, d1	44.6	39.8	40.8	37.0	32.5		43.0	17.8	18.0	49.3	35.9	45.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	3.5	24.9	55.5	29.9		63.3	0.1	0.4	2.5	22.7	36.4
Delay (s)	45.9	43.3	65.7	92.5	62.4		106.3	17.8	18.4	51.8	58.6	82.3
Level of Service	D	D	E	F	E		F	B	B	D	E	F
Approach Delay (s)		50.4			72.8			71.5			63.7	
Approach LOS		D			E			E			E	

Intersection Summary				
HCM Average Control Delay	66.3	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service	E	
Analysis Period (min)	15			

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5040		1770	5026		1770	3493		1770	3380	
Flt Permitted	0.95	1.00		0.95	1.00		0.65	1.00		0.52	1.00	
Satd. Flow (perm)	1770	5040		1770	5026		1215	3493		969	3380	
Volume (vph)	33	599	38	20	2038	173	50	278	27	51	101	43
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	651	41	22	2215	188	54	302	29	55	110	47
RTOR Reduction (vph)	0	9	0	0	14	0	0	13	0	0	38	0
Lane Group Flow (vph)	36	683	0	22	2389	0	54	318	0	55	119	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	1.4	29.9		0.7	29.2		9.8	9.8		9.8	9.8	
Effective Green, g (s)	1.4	29.9		0.7	29.2		9.8	9.8		9.8	9.8	
Actuated g/C Ratio	0.03	0.57		0.01	0.56		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	47	2876		24	2801		227	653		181	632	
v/s Ratio Prot	c0.02	0.14		0.01	c0.48			c0.09			0.05	
v/s Ratio Perm							0.04			0.06		
v/c Ratio	0.77	0.24		0.92	0.85		0.24	0.49		0.30	0.19	
Uniform Delay, d1	25.3	5.6		25.8	9.8		18.1	19.1		18.4	17.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.3	0.0		145.1	2.7		0.5	0.6		1.0	0.1	
Delay (s)	77.6	5.6		170.9	12.5		18.7	19.6		19.3	18.1	
Level of Service	E	A		F	B		B	B		B	B	
Approach Delay (s)		9.2			13.9			19.5			18.4	
Approach LOS		A			B			B			B	

Intersection Summary				
HCM Average Control Delay	13.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	52.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Hesperia GP Update
14: Ranchero Rd & Maple Ave

7/9/2009
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4983		1770	5032		1770	3509		1770	3325	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4983		1770	5032		1770	3509		1770	3325	
Volume (vph)	27	634	98	45	1713	130	194	256	16	57	388	263
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	689	107	49	1862	141	211	278	17	62	422	286
RTOR Reduction (vph)	0	26	0	0	11	0	0	5	0	0	102	0
Lane Group Flow (vph)	29	770	0	49	1992	0	211	290	0	62	606	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.5	30.2		3.5	32.2		10.8	24.7		4.0	17.9	
Effective Green, g (s)	1.5	30.2		3.5	32.2		10.8	24.7		4.0	17.9	
Actuated g/C Ratio	0.02	0.39		0.04	0.41		0.14	0.32		0.05	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	34	1919		79	2067		244	1106		90	759	
v/s Ratio Prot	0.02	0.16		c0.03	c0.40		c0.12	0.08		0.04	c0.21	
v/s Ratio Perm												
v/c Ratio	0.85	0.40		0.62	0.96		0.86	0.26		0.69	0.80	
Uniform Delay, d1	38.3	17.5		36.8	22.5		33.1	20.0		36.6	28.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	95.5	0.1		14.2	12.4		25.7	0.1		19.7	5.9	
Delay (s)	133.9	17.7		51.0	34.9		58.8	20.2		56.3	34.4	
Level of Service	F	B		D	C		E	C		E	C	
Approach Delay (s)		21.7			35.3			36.3			36.2	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	78.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
15: Ranchero Rd & I Avenue

7/9/2009
AM Peak Hour

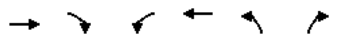
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.94		1.00	0.99		1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4801		1770	3516		1770	4838		1770	3387	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4801		1770	3516		1770	4838		1770	3387	
Volume (vph)	375	374	223	257	440	20	176	366	176	45	420	169
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	408	407	242	279	478	22	191	398	191	49	457	184
RTOR Reduction (vph)	0	133	0	0	4	0	0	99	0	0	56	0
Lane Group Flow (vph)	408	516	0	279	496	0	191	490	0	49	585	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	16.2	16.3		14.1	14.2		10.5	20.4		7.4	17.3	
Effective Green, g (s)	16.2	16.3		14.1	14.2		10.5	20.4		7.4	17.3	
Actuated g/C Ratio	0.22	0.22		0.19	0.19		0.14	0.27		0.10	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	386	1055		336	673		250	1330		177	790	
v/s Ratio Prot	c0.23	0.14		0.16	c0.14		c0.11	c0.12		0.03	c0.19	
v/s Ratio Perm												
v/c Ratio	1.06	0.49		0.83	0.74		0.76	0.37		0.28	0.74	
Uniform Delay, d1	29.0	25.3		28.9	28.2		30.7	21.7		30.9	26.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	61.6	0.4		15.8	4.2		13.0	0.2		0.9	3.8	
Delay (s)	90.6	25.7		44.7	32.5		43.6	21.9		31.8	30.1	
Level of Service	F	C		D	C		D	C		C	C	
Approach Delay (s)		50.7			36.8			27.2			30.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	37.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.99		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1760		1770	5085	3470	
Flt Permitted	0.96		0.34	1.00	1.00	
Satd. Flow (perm)	1760		633	5085	3470	
Volume (vph)	108	11	16	369	636	95
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	12	17	401	691	103
RTOR Reduction (vph)	6	0	0	0	9	0
Lane Group Flow (vph)	123	0	17	401	785	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	8.6		31.2	31.2	31.2	
Effective Green, g (s)	8.6		31.2	31.2	31.2	
Actuated g/C Ratio	0.18		0.65	0.65	0.65	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	317		413	3319	2265	
v/s Ratio Prot				0.08	c0.23	
v/s Ratio Perm	0.07		0.03			
v/c Ratio	0.39		0.04	0.12	0.35	
Uniform Delay, d1	17.3		3.0	3.1	3.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.8		0.0	0.0	0.1	
Delay (s)	18.1		3.0	3.1	3.8	
Level of Service	B		A	A	A	
Approach Delay (s)	18.1			3.1	3.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	5.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.93		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3290		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3290		1770	3539	1770	1583
Volume (vph)	424	374	430	1251	26	181
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	461	407	467	1360	28	197
RTOR Reduction (vph)	203	0	0	0	0	172
Lane Group Flow (vph)	665	0	467	1360	28	25
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	17.5		21.1	42.6	7.5	7.5
Effective Green, g (s)	17.5		21.1	42.6	7.5	7.5
Actuated g/C Ratio	0.30		0.36	0.73	0.13	0.13
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	991		643	2595	228	204
v/s Ratio Prot	c0.26		c0.26	0.38	0.02	
v/s Ratio Perm						0.12
v/c Ratio	0.67		0.73	0.52	0.12	0.12
Uniform Delay, d1	17.8		16.0	3.4	22.4	22.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8		4.1	0.2	0.2	0.3
Delay (s)	19.6		20.1	3.6	22.6	22.7
Level of Service	B		C	A	C	C
Approach Delay (s)	19.6			7.8	22.7	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	0.92		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3273		3433	3459		3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3273		3433	3459		3433	5085	1583	3433	5085	1583
Volume (vph)	261	298	299	183	1255	224	125	199	16	52	934	525
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	284	324	325	199	1364	243	136	216	17	57	1015	571
RTOR Reduction (vph)	0	85	0	0	12	0	0	0	13	0	0	184
Lane Group Flow (vph)	284	564	0	199	1595	0	136	216	4	57	1015	387
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	14.2	56.2		12.0	54.0		5.0	30.9	30.9	4.0	29.9	29.9
Effective Green, g (s)	14.2	56.2		12.0	54.0		5.0	30.9	30.9	4.0	29.9	29.9
Actuated g/C Ratio	0.12	0.47		0.10	0.45		0.04	0.26	0.26	0.03	0.25	0.25
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	409	1544		346	1568		144	1319	411	115	1277	397
v/s Ratio Prot	c0.08	0.20		0.06	c0.46		c0.04	0.04		0.02	0.20	
v/s Ratio Perm									0.01			0.36
v/c Ratio	0.69	0.37		0.58	1.02		0.94	0.16	0.01	0.50	0.79	0.97
Uniform Delay, d1	50.4	20.1		51.1	32.5		56.9	34.1	32.7	56.6	41.7	44.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.1		2.3	27.1		57.9	0.1	0.0	3.3	3.5	38.1
Delay (s)	55.4	20.2		53.4	59.7		114.8	34.2	32.8	59.9	45.2	82.3
Level of Service	E	C		D	E		F	C	C	E	D	F
Approach Delay (s)		30.9			59.0			63.8			58.6	
Approach LOS		C			E			E			E	

Intersection Summary			
HCM Average Control Delay	53.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	119.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	0.96		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3346		1770	3388		1770	3528		1770	3377	
Flt Permitted	0.13	1.00		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	250	3346		1092	3388		1770	3528		1770	3377	
Volume (vph)	87	157	90	197	908	361	212	557	12	116	423	187
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	171	98	214	987	392	230	605	13	126	460	203
RTOR Reduction (vph)	0	54	0	0	62	0	0	2	0	0	52	0
Lane Group Flow (vph)	95	215	0	214	1317	0	230	616	0	126	611	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.8	29.8		29.8	29.8		9.1	20.0		5.3	16.2	
Effective Green, g (s)	29.8	29.8		29.8	29.8		9.1	20.0		5.3	16.2	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.14	0.30		0.08	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	111	1486		485	1505		240	1052		140	815	
v/s Ratio Prot		0.08			c0.41		c0.13	c0.18		0.07	c0.20	
v/s Ratio Perm	0.38			0.20								
v/c Ratio	0.86	0.14		0.44	0.88		0.96	0.59		0.90	0.75	
Uniform Delay, d1	16.7	11.1		12.9	17.0		28.8	20.0		30.6	23.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	43.7	0.0		0.6	6.0		46.0	0.8		47.4	3.9	
Delay (s)	60.4	11.1		13.5	23.0		74.8	20.9		78.0	27.5	
Level of Service	E	B		B	C		E	C		E	C	
Approach Delay (s)		24.0			21.7			35.5			35.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Volume (vph)	554	219	359	274	433	635
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	602	238	390	298	471	690
RTOR Reduction (vph)	0	0	0	246	0	483
Lane Group Flow (vph)	602	238	390	52	471	207
Turn Type	Prot			Perm		custom
Protected Phases	1		2			
Permitted Phases		6		2	8	8
Actuated Green, G (s)	16.1	10.7	14.1	14.1	24.4	24.4
Effective Green, g (s)	16.1	10.7	14.1	14.1	24.4	24.4
Actuated g/C Ratio	0.20	0.13	0.17	0.17	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	680	466	614	275	531	475
v/s Ratio Prot	c0.18		0.11			
v/s Ratio Perm		0.07		0.19	0.27	0.44
v/c Ratio	0.89	0.51	0.64	0.19	0.89	0.44
Uniform Delay, d1	31.7	32.9	31.2	28.7	27.1	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.2	0.9	2.2	0.3	16.3	0.6
Delay (s)	44.9	33.8	33.4	29.0	43.4	23.6
Level of Service	D	C	C	C	D	C
Approach Delay (s)		41.7	31.5		31.6	
Approach LOS		D	C		C	

Intersection Summary				
HCM Average Control Delay	34.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	59.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	207	1442	862	7	1471	180	1428	701	311	905	1295	202
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	1567	937	8	1599	196	1552	762	338	984	1408	220
RTOR Reduction (vph)	0	0	469	0	0	100	0	0	48	0	0	43
Lane Group Flow (vph)	225	1567	468	8	1599	96	1552	762	290	984	1408	177
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	42.4	42.4	0.8	36.2	36.2	43.0	33.9	33.9	40.1	31.0	31.0
Effective Green, g (s)	7.0	42.4	42.4	0.8	36.2	36.2	43.0	33.9	33.9	40.1	31.0	31.0
Actuated g/C Ratio	0.05	0.32	0.32	0.01	0.27	0.27	0.32	0.25	0.25	0.30	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	180	1619	887	21	1382	430	1108	1294	403	1034	1183	368
v/s Ratio Prot	c0.07	0.31		0.00	c0.31		c0.45	0.15		0.29	c0.28	
v/s Ratio Perm			0.34			0.12			0.21			0.14
v/c Ratio	1.25	0.97	0.53	0.38	1.16	0.22	1.40	0.59	0.72	0.95	1.19	0.48
Uniform Delay, d1	63.1	44.7	37.2	66.0	48.5	37.6	45.1	43.5	45.3	45.6	51.1	44.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	150.0	15.3	0.6	11.2	79.2	0.3	185.8	0.7	6.2	17.5	94.2	1.0
Delay (s)	213.1	60.0	37.8	77.1	127.7	37.9	230.9	44.2	51.5	63.1	145.3	45.1
Level of Service	F	E	D	E	F	D	F	D	D	E	F	D
Approach Delay (s)		65.0			117.7			154.4			105.9	
Approach LOS		E			F			F			F	

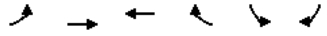
Intersection Summary				
HCM Average Control Delay	109.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.29			
Actuated Cycle Length (s)	133.2	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	113.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3475		3433	3476	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3475		3433	3476	
Volume (vph)	23	605	108	171	1177	257	822	511	71	61	507	68
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	658	117	186	1279	279	893	555	77	66	551	74
RTOR Reduction (vph)	0	0	91	0	0	195	0	12	0	0	12	0
Lane Group Flow (vph)	25	658	26	186	1279	84	893	620	0	66	613	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	1.5	19.1	19.1	8.4	26.0	26.0	24.4	39.2		3.8	18.6	
Effective Green, g (s)	1.5	19.1	19.1	8.4	26.0	26.0	24.4	39.2		3.8	18.6	
Actuated g/C Ratio	0.02	0.22	0.22	0.10	0.30	0.30	0.28	0.45		0.04	0.22	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	60	1123	350	333	1528	476	968	1575		151	747	
v/s Ratio Prot	0.01	0.13		c0.05	c0.25		c0.26	0.18		0.02	c0.18	
v/s Ratio Perm			0.07			0.18						
v/c Ratio	0.42	0.59	0.07	0.56	0.84	0.18	0.92	0.39		0.44	0.82	
Uniform Delay, d1	42.1	30.2	26.7	37.3	28.3	22.3	30.1	15.7		40.3	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	0.8	0.1	2.0	4.2	0.2	13.8	0.2		2.0	7.2	
Delay (s)	46.7	30.9	26.8	39.3	32.4	22.5	44.0	15.9		42.3	39.6	
Level of Service	D	C	C	D	C	C	D	B		D	D	
Approach Delay (s)		30.8			31.6			32.3			39.8	
Approach LOS		C			C			C			D	

Intersection Summary				
HCM Average Control Delay	32.9	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

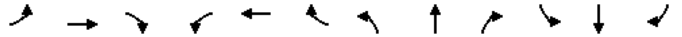
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	0.96		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4878		1770	5085	1770	1583
Flt Permitted	1.00		0.20	1.00	0.95	1.00
Satd. Flow (perm)	4878		367	5085	1770	1583
Volume (vph)	862	322	154	2684	1	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	937	350	167	2917	1	65
RTOR Reduction (vph)	79	0	0	0	0	57
Lane Group Flow (vph)	1208	0	167	2917	1	8
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	36.0		36.0	36.0	6.2	6.2
Effective Green, g (s)	36.0		36.0	36.0	6.2	6.2
Actuated g/C Ratio	0.72		0.72	0.72	0.12	0.12
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3498		263	3647	219	196
v/s Ratio Prot	0.26			c0.57	0.00	
v/s Ratio Perm			0.45			0.04
v/c Ratio	0.35		0.63	0.80	0.00	0.04
Uniform Delay, d1	2.7		3.7	4.7	19.3	19.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1		4.9	1.3	0.0	0.1
Delay (s)	2.7		8.6	6.0	19.3	19.5
Level of Service	A		A	A	B	B
Approach Delay (s)	2.7			6.1	19.5	
Approach LOS	A			A	B	

Intersection Summary				
HCM Average Control Delay	5.4	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	5061		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	5061		1770	1583
Volume (vph)	155	1090	3275	108	252	408
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	1185	3560	117	274	443
RTOR Reduction (vph)	0	0	2	0	0	113
Lane Group Flow (vph)	168	1185	3675	0	274	330
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.0	115.0	97.0		27.0	27.0
Effective Green, g (s)	14.0	115.0	97.0		27.0	27.0
Actuated g/C Ratio	0.09	0.77	0.65		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	165	3899	3273		319	285
v/s Ratio Prot	c0.09	0.23	c0.73		0.15	
v/s Ratio Perm						0.28
v/c Ratio	1.02	0.30	1.12		0.86	1.16
Uniform Delay, d1	68.0	5.3	26.5		59.7	61.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	74.9	0.0	59.9		19.9	102.8
Delay (s)	142.9	5.4	86.4		79.5	164.3
Level of Service	F	A	F		E	F
Approach Delay (s)		22.4	86.4		131.9	
Approach LOS		C	F		F	

Intersection Summary			
HCM Average Control Delay	77.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.91	1.00		0.91	1.00				0.95	0.91	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.85	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (prot)		5085	1583		5085	1583				1681	1441	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (perm)		5085	1583		5085	1583				1681	1441	1504
Volume (vph)	0	1160	94	0	2499	98	0	0	0	37	0	995
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1261	102	0	2716	107	0	0	0	40	0	1082
RTOR Reduction (vph)	0	0	48	0	0	47	0	0	0	0	1	1
Lane Group Flow (vph)	0	1261	54	0	2716	60	0	0	0	40	540	540
Turn Type			Perm			Perm				Prot		Perm
Protected Phases		4			8					1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		48.0	48.0		48.0	48.0				34.0	34.0	34.0
Effective Green, g (s)		48.0	48.0		48.0	48.0				34.0	34.0	34.0
Actuated g/C Ratio		0.53	0.53		0.53	0.53				0.38	0.38	0.38
Clearance Time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)		2712	844		2712	844				635	544	568
v/s Ratio Prot		0.25			c0.53					0.02	c0.38	
v/s Ratio Perm			0.06			0.07						0.36
v/c Ratio		0.46	0.06		1.00	0.07				0.06	0.99	0.95
Uniform Delay, d1		13.0	10.1		21.0	10.2				17.8	27.9	27.2
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		17.6	0.0				0.0	37.0	27.5
Delay (s)		13.2	10.2		38.6	10.2				17.9	64.9	54.7
Level of Service		B	B		D	B				B	E	D
Approach Delay (s)		12.9			37.6			0.0			58.3	
Approach LOS		B			D			A			E	

Intersection Summary			
HCM Average Control Delay	35.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.86	0.86
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	4708	1362
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	4708	1362
Volume (vph)	79	894	321	779	1807	119	380	605	463	235	1431	727
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	972	349	847	1964	129	413	658	503	255	1555	790
RTOR Reduction (vph)	0	0	154	0	0	51	0	0	285	0	14	41
Lane Group Flow (vph)	86	972	195	847	1964	78	413	658	218	255	1784	506
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	25.0	25.0	32.0	53.0	53.0	16.0	52.5	52.5	14.5	51.0	51.0
Effective Green, g (s)	4.0	25.0	25.0	32.0	53.0	53.0	16.0	52.5	52.5	14.5	51.0	51.0
Actuated g/C Ratio	0.03	0.18	0.18	0.23	0.38	0.38	0.11	0.38	0.38	0.10	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	98	908	283	785	1925	599	392	1907	594	356	1715	496
v/s Ratio Prot	0.03	0.19		c0.25	0.39		c0.12	0.13		0.07	0.38	
v/s Ratio Perm			0.22			0.08			0.32			0.40
v/c Ratio	0.88	1.07	0.69	1.08	1.02	0.13	1.05	0.35	0.37	0.72	1.04	1.02
Uniform Delay, d1	67.8	57.5	53.9	54.0	43.5	28.4	62.0	31.4	31.7	60.8	44.5	44.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	53.1	50.6	7.1	55.6	25.8	0.1	60.2	0.1	0.4	6.7	33.0	45.4
Delay (s)	120.8	108.1	60.9	109.6	69.3	28.5	122.2	31.5	32.1	67.5	77.5	89.9
Level of Service	F	F	E	F	E	C	F	C	C	E	E	F
Approach Delay (s)		97.2			79.1			55.5			79.1	
Approach LOS		F			E			E			E	

Intersection Summary				
HCM Average Control Delay	77.7	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	96.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3409		3433	3254	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3409		3433	3254	
Volume (vph)	36	1181	141	160	1607	91	408	591	192	82	606	705
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1284	153	174	1747	99	443	642	209	89	659	766
RTOR Reduction (vph)	0	0	100	0	0	47	0	24	0	0	50	0
Lane Group Flow (vph)	39	1284	53	174	1747	52	443	827	0	89	1375	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	3.2	36.9	36.9	8.9	42.6	42.6	16.0	61.2		6.9	52.1	
Effective Green, g (s)	3.2	36.9	36.9	8.9	42.6	42.6	16.0	61.2		6.9	52.1	
Actuated g/C Ratio	0.02	0.28	0.28	0.07	0.33	0.33	0.12	0.47		0.05	0.40	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	85	1444	450	235	1668	519	423	1606		182	1305	
v/s Ratio Prot	0.01	0.25		c0.05	c0.34		c0.13	0.25		0.03	c0.44	
v/s Ratio Perm			0.10			0.06						
v/c Ratio	0.46	0.89	0.12	0.74	1.05	0.10	1.05	0.51		0.49	1.11dr	
Uniform Delay, d1	62.5	44.5	34.5	59.4	43.7	30.3	57.0	24.0		59.8	38.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	7.1	0.1	11.8	35.6	0.1	56.7	0.3		2.1	40.4	
Delay (s)	66.4	51.6	34.6	71.2	79.2	30.4	113.6	24.3		61.8	79.3	
Level of Service	E	D	C	E	E	C	F	C		E	E	
Approach Delay (s)		50.2			76.2			54.9			78.3	
Approach LOS		D			E			D			E	

Intersection Summary				
HCM Average Control Delay	66.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	129.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	98.8%	ICU Level of Service	F	
Analysis Period (min)	15			
dr Defacto Right Lane. Recode with 1 though lane as a right lane.				
c Critical Lane Group				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	1770	1583
Volume (vph)	1662	334	173	1767	222	270
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1807	363	188	1921	241	293
RTOR Reduction (vph)	0	182	0	0	0	229
Lane Group Flow (vph)	1807	181	188	1921	241	64
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	33.9	33.9	7.2	45.1	14.8	14.8
Effective Green, g (s)	33.9	33.9	7.2	45.1	14.8	14.8
Actuated g/C Ratio	0.50	0.50	0.11	0.66	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2539	790	364	3378	386	345
v/s Ratio Prot	c0.36		0.05	c0.38	0.14	
v/s Ratio Perm		0.23				0.19
v/c Ratio	0.71	0.23	0.52	0.57	0.62	0.19
Uniform Delay, d1	13.2	9.6	28.7	6.2	24.0	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	1.2	0.2	3.1	0.3
Delay (s)	14.2	9.8	29.9	6.4	27.2	21.9
Level of Service	B	A	C	A	C	C
Approach Delay (s)	13.4			8.5	24.3	
Approach LOS	B			A	C	

Intersection Summary				
HCM Average Control Delay	12.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	59.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3519		3433	3531		1770	1863	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3519		3433	3531		1770	1863	1583	1770	3539	1583
Volume (vph)	99	1629	65	318	1984	29	159	651	109	286	401	137
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	1771	71	346	2157	32	173	708	118	311	436	149
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	44	0	0	80
Lane Group Flow (vph)	108	1840	0	346	2188	0	173	708	74	311	436	69
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.0	59.0		11.0	66.0		18.9	43.0	43.0	21.0	45.1	45.1
Effective Green, g (s)	4.0	59.0		11.0	66.0		18.9	43.0	43.0	21.0	45.1	45.1
Actuated g/C Ratio	0.03	0.39		0.07	0.44		0.13	0.29	0.29	0.14	0.30	0.30
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	1384		252	1554		223	534	454	248	1064	476
v/s Ratio Prot	0.03	0.52		c0.10	c0.62		0.10	c0.38		c0.18	0.12	
v/s Ratio Perm									0.07			0.09
v/c Ratio	1.17	1.33		1.37	1.41		0.78	1.33	0.16	1.25	0.41	0.14
Uniform Delay, d1	73.0	45.5		69.5	42.0		63.5	53.5	40.0	64.5	41.8	38.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	148.1	153.4		191.0	187.6		15.5	159.3	0.2	143.0	0.3	0.1
Delay (s)	221.1	198.9		260.5	229.6		78.9	212.8	40.2	207.5	42.1	38.5
Level of Service	F	F		F	F		E	F	D	F	D	D
Approach Delay (s)		200.1			233.8			169.2			98.9	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	194.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.34			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	122.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3501		3433	1642		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3501		3433	1642		1770	1863	1583
Volume (vph)	51	896	847	168	1373	107	346	81	306	65	56	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	974	921	183	1492	116	376	88	333	71	61	65
RTOR Reduction (vph)	0	0	468	0	6	0	0	149	0	0	0	58
Lane Group Flow (vph)	55	974	453	183	1602	0	376	272	0	71	61	7
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	3.0	31.7	31.7	10.1	38.8		13.8	15.2		7.1	8.5	8.5
Effective Green, g (s)	3.0	31.7	31.7	10.1	38.8		13.8	15.2		7.1	8.5	8.5
Actuated g/C Ratio	0.04	0.40	0.40	0.13	0.48		0.17	0.19		0.09	0.11	0.11
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	66	1401	626	223	1696		591	312		157	198	168
v/s Ratio Prot	0.03	0.28		c0.10	0.46		c0.11	c0.26		0.04	0.03	
v/s Ratio Perm			0.58									0.04
v/c Ratio	0.83	0.70	0.72	0.82	0.94		0.64	0.87		0.45	0.31	0.04
Uniform Delay, d1	38.3	20.2	20.5	34.1	19.6		30.8	31.5		34.7	33.1	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	56.6	1.5	4.1	20.9	11.3		2.2	22.4		2.1	0.9	0.1
Delay (s)	94.9	21.7	24.6	55.0	30.9		33.1	53.9		36.7	34.0	32.2
Level of Service	F	C	C	E	C		C	D		D	C	C
Approach Delay (s)		25.1			33.4			44.0			34.4	
Approach LOS		C			C			D			C	

Intersection Summary					
HCM Average Control Delay	31.8	HCM Level of Service		C	
HCM Volume to Capacity ratio	1.26				
Actuated Cycle Length (s)	80.1	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	84.7%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3465		3433	3535		3433	3488		3433	3281	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3465		3433	3535		3433	3488		3433	3281	
Volume (vph)	172	897	146	147	931	8	300	395	42	56	211	200
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	975	159	160	1012	9	326	429	46	61	229	217
RTOR Reduction (vph)	0	18	0	0	1	0	0	12	0	0	125	0
Lane Group Flow (vph)	187	1116	0	160	1020	0	326	463	0	61	321	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.6	24.6		4.0	24.0		8.1	18.7		2.3	12.9	
Effective Green, g (s)	4.6	24.6		4.0	24.0		8.1	18.7		2.3	12.9	
Actuated g/C Ratio	0.07	0.38		0.06	0.37		0.12	0.29		0.04	0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	241	1299		209	1293		424	994		120	645	
v/s Ratio Prot	c0.05	c0.33		0.05	0.29		c0.09	0.14		0.02	c0.14	
v/s Ratio Perm												
v/c Ratio	0.78	0.86		0.77	0.79		0.77	0.47		0.51	0.50	
Uniform Delay, d1	30.0	18.9		30.3	18.5		27.8	19.3		31.1	23.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.4	5.9		15.3	3.3		8.2	0.3		3.4	0.6	
Delay (s)	44.4	24.8		45.7	21.8		36.0	19.7		34.5	24.1	
Level of Service	D	C		D	C		D	B		C	C	
Approach Delay (s)		27.6			25.1			26.3			25.3	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	26.2	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.75				
Actuated Cycle Length (s)	65.6	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	67.8%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	58	776	333	155	786	74	260	747	118	50	294	13
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	843	362	168	854	80	283	812	128	54	320	14
RTOR Reduction (vph)	0	0	241	0	0	56	0	0	85	0	0	10
Lane Group Flow (vph)	63	843	121	168	854	24	283	812	43	54	320	4
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.1	16.5	16.5	3.0	17.4	17.4	7.1	19.3	19.3	2.1	14.3	14.3
Effective Green, g (s)	2.1	16.5	16.5	3.0	17.4	17.4	7.1	19.3	19.3	2.1	14.3	14.3
Actuated g/C Ratio	0.04	0.29	0.29	0.05	0.31	0.31	0.12	0.34	0.34	0.04	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	1026	459	181	1082	484	428	1200	537	65	889	398
v/s Ratio Prot	0.02	0.24		c0.05	c0.24		c0.08	c0.23		0.03	0.09	
v/s Ratio Perm			0.23			0.05			0.08			0.01
v/c Ratio	0.50	0.82	0.26	0.93	0.79	0.05	0.66	0.68	0.08	0.83	0.36	0.01
Uniform Delay, d1	26.9	18.8	15.5	26.8	18.1	13.9	23.8	16.1	12.8	27.2	17.5	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	5.4	0.3	46.2	3.9	0.0	3.8	1.5	0.1	56.7	0.3	0.0
Delay (s)	29.9	24.2	15.8	73.0	22.0	14.0	27.6	17.7	12.8	83.9	17.8	16.0
Level of Service	C	C	B	E	C	B	C	B	B	F	B	B
Approach Delay (s)		22.1			29.2			19.4			26.9	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

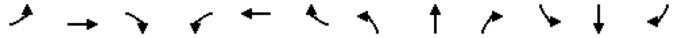
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3521		1770	3470		1770	5062		1770	5085	
Flt Permitted	0.20	1.00		0.39	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	373	3521		735	3470		1770	5062		1770	5085	
Volume (vph)	13	391	14	42	853	128	206	716	23	412	2338	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	425	15	46	927	139	224	778	25	448	2541	2
RTOR Reduction (vph)	0	4	0	0	16	0	0	4	0	0	0	0
Lane Group Flow (vph)	14	436	0	46	1050	0	224	799	0	448	2543	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	20.0	20.0		20.0	20.0		8.0	22.0		21.0	35.0	
Effective Green, g (s)	20.0	20.0		20.0	20.0		8.0	22.0		21.0	35.0	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.11	0.29		0.28	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	99	939		196	925		189	1485		496	2373	
v/s Ratio Prot		0.12			c0.31		c0.13	0.16		0.25	c0.50	
v/s Ratio Perm	0.04			0.06								
v/c Ratio	0.14	0.46		0.23	1.13		1.19	0.54		0.90	1.07	
Uniform Delay, d1	21.0	23.0		21.5	27.5		33.5	22.2		26.0	20.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.4		0.6	74.1		124.2	0.4		19.6	41.1	
Delay (s)	21.6	23.4		22.1	101.6		157.7	22.6		45.6	61.1	
Level of Service	C	C		C	F		F	C		D	E	
Approach Delay (s)		23.3			98.4			52.1			58.8	
Approach LOS		C			F			D			E	

Intersection Summary			
HCM Average Control Delay	62.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	5085	5085	1583
Volume (vph)	364	168	131	2003	4043	1506
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	396	183	142	2177	4395	1637
RTOR Reduction (vph)	0	40	0	0	0	183
Lane Group Flow (vph)	396	143	142	2177	4395	1454
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	16.0	16.0	5.0	126.0	117.0	117.0
Effective Green, g (s)	16.0	16.0	5.0	126.0	117.0	117.0
Actuated g/C Ratio	0.11	0.11	0.03	0.84	0.78	0.78
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	366	169	114	4271	3966	1235
v/s Ratio Prot			c0.04	0.43	0.86	
v/s Ratio Perm	0.12	0.12				1.03
v/c Ratio	1.08	0.84	1.25	0.51	1.11	1.18
Uniform Delay, d1	67.0	65.8	72.5	3.4	16.5	16.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	70.7	30.2	164.4	0.1	53.0	88.5
Delay (s)	137.7	95.9	236.9	3.5	69.5	105.0
Level of Service	F	F	F	A	E	F
Approach Delay (s)	124.5			17.7	79.1	
Approach LOS	F			B	E	

Intersection Summary				
HCM Average Control Delay	66.1	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.29			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	103.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	2787
Volume (vph)	296	684	855	176	2228	4	777	321	66	53	952	844
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	322	743	929	191	2422	4	845	349	72	58	1035	917
RTOR Reduction (vph)	0	0	451	0	0	1	0	0	44	0	0	189
Lane Group Flow (vph)	322	743	478	191	2422	3	845	349	28	58	1035	728
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.0	54.0	54.0	12.0	55.0	55.0	28.0	54.8	54.8	4.0	30.8	30.8
Effective Green, g (s)	11.0	54.0	54.0	12.0	55.0	55.0	28.0	54.8	54.8	4.0	30.8	30.8
Actuated g/C Ratio	0.08	0.38	0.38	0.09	0.39	0.39	0.20	0.39	0.39	0.03	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	268	1950	1069	293	1986	618	683	1979	616	98	1112	610
v/s Ratio Prot	c0.09	0.15		0.06	c0.48		c0.25	0.07		0.02	0.20	
v/s Ratio Perm			0.33			0.00			0.05			0.33
v/c Ratio	1.20	0.38	0.45	0.65	1.22	0.00	1.24	0.18	0.05	0.59	0.93	1.19
Uniform Delay, d1	64.9	31.3	32.3	62.4	42.9	26.2	56.4	28.2	26.7	67.6	54.0	55.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	120.7	0.1	0.3	5.1	103.6	0.0	119.1	0.0	0.0	9.2	13.5	102.5
Delay (s)	185.6	31.5	32.6	67.5	146.5	26.2	175.5	28.2	26.8	76.8	67.4	157.5
Level of Service	F	C	C	E	F	C	F	C	C	E	E	F
Approach Delay (s)		56.9			140.5			126.4			108.8	
Approach LOS		E			F			F			F	

Intersection Summary				
HCM Average Control Delay	109.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.25			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	105.4%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	5085	1583	3433	5085
Volume (vph)	965	303	687	81	296	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1049	329	747	88	322	1710
RTOR Reduction (vph)	0	209	0	64	0	0
Lane Group Flow (vph)	1049	120	747	24	322	1710
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	18.9	18.9	13.9	13.9	7.1	25.0
Effective Green, g (s)	18.9	18.9	13.9	13.9	7.1	25.0
Actuated g/C Ratio	0.36	0.36	0.27	0.27	0.14	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1250	576	1362	424	470	2449
v/s Ratio Prot			0.15		0.09	c0.34
v/s Ratio Perm	0.31	0.21		0.06		
v/c Ratio	0.84	0.21	0.55	0.06	0.69	0.70
Uniform Delay, d1	15.1	11.4	16.3	14.1	21.3	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.2	0.5	0.1	4.1	0.9
Delay (s)	20.2	11.5	16.8	14.2	25.4	11.4
Level of Service	C	B	B	B	C	B
Approach Delay (s)	18.1		16.5			13.6
Approach LOS	B		B			B

Intersection Summary				
HCM Average Control Delay	15.7	HCM Level of Service		B
HCM Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	51.9	Sum of lost time (s)		8.0
Intersection Capacity Utilization	64.6%	ICU Level of Service		C
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91	1.00	0.97	0.91					0.95	0.91	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.94	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		5085	1583	3433	5085					1681	1544	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		5085	1583	3433	5085					1681	1544	1504
Volume (vph)	0	1388	333	855	2542	0	0	0	0	503	0	424
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1509	362	929	2763	0	0	0	0	547	0	461
RTOR Reduction (vph)	0	0	234	0	0	0	0	0	0	0	2	2
Lane Group Flow (vph)	0	1509	128	929	2763	0	0	0	0	342	351	311
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases			4									6
Actuated Green, G (s)		26.5	26.5	18.5	49.0					18.0	18.0	18.0
Effective Green, g (s)		26.5	26.5	18.5	49.0					18.0	18.0	18.0
Actuated g/C Ratio		0.35	0.35	0.25	0.65					0.24	0.24	0.24
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1797	559	847	3322					403	371	361
v/s Ratio Prot		0.30		c0.27	c0.54					0.20	c0.23	
v/s Ratio Perm			0.23									0.21
v/c Ratio		0.84	0.23	1.10	0.83					0.85	0.95	0.86
Uniform Delay, d1		22.3	17.1	28.2	9.9					27.2	28.0	27.3
Progression Factor		1.00	1.00	1.21	1.52					1.00	1.00	1.00
Incremental Delay, d2		3.6	0.2	45.6	0.2					15.2	32.6	22.6
Delay (s)		25.9	17.3	79.8	15.1					42.4	60.6	49.9
Level of Service		C	B	E	B					D	E	D
Approach Delay (s)		24.3			31.4			0.0			51.1	
Approach LOS		C			C			A			D	

Intersection Summary				
HCM Average Control Delay	32.4	HCM Level of Service		C
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	75.0	Sum of lost time (s)		8.0
Intersection Capacity Utilization	94.5%	ICU Level of Service		F
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	0.97	0.91			0.91	1.00	0.95	0.91	0.95			
Frt	1.00	1.00			1.00	0.85	1.00	0.86	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3433	5085			5085	1583	1681	1458	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	3433	5085			5085	1583	1681	1458	1504			
Volume (vph)	465	1425	0	0	3223	626	174	0	410	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	505	1549	0	0	3503	680	189	0	446	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	140	0	82	82	0	0	0
Lane Group Flow (vph)	505	1549	0	0	3503	540	166	157	148	0	0	0
Turn Type	Prot					Perm	Prot		Perm			
Protected Phases	7	4			8		5	2				
Permitted Phases						8			2			
Actuated Green, G (s)	22.0	125.0			99.0	99.0	17.0	17.0	17.0			
Effective Green, g (s)	22.0	125.0			99.0	99.0	17.0	17.0	17.0			
Actuated g/C Ratio	0.15	0.83			0.66	0.66	0.11	0.11	0.11			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	504	4238			3356	1045	191	165	170			
v/s Ratio Prot	c0.15	0.30			c0.69		0.10	c0.16				
v/s Ratio Perm						0.43			0.15			
v/c Ratio	1.00	0.37			1.04	0.52	0.87	0.95	0.87			
Uniform Delay, d1	64.0	3.0			25.5	13.2	65.4	66.1	65.4			
Progression Factor	0.86	2.05			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	28.7	0.0			28.5	0.4	31.6	56.1	42.0			
Delay (s)	83.8	6.2			54.0	13.6	97.0	122.2	107.4			
Level of Service	F	A			D	B	F	F	F			
Approach Delay (s)		25.2			47.5			110.3			0.0	
Approach LOS		C			D			F			A	

Intersection Summary			
HCM Average Control Delay	46.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3538		3433	3325	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3538		3433	3325	
Volume (vph)	99	548	56	48	1574	354	459	881	2	92	560	380
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	596	61	52	1711	385	499	958	2	100	609	413
RTOR Reduction (vph)	0	0	39	0	0	97	0	0	0	0	73	0
Lane Group Flow (vph)	108	596	22	52	1711	288	499	960	0	100	949	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.0	33.2	33.2	2.4	31.6	31.6	13.0	37.6		3.2	27.8	
Effective Green, g (s)	4.0	33.2	33.2	2.4	31.6	31.6	13.0	37.6		3.2	27.8	
Actuated g/C Ratio	0.04	0.36	0.36	0.03	0.34	0.34	0.14	0.41		0.03	0.30	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	149	1827	569	89	1739	541	483	1440		119	1000	
v/s Ratio Prot	c0.03	0.12		0.02	c0.34		c0.15	0.27		0.03	c0.31	
v/s Ratio Perm			0.04			0.24						
v/c Ratio	0.72	0.33	0.04	0.58	0.98	0.53	1.03	0.67		0.84	0.95	
Uniform Delay, d1	43.7	21.5	19.2	44.5	30.1	24.4	39.7	22.3		44.3	31.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.0	0.1	0.0	9.4	17.7	1.0	49.7	1.2		38.5	17.3	
Delay (s)	59.7	21.6	19.3	53.9	47.9	25.5	89.4	23.5		82.9	48.9	
Level of Service	E	C	B	D	D	C	F	C		F	D	
Approach Delay (s)		26.8			44.0			46.0			52.0	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	43.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	92.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
41: Bear Valley Rd & Hesperia Rd

7/9/2009
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	157	1638	229	334	1599	43	192	996	316	253	629	106
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	1780	249	363	1738	47	209	1083	343	275	684	115
RTOR Reduction (vph)	0	0	151	0	0	29	0	0	109	0	0	82
Lane Group Flow (vph)	171	1780	98	363	1738	18	209	1083	234	275	684	33
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	34.0	34.0	11.0	38.0	38.0	10.2	31.0	31.0	8.0	28.8	28.8
Effective Green, g (s)	7.0	34.0	34.0	11.0	38.0	38.0	10.2	31.0	31.0	8.0	28.8	28.8
Actuated g/C Ratio	0.07	0.34	0.34	0.11	0.38	0.38	0.10	0.31	0.31	0.08	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	1729	538	378	1932	602	350	1097	491	275	1019	456
v/s Ratio Prot	0.05	c0.35		c0.11	c0.34		0.06	c0.31		c0.08	0.19	
v/s Ratio Perm			0.16			0.03			0.22			0.07
v/c Ratio	0.71	1.03	0.18	0.96	0.90	0.03	0.60	0.99	0.48	1.00	0.67	0.07
Uniform Delay, d1	45.5	33.0	23.2	44.3	29.2	19.4	42.9	34.3	27.9	46.0	31.4	25.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.6	29.6	0.2	35.9	6.1	0.0	2.7	23.8	0.7	54.3	1.8	0.1
Delay (s)	55.1	62.6	23.4	80.1	35.3	19.5	45.7	58.2	28.7	100.3	33.2	26.0
Level of Service	E	E	C	F	D	B	D	E	C	F	C	C
Approach Delay (s)		57.6			42.5			50.4			49.6	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	50.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
42: Lemon St & E Ave

7/9/2009
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	1.00		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4915		1770	5063		1770	3359		1770	3219	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4915		1770	5063		1770	3359		1770	3219	
Volume (vph)	148	895	257	17	1184	36	349	195	100	92	154	233
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	161	973	279	18	1287	39	379	212	109	100	167	253
RTOR Reduction (vph)	0	56	0	0	3	0	0	79	0	0	130	0
Lane Group Flow (vph)	161	1196	0	18	1323	0	379	242	0	100	290	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.0	31.6		0.8	24.4		17.8	20.0		9.4	11.6	
Effective Green, g (s)	8.0	31.6		0.8	24.4		17.8	20.0		9.4	11.6	
Actuated g/C Ratio	0.10	0.41		0.01	0.31		0.23	0.26		0.12	0.15	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	1996		18	1588		405	863		214	480	
v/s Ratio Prot	c0.09	0.25		0.01	c0.26		c0.21	0.10		0.06	c0.13	
v/s Ratio Perm												
v/c Ratio	0.88	0.60		1.00	0.83		0.94	0.28		0.47	0.60	
Uniform Delay, d1	34.4	18.1		38.5	24.8		29.4	23.1		31.9	31.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	36.1	0.5		212.1	3.9		28.8	0.2		1.6	2.1	
Delay (s)	70.6	18.6		250.6	28.7		58.2	23.3		33.5	33.1	
Level of Service	E	B		F	C		E	C		C	C	
Approach Delay (s)		24.5			31.7			42.2			33.2	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5054		1770	5068		1770	3489		1770	3490	
Flt Permitted	0.95	1.00		0.95	1.00		0.40	1.00		0.27	1.00	
Satd. Flow (perm)	1770	5054		1770	5068		748	3489		503	3490	
Volume (vph)	16	798	34	130	1128	27	119	761	80	13	433	44
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	867	37	141	1226	29	129	827	87	14	471	48
RTOR Reduction (vph)	0	9	0	0	5	0	0	16	0	0	16	0
Lane Group Flow (vph)	17	895	0	141	1250	0	129	898	0	14	503	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	0.7	16.5		4.4	20.2		14.8	14.8		14.8	14.8	
Effective Green, g (s)	0.7	16.5		4.4	20.2		14.8	14.8		14.8	14.8	
Actuated g/C Ratio	0.01	0.35		0.09	0.42		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	1748		163	2146		232	1083		156	1083	
v/s Ratio Prot	0.01	0.18		c0.08	c0.25			c0.26			0.15	
v/s Ratio Perm							0.17			0.03		
v/c Ratio	0.65	0.51		0.87	0.58		0.56	0.83		0.09	0.46	
Uniform Delay, d1	23.4	12.4		21.4	10.5		13.7	15.3		11.7	13.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	46.4	0.3		34.9	0.4		2.9	5.4		0.3	0.3	
Delay (s)	69.7	12.7		56.2	10.9		16.6	20.7		11.9	13.6	
Level of Service	E	B		E	B		B	C		B	B	
Approach Delay (s)		13.7			15.5			20.1			13.5	
Approach LOS		B			B			C			B	

Intersection Summary				
HCM Average Control Delay	16.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		1.00	0.95					1.00		1.00
Frt		0.93		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3307		1770	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3307		1770	3539					1770		1583
Volume (vph)	0	873	677	259	1302	0	0	0	0	298	0	43
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	949	736	282	1415	0	0	0	0	324	0	47
RTOR Reduction (vph)	0	173	0	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	0	1512	0	282	1415	0	0	0	0	324	0	10
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		37.5		14.0	55.5					16.5		16.5
Effective Green, g (s)		37.5		14.0	55.5					16.5		16.5
Actuated g/C Ratio		0.47		0.18	0.69					0.21		0.21
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1550		310	2455					365		326
v/s Ratio Prot		c0.51		c0.16	0.40					c0.18		
v/s Ratio Perm												0.03
v/c Ratio		0.98		0.91	0.58					0.89		0.03
Uniform Delay, d1		20.8		32.4	6.3					30.8		25.4
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		17.2		28.8	0.3					22.0		0.2
Delay (s)		38.0		61.1	6.6					52.8		25.5
Level of Service		D		E	A					D		C
Approach Delay (s)		38.0			15.6			0.0			49.3	
Approach LOS		D			B			A			D	

Intersection Summary				
HCM Average Control Delay	29.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	87.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0		4.0			
Lane Util. Factor	1.00	0.95			0.95		1.00		1.00			
Frt	1.00	1.00			0.95		1.00		0.85			
Flt Protected	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (prot)	1770	3539			3357		1770		1583			
Flt Permitted	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (perm)	1770	3539			3357		1770		1583			
Volume (vph)	117	1054	0	0	1437	751	125	0	271	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	1146	0	0	1562	816	136	0	295	0	0	0
RTOR Reduction (vph)	0	0	0	0	74	0	0	0	114	0	0	0
Lane Group Flow (vph)	127	1146	0	0	2304	0	136	0	181	0	0	0
Turn Type	Prot						Prot		custom			
Protected Phases	7	4			8		5					
Permitted Phases									2			
Actuated Green, G (s)	8.9	68.3			55.4		13.7		13.7			
Effective Green, g (s)	8.9	68.3			55.4		13.7		13.7			
Actuated g/C Ratio	0.10	0.76			0.62		0.15		0.15			
Clearance Time (s)	4.0	4.0			4.0		4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)	175	2686			2066		269		241			
v/s Ratio Prot	c0.07	0.32			c0.71		0.08					
v/s Ratio Perm									0.19			
v/c Ratio	0.73	0.43			1.12		0.51		0.75			
Uniform Delay, d1	39.4	3.9			17.3		35.0		36.5			
Progression Factor	1.00	1.00			1.00		1.00		1.00			
Incremental Delay, d2	13.9	0.1			59.2		1.5		19.1			
Delay (s)	53.3	4.0			76.5		36.5		55.6			
Level of Service	D	A			E		D		E			
Approach Delay (s)		8.9			76.5			49.6			0.0	
Approach LOS		A			E			D			A	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	143	577	605	333	1709	13	309	128	113	7	805	169
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	627	658	362	1858	14	336	139	123	8	875	184
RTOR Reduction (vph)	0	0	136	0	0	8	0	0	81	0	0	110
Lane Group Flow (vph)	155	627	522	362	1858	6	336	139	42	8	875	74
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	32.7	32.7	11.0	37.7	37.7	10.0	30.9	30.9	0.8	21.7	21.7
Effective Green, g (s)	6.0	32.7	32.7	11.0	37.7	37.7	10.0	30.9	30.9	0.8	21.7	21.7
Actuated g/C Ratio	0.07	0.36	0.36	0.12	0.41	0.41	0.11	0.34	0.34	0.01	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	225	1819	566	413	2097	653	376	1719	535	30	1207	376
v/s Ratio Prot	0.05	0.12		c0.11	0.37		c0.10	0.03		0.00	c0.17	
v/s Ratio Perm			0.42			0.01			0.08			0.12
v/c Ratio	0.69	0.34	0.92	0.88	0.89	0.01	0.89	0.08	0.08	0.27	0.72	0.20
Uniform Delay, d1	41.8	21.5	28.1	39.5	24.9	15.8	40.2	20.6	20.6	45.0	32.1	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.5	0.1	20.8	18.4	4.9	0.0	22.5	0.0	0.1	4.7	2.2	0.3
Delay (s)	50.3	21.6	48.9	57.9	29.8	15.8	62.7	20.6	20.6	49.7	34.3	28.1
Level of Service	D	C	D	E	C	B	E	C	C	D	C	C
Approach Delay (s)		37.2			34.3			44.3			33.3	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	36.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3493		3433	3377		3433	3461		3433	3503	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3493		3433	3377		3433	3461		3433	3503	
Volume (vph)	43	621	59	73	632	279	36	1223	210	111	789	57
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	675	64	79	687	303	39	1329	228	121	858	62
RTOR Reduction (vph)	0	8	0	0	55	0	0	15	0	0	6	0
Lane Group Flow (vph)	47	731	0	79	935	0	39	1542	0	121	914	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.3	25.2		3.1	26.0		2.3	42.5		4.0	44.2	
Effective Green, g (s)	2.3	25.2		3.1	26.0		2.3	42.5		4.0	44.2	
Actuated g/C Ratio	0.03	0.28		0.03	0.29		0.03	0.47		0.04	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	87	969		117	967		87	1620		151	1705	
v/s Ratio Prot	0.01	0.21		c0.02	c0.29		0.01	c0.45		c0.04	0.26	
v/s Ratio Perm												
v/c Ratio	0.54	0.75		0.68	0.97		0.45	0.95		0.80	0.54	
Uniform Delay, d1	43.7	30.0		43.4	32.0		43.6	23.2		43.0	16.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	3.4		14.3	21.1		3.6	12.7		25.4	0.3	
Delay (s)	50.4	33.4		57.7	53.1		47.3	35.9		68.5	16.5	
Level of Service	D	C		E	D		D	D		E	B	
Approach Delay (s)		34.4			53.4			36.2			22.5	
Approach LOS		C			D			D			C	

Intersection Summary				
HCM Average Control Delay	36.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1844		1770	1857		1770	3447		1770	3452	
Flt Permitted	0.61	1.00		0.64	1.00		0.49	1.00		0.34	1.00	
Satd. Flow (perm)	1132	1844		1199	1857		917	3447		639	3452	
Volume (vph)	81	155	11	106	216	5	13	584	122	1	345	68
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	168	12	115	235	5	14	635	133	1	375	74
RTOR Reduction (vph)	0	4	0	0	1	0	0	18	0	0	17	0
Lane Group Flow (vph)	88	176	0	115	239	0	14	750	0	1	432	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.9	8.9		8.9	8.9		18.2	18.2		18.2	18.2	
Effective Green, g (s)	8.9	8.9		8.9	8.9		18.2	18.2		18.2	18.2	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.52	0.52		0.52	0.52	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	287	468		304	471		475	1787		331	1790	
v/s Ratio Prot		0.10			c0.13			c0.22			0.13	
v/s Ratio Perm	0.08			0.10			0.02			0.00		
v/c Ratio	0.31	0.38		0.38	0.51		0.03	0.42		0.00	0.24	
Uniform Delay, d1	10.6	10.8		10.8	11.2		4.1	5.2		4.1	4.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.5		0.8	0.9		0.0	0.2		0.0	0.1	
Delay (s)	11.2	11.3		11.6	12.1		4.2	5.4		4.1	4.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		11.3			11.9			5.3			4.7	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay	7.3	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	35.1	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	46.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3499		1770	3536		1770	3519		1770	3333	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3499		1770	3536		1770	3519		1770	3333	
Volume (vph)	420	519	42	69	597	4	251	381	15	17	348	222
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	564	46	75	649	4	273	414	16	18	378	241
RTOR Reduction (vph)	0	8	0	0	1	0	0	3	0	0	126	0
Lane Group Flow (vph)	457	602	0	75	652	0	273	427	0	18	493	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	20.0	30.6		6.2	16.8		12.0	27.6		1.6	17.2	
Effective Green, g (s)	20.0	30.6		6.2	16.8		12.0	27.6		1.6	17.2	
Actuated g/C Ratio	0.24	0.37		0.08	0.20		0.15	0.34		0.02	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	432	1306		134	724		259	1184		35	699	
v/s Ratio Prot	c0.26	0.17		0.04	c0.18		c0.15	0.12		0.01	c0.19	
v/s Ratio Perm												
v/c Ratio	1.06	0.46		0.56	0.90		1.05	0.36		0.51	0.71	
Uniform Delay, d1	31.0	19.5		36.6	31.8		35.0	20.5		39.8	30.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	59.4	0.3		5.0	14.4		70.9	0.2		12.2	3.3	
Delay (s)	90.4	19.7		41.6	46.1		105.9	20.7		52.0	33.3	
Level of Service	F	B		D	D		F	C		D	C	
Approach Delay (s)		50.0			45.7			53.8			33.8	
Approach LOS		D			D			D			C	

Intersection Summary					
HCM Average Control Delay	46.6	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.97				
Actuated Cycle Length (s)	82.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	83.9%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5067		3433	4806		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5067		3433	4806		1770	3539	1583
Volume (vph)	207	482	762	523	1171	29	1118	443	257	11	606	329
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	524	828	568	1273	32	1215	482	279	12	659	358
RTOR Reduction (vph)	0	0	700	0	2	0	0	95	0	0	0	108
Lane Group Flow (vph)	225	524	128	568	1303	0	1215	666	0	12	659	250
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	7.0	16.0	16.0	16.0	25.0		34.0	54.4		0.8	21.2	21.2
Effective Green, g (s)	7.0	16.0	16.0	16.0	25.0		34.0	54.4		0.8	21.2	21.2
Actuated g/C Ratio	0.07	0.16	0.16	0.16	0.24		0.33	0.53		0.01	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	233	788	432	532	1227		1131	2533		14	727	325
v/s Ratio Prot	0.07	0.10		c0.17	0.26		c0.35	0.16		0.01	0.19	
v/s Ratio Perm			0.30									0.23
v/c Ratio	0.97	0.66	0.30	1.07	1.06		1.07	0.26		0.86	0.91	0.77
Uniform Delay, d1	48.0	41.1	38.6	43.6	39.1		34.6	13.4		51.1	40.0	38.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	48.9	2.1	0.4	58.3	43.8		49.1	0.1		164.6	14.9	10.5
Delay (s)	96.8	43.2	39.0	101.9	82.9		83.7	13.5		215.8	54.9	49.1
Level of Service	F	D	D	F	F		F	B		F	D	D
Approach Delay (s)		48.7			88.7			56.6			54.8	
Approach LOS		D			F			E			D	

Intersection Summary					
HCM Average Control Delay	63.7	HCM Level of Service		E	
HCM Volume to Capacity ratio	1.23				
Actuated Cycle Length (s)	103.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	91.2%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.94		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3199		1770	3333		1770	3525		1770	3350	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3199		1770	3333		1770	3525		1770	3350	
Volume (vph)	88	166	294	57	361	229	243	803	22	33	344	190
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	180	320	62	392	249	264	873	24	36	374	207
RTOR Reduction (vph)	0	240	0	0	161	0	0	3	0	0	116	0
Lane Group Flow (vph)	96	260	0	62	480	0	264	894	0	36	465	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.7	14.9		2.1	13.3		10.9	25.0		1.4	15.5	
Effective Green, g (s)	3.7	14.9		2.1	13.3		10.9	25.0		1.4	15.5	
Actuated g/C Ratio	0.06	0.25		0.04	0.22		0.18	0.42		0.02	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	110	802		63	746		325	1484		42	874	
v/s Ratio Prot	c0.05	0.16		0.04	c0.19		c0.15	c0.25		0.02	0.17	
v/s Ratio Perm												
v/c Ratio	0.87	0.32		0.98	0.64		0.81	0.60		0.86	0.53	
Uniform Delay, d1	27.6	18.1		28.6	20.9		23.3	13.3		28.9	18.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	48.2	0.2		107.2	1.9		14.3	0.7		84.5	0.6	
Delay (s)	75.9	18.4		135.8	22.8		37.5	14.0		113.4	19.5	
Level of Service	E	B		F	C		D	B		F	B	
Approach Delay (s)		27.6			32.8			19.4			24.9	
Approach LOS		C			C			B			C	

Intersection Summary				
HCM Average Control Delay	25.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	64.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3395	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	3539	3395	
Volume (vph)	262	182	455	1237	861	320
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	285	198	495	1345	936	348
RTOR Reduction (vph)	0	162	0	0	42	0
Lane Group Flow (vph)	285	36	495	1345	1242	0
Turn Type		custom	Prot			
Protected Phases			5	2	6	
Permitted Phases	4	4				
Actuated Green, G (s)	16.4	16.4	26.0	65.0	35.0	
Effective Green, g (s)	16.4	16.4	26.0	65.0	35.0	
Actuated g/C Ratio	0.18	0.18	0.29	0.73	0.39	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	325	290	515	2573	1329	
v/s Ratio Prot			c0.28	0.38	c0.38	
v/s Ratio Perm	0.16	0.13				
v/c Ratio	0.88	0.13	0.96	0.52	0.93	
Uniform Delay, d1	35.5	30.5	31.2	5.4	26.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	22.3	0.2	29.9	0.8	13.3	
Delay (s)	57.8	30.7	61.1	6.1	39.4	
Level of Service	E	C	E	A	D	
Approach Delay (s)	46.7			20.9	39.4	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	31.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	83.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3518		3433	3439		3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3518		3433	3439		3433	5085	1583	3433	5085	1583
Volume (vph)	137	579	24	124	1527	354	12	754	69	303	1956	371
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	629	26	135	1660	385	13	820	75	329	2126	403
RTOR Reduction (vph)	0	2	0	0	14	0	0	0	59	0	0	137
Lane Group Flow (vph)	149	653	0	135	2031	0	13	820	16	329	2126	266
Turn Type	Prot			Prot			Prot		Perm	Prot		custom
Protected Phases	7			3	8		5	2		1	6	
Permitted Phases		4							2			1
Actuated Green, G (s)	5.0	67.4		9.6	72.0		1.6	33.4	33.4	26.0	57.8	26.0
Effective Green, g (s)	5.0	67.4		9.6	72.0		1.6	33.4	33.4	26.0	57.8	26.0
Actuated g/C Ratio	0.03	0.44		0.06	0.47		0.01	0.22	0.22	0.17	0.38	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	113	1556		216	1625		36	1114	347	586	1929	270
v/s Ratio Prot	c0.04			0.04	c0.59		0.00	0.16		0.10	c0.42	
v/s Ratio Perm		0.19							0.05			0.25
v/c Ratio	1.32	0.42		0.62	1.25		0.36	0.74	0.05	0.56	1.10	0.99
Uniform Delay, d1	73.7	29.1		69.6	40.2		74.9	55.4	46.9	58.0	47.3	63.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	192.5	0.2		5.5	117.8		6.1	4.3	0.3	1.2	54.5	50.4
Delay (s)	266.2	29.3		75.2	158.0		81.0	59.7	47.2	59.2	101.8	113.4
Level of Service	F	C		E	F		F	E	D	E	F	F
Approach Delay (s)		73.2			152.9			59.0			98.5	
Approach LOS		E			F			E			F	

Intersection Summary			
HCM Average Control Delay	107.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	152.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.91	1.00		0.91	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		5085	1583		5085	1583	1770		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		5085	1583		5085	1583	1770		1583			
Volume (vph)	0	827	613	0	2512	388	146	0	469	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	899	666	0	2730	422	159	0	510	0	0	0
RTOR Reduction (vph)	0	0	300	0	0	190	0	0	86	0	0	0
Lane Group Flow (vph)	0	899	366	0	2730	232	159	0	424	0	0	0
Turn Type			Perm			Perm	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			4			8			2			
Actuated Green, G (s)		33.0	33.0		33.0	33.0	19.0		19.0			
Effective Green, g (s)		33.0	33.0		33.0	33.0	19.0		19.0			
Actuated g/C Ratio		0.55	0.55		0.55	0.55	0.32		0.32			
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)		2797	871		2797	871	561		501			
v/s Ratio Prot		0.18			c0.54		0.09					
v/s Ratio Perm			0.42			0.27			0.32			
v/c Ratio		0.32	0.42		0.98	0.27	0.28		0.85			
Uniform Delay, d1		7.4	7.9		13.1	7.1	15.4		19.1			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		0.1	0.3		11.9	0.2	1.3		16.0			
Delay (s)		7.4	8.2		25.0	7.3	16.7		35.2			
Level of Service		A	A		C	A	B		D			
Approach Delay (s)		7.8			22.6			30.8			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		1.00	0.95					1.00		1.00
Frt		0.91		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3224		1770	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3224		1770	3539					1770		1583
Volume (vph)	0	273	399	565	1049	0	0	0	0	341	0	198
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	297	434	614	1140	0	0	0	0	371	0	215
RTOR Reduction (vph)	0	357	0	0	0	0	0	0	0	0	0	74
Lane Group Flow (vph)	0	375	0	614	1140	0	0	0	0	371	0	141
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		12.5		25.3	41.8					20.2		20.2
Effective Green, g (s)		12.5		25.3	41.8					20.2		20.2
Actuated g/C Ratio		0.18		0.36	0.60					0.29		0.29
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		576		640	2113					511		457
v/s Ratio Prot		c0.23		c0.35	0.32					c0.21		
v/s Ratio Perm												0.14
v/c Ratio		0.65		0.96	0.54					0.73		0.31
Uniform Delay, d1		26.7		21.8	8.4					22.4		19.4
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		2.6		25.5	0.3					5.1		1.7
Delay (s)		29.3		47.4	8.6					27.5		21.2
Level of Service		C		D	A					C		C
Approach Delay (s)		29.3			22.2			0.0			25.2	
Approach LOS		C			C			A			C	

Intersection Summary				
HCM Average Control Delay	24.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	80.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0		4.0			
Lane Util. Factor	1.00	0.95			0.95		1.00		1.00			
Frt	1.00	1.00			0.96		1.00		0.85			
Flt Protected	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (prot)	1770	3539			3410		1770		1583			
Flt Permitted	0.10	1.00			1.00		0.95		1.00			
Satd. Flow (perm)	182	3539			3410		1770		1583			
Volume (vph)	7	607	0	0	1512	484	102	0	84	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	660	0	0	1643	526	111	0	91	0	0	0
RTOR Reduction (vph)	0	0	0	0	47	0	0	0	69	0	0	0
Lane Group Flow (vph)	8	660	0	0	2122	0	111	0	22	0	0	0
Turn Type	Perm						Prot		custom			
Protected Phases		4			8		5					
Permitted Phases	4								2			
Actuated Green, G (s)	41.0	41.0			41.0		16.0		16.0			
Effective Green, g (s)	41.0	41.0			41.0		16.0		16.0			
Actuated g/C Ratio	0.63	0.63			0.63		0.25		0.25			
Clearance Time (s)	4.0	4.0			4.0		4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)	115	2232			2151		436		390			
v/s Ratio Prot		0.19			c0.64		c0.06					
v/s Ratio Perm	0.04								0.06			
v/c Ratio	0.07	0.30			0.99		0.25		0.06			
Uniform Delay, d1	4.6	5.4			11.7		19.7		18.7			
Progression Factor	1.00	1.00			1.00		1.00		1.00			
Incremental Delay, d2	0.3	0.1			16.1		0.3		0.3			
Delay (s)	4.9	5.5			27.9		20.0		19.0			
Level of Service	A	A			C		C		B			
Approach Delay (s)		5.5			27.9			19.6			0.0	
Approach LOS		A			C			B			A	

Intersection Summary				
HCM Average Control Delay	22.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	80.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	0.90	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.98	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1653	1504	5085	1583	3433	5085
Flt Permitted	0.98	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1653	1504	5085	1583	3433	5085
Volume (vph)	129	555	1339	22	42	2572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	603	1455	24	46	2796
RTOR Reduction (vph)	117	117	0	11	0	0
Lane Group Flow (vph)	279	230	1455	13	46	2796
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	13.1	13.1	31.6	31.6	2.3	37.9
Effective Green, g (s)	13.1	13.1	31.6	31.6	2.3	37.9
Actuated g/C Ratio	0.22	0.22	0.54	0.54	0.04	0.64
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	367	334	2723	848	134	3266
v/s Ratio Prot	c0.24		0.29		0.01	c0.55
v/s Ratio Perm		0.23		0.02		
v/c Ratio	0.76	0.69	0.53	0.02	0.34	0.86
Uniform Delay, d1	21.5	21.1	8.9	6.4	27.6	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	5.8	0.2	0.0	1.5	2.4
Delay (s)	30.5	26.9	9.1	6.4	29.2	10.8
Level of Service	C	C	A	A	C	B
Approach Delay (s)	28.8		9.1			11.1
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	1.00		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3300		1770	3529		1770	3523		1770	3353	
Flt Permitted	0.28	1.00		0.61	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	517	3300		1134	3529		1770	3523		1770	3353	
Volume (vph)	47	116	95	21	526	10	392	714	22	6	622	337
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	126	103	23	572	11	426	776	24	7	676	366
RTOR Reduction (vph)	0	81	0	0	2	0	0	3	0	0	55	0
Lane Group Flow (vph)	51	148	0	23	581	0	426	797	0	7	987	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	14.4	14.4		14.4	14.4		16.7	39.1		0.8	23.2	
Effective Green, g (s)	14.4	14.4		14.4	14.4		16.7	39.1		0.8	23.2	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.25	0.59		0.01	0.35	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	112	717		246	766		446	2078		21	1173	
v/s Ratio Prot		0.07			c0.17		c0.24	0.23		0.00	c0.31	
v/s Ratio Perm	0.10			0.02								
v/c Ratio	0.46	0.21		0.09	0.76		0.96	0.38		0.33	0.84	
Uniform Delay, d1	22.5	21.3		20.7	24.3		24.4	7.2		32.5	19.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.1		0.2	4.3		31.1	0.1		9.1	5.6	
Delay (s)	25.5	21.4		20.9	28.6		55.5	7.3		41.6	25.5	
Level of Service	C	C		C	C		E	A		D	C	
Approach Delay (s)		22.2			28.3			24.1			25.6	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3442		3433	3392	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3442		3433	3392	
Volume (vph)	77	1305	123	61	1358	331	126	375	85	384	457	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	1418	134	66	1476	360	137	408	92	417	497	190
RTOR Reduction (vph)	0	0	88	0	0	219	0	31	0	0	62	0
Lane Group Flow (vph)	84	1418	46	66	1476	141	137	469	0	417	625	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	3.0	21.5	21.5	2.2	20.7	20.7	3.8	14.3		8.1	18.6	
Effective Green, g (s)	3.0	21.5	21.5	2.2	20.7	20.7	3.8	14.3		8.1	18.6	
Actuated g/C Ratio	0.05	0.35	0.35	0.04	0.33	0.33	0.06	0.23		0.13	0.30	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	1761	548	122	1695	528	210	793		448	1016	
v/s Ratio Prot	c0.02	0.28		0.02	c0.29		0.04	0.15		c0.12	c0.20	
v/s Ratio Perm			0.08			0.23						
v/c Ratio	0.51	0.81	0.08	0.54	0.87	0.27	0.65	0.59		0.93	0.62	
Uniform Delay, d1	28.8	18.4	13.7	29.5	19.4	15.1	28.5	21.3		26.7	18.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	2.8	0.1	4.8	5.2	0.3	7.1	1.2		26.1	1.1	
Delay (s)	31.2	21.2	13.7	34.3	24.6	15.4	35.6	22.5		52.8	19.8	
Level of Service	C	C	B	C	C	B	D	C		D	B	
Approach Delay (s)		21.1			23.2			25.3			32.3	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM Average Control Delay	24.7	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.77				
Actuated Cycle Length (s)	62.1	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	66.9%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3499		3433	3531		3433	3535		3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3499		3433	3531		3433	3535		3433	3539	1583
Volume (vph)	229	1556	129	11	1319	21	239	376	3	64	201	284
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	249	1691	140	12	1434	23	260	409	3	70	218	309
RTOR Reduction (vph)	0	6	0	0	1	0	0	1	0	0	0	99
Lane Group Flow (vph)	249	1825	0	12	1456	0	260	411	0	70	218	210
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	8.8	51.1		0.8	43.1		7.1	18.0		3.9	14.8	14.8
Effective Green, g (s)	8.8	51.1		0.8	43.1		7.1	18.0		3.9	14.8	14.8
Actuated g/C Ratio	0.10	0.57		0.01	0.48		0.08	0.20		0.04	0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	336	1991		31	1695		271	709		149	583	261
v/s Ratio Prot	c0.07	c0.52		0.00	0.41		c0.08	c0.12		0.02	0.06	
v/s Ratio Perm												0.20
v/c Ratio	0.74	0.92		0.39	0.86		0.96	0.58		0.47	0.37	0.80
Uniform Delay, d1	39.4	17.4		44.3	20.7		41.2	32.5		41.9	33.4	36.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.5	7.1		7.8	4.6		43.0	1.2		2.3	0.4	16.2
Delay (s)	47.9	24.6		52.1	25.2		84.2	33.6		44.3	33.8	52.3
Level of Service	D	C		D	C		F	C		D	C	D
Approach Delay (s)		27.4			25.5			53.2			44.6	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM Average Control Delay	32.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	1.03				
Actuated Cycle Length (s)	89.8	Sum of lost time (s)		20.0	
Intersection Capacity Utilization	77.6%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

Hesperia GP Update
76: Main St. & Peach Ave

7/9/2009
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.96		1.00	0.90		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5022		1770	4904		1770	3184		1770	3275	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5022		1770	4904		1770	3184		1770	3275	
Volume (vph)	69	470	42	247	717	224	50	168	340	98	156	155
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	511	46	268	779	243	54	183	370	107	170	168
RTOR Reduction (vph)	0	16	0	0	77	0	0	283	0	0	131	0
Lane Group Flow (vph)	75	541	0	268	945	0	54	270	0	107	207	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.7	14.1		10.9	21.3		2.1	10.5		3.7	12.1	
Effective Green, g (s)	3.7	14.1		10.9	21.3		2.1	10.5		3.7	12.1	
Actuated g/C Ratio	0.07	0.26		0.20	0.39		0.04	0.19		0.07	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	119	1283		350	1892		67	606		119	718	
v/s Ratio Prot	0.04	0.11		c0.15	c0.21		0.03	c0.17		c0.06	0.10	
v/s Ratio Perm												
v/c Ratio	0.63	0.42		0.77	0.50		0.81	0.45		0.90	0.29	
Uniform Delay, d1	25.1	17.1		20.9	12.9		26.3	19.8		25.6	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.2		9.6	0.2		48.7	0.5		51.9	0.2	
Delay (s)	35.5	17.4		30.6	13.1		75.1	20.3		77.4	18.2	
Level of Service	D	B		C	B		E	C		E	B	
Approach Delay (s)		19.5			16.7			25.2			32.4	
Approach LOS		B			B			C			C	

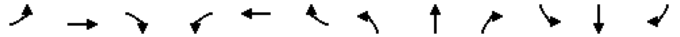
Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
77: Danbury Ave & I Avenue

7/9/2009
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3528		1770	3503		1770	3517		1770	3484	
Flt Permitted	0.95	1.00		0.95	1.00		0.35	1.00		0.31	1.00	
Satd. Flow (perm)	1770	3528		1770	3503		649	3517		569	3484	
Volume (vph)	234	370	8	40	426	31	5	562	25	31	450	52
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	254	402	9	43	463	34	5	611	27	34	489	57
RTOR Reduction (vph)	0	3	0	0	10	0	0	6	0	0	17	0
Lane Group Flow (vph)	254	408	0	43	487	0	5	632	0	34	529	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7			3	8			2			6	
Permitted Phases		4					2			6		
Actuated Green, G (s)	10.1	22.6		1.8	14.3		13.1	13.1		13.1	13.1	
Effective Green, g (s)	10.1	22.6		1.8	14.3		13.1	13.1		13.1	13.1	
Actuated g/C Ratio	0.20	0.46		0.04	0.29		0.26	0.26		0.26	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	361	1611		64	1012		172	931		151	922	
v/s Ratio Prot	c0.14			0.02	c0.14			c0.18			0.16	
v/s Ratio Perm		0.12					0.01			0.06		
v/c Ratio	0.70	0.25		0.67	0.48		0.03	0.68		0.23	0.57	
Uniform Delay, d1	18.3	8.3		23.6	14.5		13.5	16.3		14.2	15.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.1	0.1		24.3	0.4		0.1	2.0		0.8	0.9	
Delay (s)	24.4	8.3		47.9	14.9		13.6	18.3		15.0	16.6	
Level of Service	C	A		D	B		B	B		B	B	
Approach Delay (s)		14.5			17.5			18.3			16.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.95		1.00	0.97		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4809		1770	4948		1770	3367		1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4809		1770	4948		1770	3367		1770	3539	1583
Volume (vph)	375	366	208	102	418	92	369	310	149	21	123	843
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	408	398	226	111	454	100	401	337	162	23	134	916
RTOR Reduction (vph)	0	74	0	0	27	0	0	45	0	0	0	210
Lane Group Flow (vph)	408	550	0	111	527	0	401	454	0	23	134	706
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	53.0	56.4		12.3	15.7		28.0	36.7		3.0	11.7	53.0
Effective Green, g (s)	53.0	56.4		12.3	15.7		28.0	36.7		3.0	11.7	53.0
Actuated g/C Ratio	0.43	0.45		0.10	0.13		0.23	0.30		0.02	0.09	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	1463	2180		175	624		398	993		43	333	674
v/s Ratio Prot	0.12	0.13		0.06	c0.11		c0.23	c0.15		0.01	0.04	c0.58
v/s Ratio Perm												
v/c Ratio	0.28	0.25		0.63	0.84		1.01	0.46		0.53	0.40	1.05
Uniform Delay, d1	23.3	21.0		53.9	53.2		48.2	35.7		60.0	53.1	35.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		7.3	10.2		47.0	0.3		12.2	0.8	47.7
Delay (s)	23.4	21.0		61.2	63.3		95.2	36.1		72.2	53.9	83.4
Level of Service	C	C		E	E		F	D		E	D	F
Approach Delay (s)		22.0			63.0			62.4			79.5	
Approach LOS		C			E			E			E	

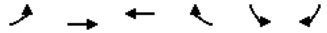
Intersection Summary			
HCM Average Control Delay	56.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	124.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		1.00	0.91					0.95	0.91	0.95
Frt		0.97		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		4943		1770	5085					1681	1610	1504
Flt Permitted		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		4943		1770	5085					1681	1610	1504
Volume (vph)	0	1666	382	21	2273	0	0	0	0	1008	0	254
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1811	415	23	2471	0	0	0	0	1096	0	276
RTOR Reduction (vph)	0	42	0	0	0	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	2184	0	23	2471	0	0	0	0	548	548	275
Turn Type				Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases												6
Actuated Green, G (s)		40.8		1.6	46.4					25.6	25.6	25.6
Effective Green, g (s)		40.8		1.6	46.4					25.6	25.6	25.6
Actuated g/C Ratio		0.51		0.02	0.58					0.32	0.32	0.32
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2521		35	2949					538	515	481
v/s Ratio Prot		0.45		0.01	c0.49					0.33	c0.34	
v/s Ratio Perm												0.18
v/c Ratio		0.87		0.66	0.84					1.02	1.06	0.57
Uniform Delay, d1		17.2		38.9	13.7					27.2	27.2	22.6
Progression Factor		1.00		1.38	0.13					1.00	1.00	1.00
Incremental Delay, d2		3.4		15.3	0.8					43.6	57.8	4.9
Delay (s)		20.6		69.0	2.7					70.8	85.0	27.5
Level of Service		C		E	A					E	F	C
Approach Delay (s)		20.6			3.3			0.0			67.7	
Approach LOS		C			A			A			E	

Intersection Summary				
HCM Average Control Delay	24.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	138.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

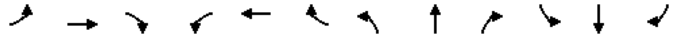
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1770	5085			5085	1583	1681	1610	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	1770	5085			5085	1583	1681	1610	1504			
Volume (vph)	243	1423	0	0	2294	903	306	0	27	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	264	1547	0	0	2493	982	333	0	29	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	335	0	0	23	0	0	0
Lane Group Flow (vph)	264	1547	0	0	2493	648	167	166	6	0	0	0
Turn Type	Prot					Perm	Prot		Perm			
Protected Phases	7	4			8		5	2				
Permitted Phases						8			2			
Actuated Green, G (s)	12.0	56.0			40.0	40.0	16.0	16.0	16.0			
Effective Green, g (s)	12.0	56.0			40.0	40.0	16.0	16.0	16.0			
Actuated g/C Ratio	0.15	0.70			0.50	0.50	0.20	0.20	0.20			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	266	3560			2543	792	336	322	301			
v/s Ratio Prot	c0.15	0.30			0.49		0.10	c0.10				
v/s Ratio Perm						0.62			0.02			
v/c Ratio	0.99	0.43			0.98	0.82	0.50	0.52	0.02			
Uniform Delay, d1	34.0	5.2			19.6	16.9	28.4	28.5	25.7			
Progression Factor	1.04	1.13			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	33.5	0.0			13.5	6.6	5.2	5.8	0.1			
Delay (s)	68.7	5.9			33.1	23.5	33.6	34.3	25.8			
Level of Service	E	A			C	C	C	C	C			
Approach Delay (s)		15.1			30.4			33.3			0.0	
Approach LOS		B			C			C			A	

Intersection Summary				
HCM Average Control Delay	25.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.03			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	138.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0		4.0
Lane Util. Factor		0.91	0.91	1.00		1.00
Frt		1.00	1.00	0.85		0.86
Flt Protected		1.00	1.00	1.00		1.00
Satd. Flow (prot)		5085	5085	1583		1611
Flt Permitted		1.00	1.00	1.00		1.00
Satd. Flow (perm)		5085	5085	1583		1611
Volume (vph)	0	2011	618	62	0	387
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2186	672	67	0	421
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	2186	672	67	0	421
Turn Type				Free		Free
Protected Phases		4	8			
Permitted Phases				Free		Free
Actuated Green, G (s)		30.6	30.6	30.6		30.6
Effective Green, g (s)		30.6	30.6	30.6		30.6
Actuated g/C Ratio		1.00	1.00	1.00		1.00
Clearance Time (s)		4.0	4.0			
Vehicle Extension (s)		3.0	3.0			
Lane Grp Cap (vph)		5085	5085	1583		1611
v/s Ratio Prot		c0.43	0.13			
v/s Ratio Perm				0.04		0.26
v/c Ratio		0.43	0.13	0.04		0.26
Uniform Delay, d1		0.0	0.0	0.0		0.0
Progression Factor		1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.0	0.1		0.4
Delay (s)		0.1	0.0	0.1		0.4
Level of Service		A	A	A		A
Approach Delay (s)		0.1	0.0		0.4	
Approach LOS		A	A		A	

Intersection Summary				
HCM Average Control Delay	0.1	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	30.6	Sum of lost time (s)	0.0	
Intersection Capacity Utilization	42.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		0.97	0.95					1.00		1.00
Frt		0.96		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3415		3433	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3415		3433	3539					1770		1583
Volume (vph)	0	384	117	555	412	0	0	0	0	197	0	303
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	417	127	603	448	0	0	0	0	214	0	329
RTOR Reduction (vph)	0	57	0	0	0	0	0	0	0	0	0	227
Lane Group Flow (vph)	0	487	0	603	448	0	0	0	0	214	0	102
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		12.6		13.4	30.0					17.0		17.0
Effective Green, g (s)		12.6		13.4	30.0					17.0		17.0
Actuated g/C Ratio		0.23		0.24	0.55					0.31		0.31
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		782		836	1930					547		489
v/s Ratio Prot		c0.16		c0.18	0.13					0.12		
v/s Ratio Perm												0.21
v/c Ratio		0.62		0.72	0.23					0.39		0.21
Uniform Delay, d1		19.1		19.1	6.5					14.9		14.0
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		1.6		3.1	0.1					0.5		1.0
Delay (s)		20.6		22.2	6.6					15.4		15.0
Level of Service		C		C	A					B		B
Approach Delay (s)		20.6			15.5			0.0			15.2	
Approach LOS		C			B			A			B	

Intersection Summary				
HCM Average Control Delay	16.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	51.1%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	5085	5085	1583
Volume (vph)	2645	72	22	121	61	87
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2875	78	24	132	66	95
RTOR Reduction (vph)	0	14	0	0	0	84
Lane Group Flow (vph)	2875	64	24	132	66	11
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	118.0	118.0	2.4	24.0	17.6	17.6
Effective Green, g (s)	118.0	118.0	2.4	24.0	17.6	17.6
Actuated g/C Ratio	0.79	0.79	0.02	0.16	0.12	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2701	1245	55	814	597	186
v/s Ratio Prot	c0.84		c0.01	0.03	0.01	
v/s Ratio Perm		0.05				0.06
v/c Ratio	1.06	0.05	0.44	0.16	0.11	0.06
Uniform Delay, d1	16.0	3.6	73.1	54.3	59.2	58.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.5	0.0	5.5	0.4	0.4	0.6
Delay (s)	53.5	3.6	78.6	54.8	59.6	59.5
Level of Service	D	A	E	D	E	E
Approach Delay (s)	52.2			58.4	59.5	
Approach LOS	D			E	E	

Intersection Summary			
HCM Average Control Delay	52.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91		0.97	0.86	0.86	0.97	0.95	0.95	0.97	0.95	0.95
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.92	0.85	1.00	0.93	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	4964		3433	4806	1362	3433	1633	1504	3433	1646	1504
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	4964		3433	4806	1362	3433	1633	1504	3433	1646	1504
Volume (vph)	170	1414	269	608	2151	668	531	233	781	777	60	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	1537	292	661	2338	726	577	253	849	845	65	190
RTOR Reduction (vph)	0	21	0	0	0	244	0	29	149	0	23	103
Lane Group Flow (vph)	185	1808	0	661	2338	482	577	492	432	845	99	30
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	11.0	41.0		18.0	48.0	48.0	26.1	32.0	32.0	23.0	28.9	28.9
Effective Green, g (s)	11.0	41.0		18.0	48.0	48.0	26.1	32.0	32.0	23.0	28.9	28.9
Actuated g/C Ratio	0.08	0.32		0.14	0.37	0.37	0.20	0.25	0.25	0.18	0.22	0.22
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	150	1566		475	1775	503	689	402	370	607	366	334
v/s Ratio Prot	0.10	0.37		c0.19	0.49		0.17	0.32		c0.25	0.07	
v/s Ratio Perm						0.53			0.39			0.09
v/c Ratio	1.23	1.15		1.39	1.32	0.96	0.84	1.22	1.17	1.39	0.27	0.09
Uniform Delay, d1	59.5	44.5		56.0	41.0	40.0	49.9	49.0	49.0	53.5	41.8	40.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	149.5	77.2		188.8	146.8	29.4	8.8	120.7	101.3	186.4	1.8	0.5
Delay (s)	209.0	121.7		244.8	187.8	69.4	58.7	169.7	150.3	239.9	43.6	40.6
Level of Service	F	F		F	F	E	E	F	F	F	D	D
Approach Delay (s)		129.7			174.9			124.8			194.0	
Approach LOS		F			F			F			F	

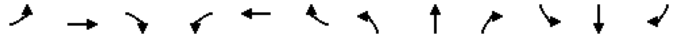
Intersection Summary			
HCM Average Control Delay	156.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	119.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91	0.88	0.97	0.91					0.95	0.91	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		5085	2787	3433	5085					1681	1441	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		5085	2787	3433	5085					1681	1441	1504
Volume (vph)	0	2088	884	316	2579	0	0	0	0	335	0	848
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2270	961	343	2803	0	0	0	0	364	0	922
RTOR Reduction (vph)	0	0	508	0	0	0	0	0	0	0	1	1
Lane Group Flow (vph)	0	2270	453	343	2803	0	0	0	0	364	460	460
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases			4									6
Actuated Green, G (s)		40.0	40.0	9.0	53.0					29.0	29.0	29.0
Effective Green, g (s)		40.0	40.0	9.0	53.0					29.0	29.0	29.0
Actuated g/C Ratio		0.44	0.44	0.10	0.59					0.32	0.32	0.32
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2260	1239	343	2995					542	464	485
v/s Ratio Prot		c0.45		0.10	c0.55					0.22	c0.32	
v/s Ratio Perm			0.34									0.31
v/c Ratio		1.00	0.37	1.00	0.94					0.67	0.99	0.95
Uniform Delay, d1		25.0	16.6	40.5	16.9					26.4	30.4	29.8
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		20.0	0.2	48.6	6.4					3.3	39.9	30.0
Delay (s)		45.0	16.8	89.1	23.3					29.7	70.3	59.8
Level of Service		D	B	F	C					C	E	E
Approach Delay (s)		36.6			30.5			0.0			55.0	
Approach LOS		D			C			A			D	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

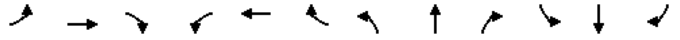
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Lane Util. Factor	0.97	0.91			0.91	1.00	0.97		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	3433	5085			5085	1583	3433		1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	3433	5085			5085	1583	3433		1583			
Volume (vph)	770	1653	0	0	1376	788	1519	0	622	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	837	1797	0	0	1496	857	1651	0	676	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	516	0	0	5	0	0	0
Lane Group Flow (vph)	837	1797	0	0	1496	341	1651	0	671	0	0	0
Turn Type	Prot					Perm	Prot		custom			
Protected Phases	7	4			8		5					
Permitted Phases						8			2			
Actuated Green, G (s)	26.0	61.0			31.0	31.0	51.0		51.0			
Effective Green, g (s)	26.0	61.0			31.0	31.0	51.0		51.0			
Actuated g/C Ratio	0.22	0.51			0.26	0.26	0.42		0.42			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	744	2585			1314	409	1459		673			
v/s Ratio Prot	c0.24	0.35			0.29		c0.48					
v/s Ratio Perm						0.54			0.43			
v/c Ratio	1.12	0.70			1.14	0.83	1.13		1.00			
Uniform Delay, d1	47.0	22.4			44.5	42.1	34.5		34.4			
Progression Factor	1.00	1.00			1.00	1.00	1.00		1.00			
Incremental Delay, d2	73.0	0.8			72.1	13.6	68.4		34.1			
Delay (s)	120.0	23.3			116.6	55.6	102.9		68.6			
Level of Service	F	C			F	E	F		E			
Approach Delay (s)		54.0			94.4			92.9			0.0	
Approach LOS		D			F			F			A	

Intersection Summary			
HCM Average Control Delay	79.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	0.97	0.86	0.86		0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	3433	4806	1362	3433	5085	1583	3433	4595	1362		5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	3433	4806	1362	3433	5085	1583	3433	4595	1362		5085	1583
Volume (vph)	634	1034	607	596	556	6	1457	960	938	0	395	207
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	689	1124	660	648	604	7	1584	1043	1020	0	429	225
RTOR Reduction (vph)	0	0	428	0	0	6	0	48	264	0	0	167
Lane Group Flow (vph)	689	1124	232	648	604	1	1584	1427	324	0	429	58
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			4			8			2			
Actuated Green, G (s)	31.0	29.0	29.0	24.1	22.1	22.1	55.0	74.9	74.9		15.9	31.0
Effective Green, g (s)	31.0	29.0	29.0	24.1	22.1	22.1	55.0	74.9	74.9		15.9	31.0
Actuated g/C Ratio	0.22	0.21	0.21	0.17	0.16	0.16	0.39	0.54	0.54		0.11	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	760	996	282	591	803	250	1349	2458	729		578	351
v/s Ratio Prot	0.20	0.23		c0.19	0.12		c0.46	0.32			0.08	0.14
v/s Ratio Perm			0.48			0.00			0.43			
v/c Ratio	0.91	1.13	0.82	1.10	0.75	0.00	1.17	0.58	0.44		0.74	0.17
Uniform Delay, d1	53.1	55.5	53.0	58.0	56.3	49.7	42.5	22.0	19.9		60.1	44.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	14.4	70.8	17.3	66.1	4.0	0.0	86.5	1.0	2.0		8.4	0.2
Delay (s)	67.5	126.3	70.3	124.1	60.3	49.7	129.0	23.0	21.8		68.4	44.3
Level of Service	E	F	E	F	E	D	F	C	C		E	D
Approach Delay (s)		95.0			93.1			68.9			60.1	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM Average Control Delay	80.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5054		1770	5032		1770	3494		1770	3446	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.58	1.00	
Satd. Flow (perm)	1770	5054		1770	5032		1014	3494		1085	3446	
Volume (vph)	70	1981	84	23	1087	82	28	227	21	234	232	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	2153	91	25	1182	89	30	247	23	254	252	54
RTOR Reduction (vph)	0	5	0	0	10	0	0	9	0	0	25	0
Lane Group Flow (vph)	76	2239	0	25	1261	0	30	261	0	254	281	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	4.3	34.3		1.4	31.4		18.3	18.3		18.3	18.3	
Effective Green, g (s)	4.3	34.3		1.4	31.4		18.3	18.3		18.3	18.3	
Actuated g/C Ratio	0.07	0.52		0.02	0.48		0.28	0.28		0.28	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	115	2627		38	2394		281	969		301	955	
v/s Ratio Prot	c0.04	c0.44		0.01	0.25			0.08			0.09	
v/s Ratio Perm							0.03			c0.23		
v/c Ratio	0.66	0.85		0.66	0.53		0.11	0.27		0.84	0.29	
Uniform Delay, d1	30.1	13.7		32.1	12.1		17.8	18.6		22.5	18.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.4	2.9		34.3	0.2		0.2	0.2		18.9	0.2	
Delay (s)	43.5	16.5		66.3	12.3		17.9	18.8		41.4	18.9	
Level of Service	D	B		E	B		B	B		D	B	
Approach Delay (s)		17.4			13.4			18.7			29.1	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4998		1770	5063		1770	3510		1770	3446	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4998		1770	5063		1770	3510		1770	3446	
Volume (vph)	105	1875	241	16	1149	34	93	562	32	121	367	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	2038	262	17	1249	37	101	611	35	132	399	85
RTOR Reduction (vph)	0	18	0	0	4	0	0	5	0	0	19	0
Lane Group Flow (vph)	114	2282	0	17	1282	0	101	641	0	132	465	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.5	43.0		1.5	36.0		6.3	19.1		8.0	20.8	
Effective Green, g (s)	8.5	43.0		1.5	36.0		6.3	19.1		8.0	20.8	
Actuated g/C Ratio	0.10	0.49		0.02	0.41		0.07	0.22		0.09	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	172	2453		30	2081		127	765		162	818	
v/s Ratio Prot	c0.06	c0.46		0.01	0.25		0.06	c0.18		c0.07	0.14	
v/s Ratio Perm												
v/c Ratio	0.66	0.93		0.57	0.62		0.80	0.84		0.81	0.57	
Uniform Delay, d1	38.2	20.9		42.7	20.4		40.0	32.8		39.1	29.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.2	7.1		22.3	0.5		28.1	8.0		25.9	0.9	
Delay (s)	47.4	28.0		65.0	20.9		68.1	40.8		65.0	30.4	
Level of Service	D	C		E	C		E	D		E	C	
Approach Delay (s)		28.9			21.5			44.5			37.8	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM Average Control Delay	30.4	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.90				
Actuated Cycle Length (s)	87.6	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	81.5%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

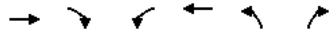
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	0.91		1.00	0.95	
Frt	1.00	0.93		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4733		1770	3464		1770	4810		1770	3418	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4733		1770	3464		1770	4810		1770	3418	
Volume (vph)	55	372	319	256	357	59	346	564	318	25	477	141
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	404	347	278	388	64	376	613	346	27	518	153
RTOR Reduction (vph)	0	173	0	0	14	0	0	99	0	0	31	0
Lane Group Flow (vph)	60	578	0	278	438	0	376	860	0	27	640	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.9	15.4		15.7	25.2		20.2	31.3		6.8	17.9	
Effective Green, g (s)	5.9	15.4		15.7	25.2		20.2	31.3		6.8	17.9	
Actuated g/C Ratio	0.07	0.18		0.18	0.30		0.24	0.37		0.08	0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	855		326	1025		420	1767		141	718	
v/s Ratio Prot	0.03	c0.16		c0.16	0.13		c0.21	0.20		0.02	c0.20	
v/s Ratio Perm												
v/c Ratio	0.49	0.68		0.85	0.43		0.90	0.49		0.19	0.89	
Uniform Delay, d1	38.2	32.6		33.6	24.2		31.5	20.8		36.6	32.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	2.1		18.9	0.3		20.9	0.2		0.7	13.3	
Delay (s)	41.2	34.7		52.5	24.5		52.4	21.0		37.3	46.1	
Level of Service	D	C		D	C		D	C		D	D	
Approach Delay (s)		35.2			35.2			29.8			45.7	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	35.2	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	85.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	78.7%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	0.91	0.95	
Frt	0.97		1.00	1.00	0.97	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1738		1770	5085	3424	
Flt Permitted	0.96		0.37	1.00	1.00	
Satd. Flow (perm)	1738		684	5085	3424	
Volume (vph)	102	30	24	845	527	145
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	33	26	918	573	158
RTOR Reduction (vph)	16	0	0	0	21	0
Lane Group Flow (vph)	128	0	26	918	710	0
Turn Type			Perm			
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	8.5		28.0	28.0	28.0	
Effective Green, g (s)	8.5		28.0	28.0	28.0	
Actuated g/C Ratio	0.19		0.63	0.63	0.63	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	332		430	3200	2154	
v/s Ratio Prot				0.18	c0.21	
v/s Ratio Perm	0.08		0.04			
v/c Ratio	0.39		0.06	0.29	0.33	
Uniform Delay, d1	15.7		3.2	3.7	3.9	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.1	0.0	0.1	
Delay (s)	16.5		3.2	3.8	3.9	
Level of Service	B		A	A	A	
Approach Delay (s)	16.5			3.8	3.9	
Approach LOS	B			A	A	

Intersection Summary				
HCM Average Control Delay	4.8	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.36			
Actuated Cycle Length (s)	44.5	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	34.1%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3504		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3504		1770	3539	1770	1583
Volume (vph)	917	65	269	761	231	739
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	997	71	292	827	251	803
RTOR Reduction (vph)	6	0	0	0	0	258
Lane Group Flow (vph)	1062	0	292	827	251	545
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	25.0		14.0	43.0	28.2	28.2
Effective Green, g (s)	25.0		14.0	43.0	28.2	28.2
Actuated g/C Ratio	0.32		0.18	0.54	0.36	0.36
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1106		313	1921	630	564
v/s Ratio Prot	c0.30		c0.17	0.23	0.14	
v/s Ratio Perm						0.51
v/c Ratio	0.96		0.93	0.43	0.40	0.97
Uniform Delay, d1	26.6		32.1	10.8	19.1	25.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	18.2		33.6	0.2	0.4	29.4
Delay (s)	44.8		65.7	11.0	19.6	54.4
Level of Service	D		E	B	B	D
Approach Delay (s)	44.8			25.2	46.1	
Approach LOS	D			C	D	

Intersection Summary				
HCM Average Control Delay	38.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	79.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	79.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Hesperia GP Update
18: Joshua St & Mariposa Ave

7/9/2009
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	0.97		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3443		3433	3452		3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3443		3433	3452		3433	5085	1583	3433	5085	1583
Volume (vph)	515	1031	229	39	638	125	304	1111	242	221	547	254
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	560	1121	249	42	693	136	330	1208	263	240	595	276
RTOR Reduction (vph)	0	15	0	0	16	0	0	0	193	0	0	215
Lane Group Flow (vph)	560	1355	0	42	813	0	330	1208	70	240	595	61
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	19.5	46.9		4.2	31.6		12.5	27.0	27.0	8.0	22.5	22.5
Effective Green, g (s)	19.5	46.9		4.2	31.6		12.5	27.0	27.0	8.0	22.5	22.5
Actuated g/C Ratio	0.19	0.46		0.04	0.31		0.12	0.26	0.26	0.08	0.22	0.22
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	656	1582		141	1068		420	1345	419	269	1121	349
v/s Ratio Prot	c0.16	c0.40		0.01	0.24		c0.10	c0.24		0.07	0.12	
v/s Ratio Perm									0.17			0.17
v/c Ratio	0.85	0.86		0.30	0.76		0.79	0.90	0.17	0.89	0.53	0.17
Uniform Delay, d1	39.9	24.6		47.5	31.8		43.5	36.2	28.9	46.6	35.1	32.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.5	4.8		1.2	3.3		9.3	8.2	0.2	28.7	0.5	0.2
Delay (s)	50.4	29.4		48.7	35.1		52.8	44.5	29.1	75.3	35.6	32.5
Level of Service	D	C		D	D		D	D	C	E	D	C
Approach Delay (s)		35.5			35.8			43.8			43.4	
Approach LOS		D			D			D			D	

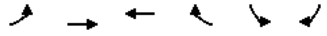
Intersection Summary			
HCM Average Control Delay	39.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	102.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
19: Muscatel St & Escondido Ave

7/9/2009
PM Peak Hour

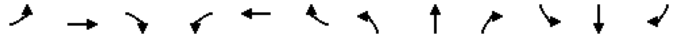
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3404		1770	3355		1770	3452		1770	3462	
Flt Permitted	0.28	1.00		0.17	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	520	3404		310	3355		1770	3452		1770	3462	
Volume (vph)	112	802	274	21	402	214	159	619	122	355	609	103
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	872	298	23	437	233	173	673	133	386	662	112
RTOR Reduction (vph)	0	48	0	0	100	0	0	24	0	0	19	0
Lane Group Flow (vph)	122	1122	0	23	570	0	173	782	0	386	755	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	24.0	24.0		24.0	24.0		8.8	17.7		16.0	24.9	
Effective Green, g (s)	24.0	24.0		24.0	24.0		8.8	17.7		16.0	24.9	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.13	0.25		0.23	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179	1172		107	1155		223	877		406	1237	
v/s Ratio Prot		c0.34			0.20		0.10	c0.23		c0.22	0.22	
v/s Ratio Perm	0.23			0.07								
v/c Ratio	0.68	0.96		0.21	0.49		0.78	0.89		0.95	0.61	
Uniform Delay, d1	19.6	22.4		16.2	18.1		29.5	25.1		26.5	18.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.2	16.9		1.0	0.3		15.5	11.3		32.1	0.9	
Delay (s)	29.8	39.2		17.2	18.4		44.9	36.4		58.6	19.3	
Level of Service	C	D		B	B		D	D		E	B	
Approach Delay (s)		38.3			18.3			37.9			32.4	
Approach LOS		D			B			D			C	

Intersection Summary			
HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Volume (vph)	711	437	346	568	368	761
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	773	475	376	617	400	827
RTOR Reduction (vph)	0	0	0	516	0	592
Lane Group Flow (vph)	773	475	376	101	400	235
Turn Type	Prot			Perm		custom
Protected Phases	1		2			
Permitted Phases		6		2	8	8
Actuated Green, G (s)	20.9	14.9	14.3	14.3	21.1	21.1
Effective Green, g (s)	20.9	14.9	14.3	14.3	21.1	21.1
Actuated g/C Ratio	0.24	0.17	0.16	0.16	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	823	605	580	260	428	383
v/s Ratio Prot	c0.23		0.11			
v/s Ratio Perm		0.13		0.39	0.23	0.52
v/c Ratio	0.94	0.79	0.65	0.39	0.93	0.61
Uniform Delay, d1	32.5	34.6	34.1	32.5	32.4	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.1	6.6	2.5	1.0	27.6	2.9
Delay (s)	50.6	41.2	36.6	33.5	59.9	32.3
Level of Service	D	D	D	C	E	C
Approach Delay (s)		47.0	34.7		41.3	
Approach LOS		D	C		D	

Intersection Summary				
HCM Average Control Delay	41.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.56			
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	63.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	150	1586	1011	45	1588	555	1015	1460	45	213	1035	199
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	1724	1099	49	1726	603	1103	1587	49	232	1125	216
RTOR Reduction (vph)	0	0	485	0	0	157	0	0	23	0	0	42
Lane Group Flow (vph)	163	1724	615	49	1726	446	1103	1587	26	232	1125	174
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	49.6	49.6	3.2	45.8	45.8	42.0	58.3	58.3	13.7	30.0	30.0
Effective Green, g (s)	7.0	49.6	49.6	3.2	45.8	45.8	42.0	58.3	58.3	13.7	30.0	30.0
Actuated g/C Ratio	0.05	0.35	0.35	0.02	0.33	0.33	0.30	0.41	0.41	0.10	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	1791	982	78	1654	515	1024	2106	655	334	1083	337
v/s Ratio Prot	c0.05	0.34		0.01	0.34		c0.32	0.31		0.07	c0.22	
v/s Ratio Perm			0.39			0.38			0.03			0.14
v/c Ratio	0.95	0.96	0.63	0.63	1.04	0.87	1.08	0.75	0.04	0.69	1.04	0.52
Uniform Delay, d1	66.7	44.7	37.9	68.2	47.5	44.6	49.4	35.1	24.6	61.5	55.4	49.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	54.8	13.5	1.3	14.8	34.4	14.3	51.3	1.6	0.0	6.1	37.9	1.3
Delay (s)	121.5	58.1	39.1	83.0	81.9	58.9	100.7	36.7	24.6	67.7	93.3	50.3
Level of Service	F	E	D	F	F	E	F	D	C	E	F	D
Approach Delay (s)		54.6			76.1			62.3			83.6	
Approach LOS		D			E			E			F	

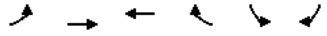
Intersection Summary				
HCM Average Control Delay	66.8	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.09			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	97.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3425		3433	3505	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3425		3433	3505	
Volume (vph)	83	1139	236	157	996	91	138	783	214	176	648	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	1238	257	171	1083	99	150	851	233	191	704	49
RTOR Reduction (vph)	0	0	150	0	0	71	0	41	0	0	8	0
Lane Group Flow (vph)	90	1238	107	171	1083	28	150	1043	0	191	745	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	3.2	16.8	16.8	4.0	17.6	17.6	3.2	20.7		4.0	21.5	
Effective Green, g (s)	3.2	16.8	16.8	4.0	17.6	17.6	3.2	20.7		4.0	21.5	
Actuated g/C Ratio	0.05	0.27	0.27	0.07	0.29	0.29	0.05	0.34		0.07	0.35	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179	1389	432	223	1455	453	179	1153		223	1225	
v/s Ratio Prot	0.03	c0.24		c0.05	0.21		0.04	c0.32		c0.06	0.21	
v/s Ratio Perm			0.16			0.06						
v/c Ratio	0.50	0.89	0.25	0.77	0.74	0.06	0.84	0.90		0.86	0.61	
Uniform Delay, d1	28.4	21.5	17.4	28.3	19.9	16.0	28.9	19.5		28.5	16.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	7.6	0.3	14.5	2.1	0.1	27.5	10.1		26.1	0.9	
Delay (s)	30.6	29.1	17.7	42.8	22.0	16.0	56.4	29.5		54.5	17.4	
Level of Service	C	C	B	D	C	B	E	C		D	B	
Approach Delay (s)		27.3			24.2			32.8			24.9	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	27.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	73.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

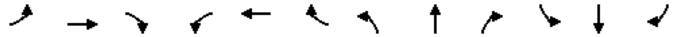
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085		1770	5085	1770	1583
Flt Permitted	1.00		0.11	1.00	0.95	1.00
Satd. Flow (perm)	5085		206	5085	1770	1583
Volume (vph)	1998	0	114	1251	163	252
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2172	0	124	1360	177	274
RTOR Reduction (vph)	0	0	0	0	0	5
Lane Group Flow (vph)	2172	0	124	1360	177	269
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	36.1		36.1	36.1	13.4	13.4
Effective Green, g (s)	36.1		36.1	36.1	13.4	13.4
Actuated g/C Ratio	0.63		0.63	0.63	0.23	0.23
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3192		129	3192	412	369
v/s Ratio Prot	0.43			0.27	0.10	
v/s Ratio Perm			c0.60			0.17
v/c Ratio	0.68		0.96	0.43	0.43	0.73
Uniform Delay, d1	7.0		10.0	5.4	18.8	20.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6		66.9	0.1	0.7	7.0
Delay (s)	7.6		77.0	5.5	19.5	27.4
Level of Service	A		E	A	B	C
Approach Delay (s)	7.6			11.5	24.3	
Approach LOS	A			B	C	

Intersection Summary				
HCM Average Control Delay	10.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	64.0%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	5033		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	5033		1770	1583
Volume (vph)	685	2627	1957	143	143	297
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	745	2855	2127	155	155	323
RTOR Reduction (vph)	0	0	5	0	0	289
Lane Group Flow (vph)	745	2855	2277	0	155	34
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	58.0	125.0	63.0		15.9	15.9
Effective Green, g (s)	58.0	125.0	63.0		15.9	15.9
Actuated g/C Ratio	0.39	0.84	0.42		0.11	0.11
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	689	4269	2129		189	169
v/s Ratio Prot	c0.42	0.56	c0.45		0.09	
v/s Ratio Perm						0.20
v/c Ratio	1.08	0.67	1.07		0.82	0.20
Uniform Delay, d1	45.5	4.4	43.0		65.1	60.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	58.4	0.4	41.1		23.9	0.6
Delay (s)	103.8	4.8	84.1		89.0	61.3
Level of Service	F	A	F		F	E
Approach Delay (s)		25.3	84.1		70.3	
Approach LOS		C	F		E	

Intersection Summary			
HCM Average Control Delay	49.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	148.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.91	1.00		0.91	1.00				0.95	0.91	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.85	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (prot)		5085	1583		5085	1583				1681	1441	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (perm)		5085	1583		5085	1583				1681	1441	1504
Volume (vph)	0	2797	25	0	1651	618	0	0	0	50	0	991
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3040	27	0	1795	672	0	0	0	54	0	1077
RTOR Reduction (vph)	0	0	9	0	0	289	0	0	0	0	10	10
Lane Group Flow (vph)	0	3040	18	0	1795	383	0	0	0	54	528	529
Turn Type			Perm			Perm				Prot		Perm
Protected Phases		4			8					1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		57.0	57.0		57.0	57.0				35.0	35.0	35.0
Effective Green, g (s)		57.0	57.0		57.0	57.0				35.0	35.0	35.0
Actuated g/C Ratio		0.57	0.57		0.57	0.57				0.35	0.35	0.35
Clearance Time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)		2898	902		2898	902				588	504	526
v/s Ratio Prot		c0.60			0.35					0.03	c0.37	
v/s Ratio Perm			0.02			0.42						0.36
v/c Ratio		1.05	0.02		0.62	0.42				0.09	1.05	1.01
Uniform Delay, d1		21.5	9.3		14.3	12.2				21.8	32.5	32.5
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		31.4	0.0		0.4	0.3				0.1	53.3	40.8
Delay (s)		52.9	9.4		14.7	12.5				21.9	85.8	73.3
Level of Service		D	A		B	B				C	F	E
Approach Delay (s)		52.5			14.1			0.0			76.8	
Approach LOS		D			B			A			E	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
27: Main St. & Escondido Ave

7/9/2009
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.86	0.86
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	4806	1362
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	4806	1362
Volume (vph)	483	998	401	545	1699	290	221	1546	784	295	1239	257
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	525	1085	436	592	1847	315	240	1680	852	321	1347	279
RTOR Reduction (vph)	0	0	112	0	0	106	0	0	241	0	0	151
Lane Group Flow (vph)	525	1085	324	592	1847	209	240	1680	611	321	1347	128
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	19.0	37.2	37.2	26.8	45.0	45.0	11.9	49.0	49.0	11.0	48.1	48.1
Effective Green, g (s)	19.0	37.2	37.2	26.8	45.0	45.0	11.9	49.0	49.0	11.0	48.1	48.1
Actuated g/C Ratio	0.14	0.27	0.27	0.19	0.32	0.32	0.09	0.35	0.35	0.08	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	466	1351	421	657	1634	509	292	1780	554	270	1651	468
v/s Ratio Prot	c0.15	0.21		0.17	c0.36		0.07	0.33		c0.09	0.28	
v/s Ratio Perm			0.28			0.20			0.54			0.20
v/c Ratio	1.13	0.80	0.77	0.90	1.13	0.41	0.82	0.94	1.10	1.19	0.82	0.27
Uniform Delay, d1	60.5	48.0	47.4	55.3	47.5	37.1	63.0	44.2	45.5	64.5	41.9	33.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	81.1	3.6	8.2	15.5	67.0	0.5	16.8	10.8	69.4	115.8	3.2	0.3
Delay (s)	141.6	51.5	55.7	70.8	114.5	37.7	79.8	54.9	114.9	180.3	45.1	33.6
Level of Service	F	D	E	E	F	D	E	D	F	F	D	C
Approach Delay (s)		75.5			96.3			75.5			65.8	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM Average Control Delay	79.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
28: Main St. & Maple Ave

7/9/2009
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3447		3433	3444	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3447		3433	3444	
Volume (vph)	348	1935	472	162	1906	89	301	817	172	212	783	172
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	378	2103	513	176	2072	97	327	888	187	230	851	187
RTOR Reduction (vph)	0	0	111	0	0	39	0	14	0	0	14	0
Lane Group Flow (vph)	378	2103	402	176	2072	58	327	1061	0	230	1024	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.0	58.0	58.0	7.0	51.0	51.0	12.0	40.0		9.0	37.0	
Effective Green, g (s)	14.0	58.0	58.0	7.0	51.0	51.0	12.0	40.0		9.0	37.0	
Actuated g/C Ratio	0.11	0.45	0.45	0.05	0.39	0.39	0.09	0.31		0.07	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	370	2269	706	185	1995	621	317	1061		238	980	
v/s Ratio Prot	c0.11	0.41		0.05	c0.41		c0.10	c0.31		0.07	0.30	
v/s Ratio Perm			0.32			0.06						
v/c Ratio	1.02	0.93	0.57	0.95	1.04	0.09	1.03	1.00		0.97	1.04	
Uniform Delay, d1	58.0	34.0	26.7	61.3	39.5	24.9	59.0	45.0		60.3	46.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.4	7.2	1.1	51.9	31.0	0.1	58.9	27.7		48.4	41.1	
Delay (s)	110.4	41.2	27.8	113.2	70.5	25.0	117.9	72.7		108.8	87.6	
Level of Service	F	D	C	F	E	C	F	E		F	F	
Approach Delay (s)		47.6			71.8			83.2			91.4	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM Average Control Delay	67.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.97	0.91	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	5085	1583	3433	5085	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	5085	1583	3433	5085	1770	1583
Volume (vph)	2675	264	332	2129	542	294
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2908	287	361	2314	589	320
RTOR Reduction (vph)	0	71	0	0	0	132
Lane Group Flow (vph)	2908	216	361	2314	589	188
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	77.0	77.0	16.0	97.0	45.0	45.0
Effective Green, g (s)	77.0	77.0	16.0	97.0	45.0	45.0
Actuated g/C Ratio	0.51	0.51	0.11	0.65	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2610	813	366	3288	531	475
v/s Ratio Prot	c0.57		c0.11	0.46	c0.33	
v/s Ratio Perm		0.18				0.20
v/c Ratio	1.11	0.27	0.99	0.70	1.11	0.40
Uniform Delay, d1	36.5	20.6	66.9	17.2	52.5	41.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	57.4	0.2	43.0	0.7	72.5	0.5
Delay (s)	93.9	20.7	109.9	17.9	125.0	42.3
Level of Service	F	C	F	B	F	D
Approach Delay (s)	87.3			30.3	95.9	
Approach LOS	F			C	F	

Intersection Summary				
HCM Average Control Delay	66.0	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.10			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	101.2%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3520		3433	3510		1770	1863	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3520		3433	3510		1770	1863	1583	1770	3539	1583
Volume (vph)	255	2633	98	249	3122	185	184	574	434	231	684	251
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	277	2862	107	271	3393	201	200	624	472	251	743	273
RTOR Reduction (vph)	0	2	0	0	3	0	0	0	68	0	0	73
Lane Group Flow (vph)	277	2967	0	271	3591	0	200	624	404	251	743	200
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	7.0	77.0		7.0	77.0		17.0	32.0	32.0	18.0	33.0	33.0
Effective Green, g (s)	7.0	77.0		7.0	77.0		17.0	32.0	32.0	18.0	33.0	33.0
Actuated g/C Ratio	0.05	0.51		0.05	0.51		0.11	0.21	0.21	0.12	0.22	0.22
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	160	1807		160	1802		201	397	338	212	779	348
v/s Ratio Prot	c0.08	0.84		0.08	c1.02		0.11	c0.33		c0.14	0.21	
v/s Ratio Perm									0.30			0.17
v/c Ratio	1.73	1.64		1.69	1.99		1.00	1.57	1.19	1.18	0.95	0.58
Uniform Delay, d1	71.5	36.5		71.5	36.5		66.5	59.0	59.0	66.0	57.7	52.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	353.8	291.4		337.6	448.8		61.7	269.2	112.7	120.4	21.5	2.3
Delay (s)	425.3	327.9		409.1	485.3		128.2	328.2	171.7	186.4	79.3	54.6
Level of Service	F	F		F	F		F	F	F	F	E	D
Approach Delay (s)		336.2			479.9			240.3			95.2	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	349.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.77			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	155.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3507		3433	1639		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3507		3433	1639		1770	1863	1583
Volume (vph)	89	2045	613	279	1935	125	751	54	217	237	136	292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	2223	666	303	2103	136	816	59	236	258	148	317
RTOR Reduction (vph)	0	0	151	0	3	0	0	96	0	0	0	65
Lane Group Flow (vph)	97	2223	515	303	2236	0	816	199	0	258	148	252
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	7.0	67.0	67.0	19.0	79.0		26.0	25.0		23.0	22.0	22.0
Effective Green, g (s)	7.0	67.0	67.0	19.0	79.0		26.0	25.0		23.0	22.0	22.0
Actuated g/C Ratio	0.05	0.45	0.45	0.13	0.53		0.17	0.17		0.15	0.15	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	83	1581	707	224	1847		595	273		271	273	232
v/s Ratio Prot	0.05	c0.63		c0.17	0.64		c0.24	c0.18		0.15	0.08	
v/s Ratio Perm			0.42									0.20
v/c Ratio	1.17	1.41	0.73	1.35	1.21		1.37	0.73		0.95	0.54	1.09
Uniform Delay, d1	71.5	41.5	34.1	65.5	35.5		62.0	59.3		63.0	59.3	64.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	151.3	186.6	3.8	185.1	100.0		177.7	9.4		41.5	2.2	84.2
Delay (s)	222.8	228.1	37.8	250.6	135.5		239.7	68.7		104.5	61.5	148.2
Level of Service	F	F	D	F	F		F	E		F	E	F
Approach Delay (s)		185.5			149.2			194.3			114.8	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM Average Control Delay	167.4	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.42			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	114.7%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.96		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3459		3433	3534		3433	3381		3433	3326	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3459		3433	3534		3433	3381		3433	3326	
Volume (vph)	310	1478	263	47	1457	14	234	267	113	10	541	363
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	1607	286	51	1584	15	254	290	123	11	588	395
RTOR Reduction (vph)	0	11	0	0	1	0	0	33	0	0	82	0
Lane Group Flow (vph)	337	1882	0	51	1598	0	254	380	0	11	901	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.0	74.6		3.2	63.8		10.0	47.8		1.6	39.4	
Effective Green, g (s)	14.0	74.6		3.2	63.8		10.0	47.8		1.6	39.4	
Actuated g/C Ratio	0.10	0.52		0.02	0.45		0.07	0.33		0.01	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	336	1802		77	1575		240	1129		38	915	
v/s Ratio Prot	c0.10	c0.55		0.01	0.45		c0.07	0.12		0.00	c0.30	
v/s Ratio Perm												
v/c Ratio	1.00	1.04		0.66	1.01		1.06	0.34		0.29	0.98	
Uniform Delay, d1	64.6	34.3		69.5	39.7		66.6	35.8		70.2	51.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	49.8	33.9		19.4	26.4		74.3	0.2		4.2	25.8	
Delay (s)	114.4	68.2		88.8	66.1		140.9	36.0		74.4	77.4	
Level of Service	F	E		F	E		F	D		E	E	
Approach Delay (s)		75.2			66.8			75.9			77.4	
Approach LOS		E			E			E			E	

Intersection Summary				
HCM Average Control Delay	73.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	143.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	99.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	6	1486	369	162	993	56	388	581	203	245	1066	39
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	1615	401	176	1079	61	422	632	221	266	1159	42
RTOR Reduction (vph)	0	0	140	0	0	31	0	0	77	0	0	21
Lane Group Flow (vph)	7	1615	261	176	1079	30	422	632	144	266	1159	21
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	0.8	56.2	56.2	6.0	61.4	61.4	14.0	32.8	32.8	22.2	41.0	41.0
Effective Green, g (s)	0.8	56.2	56.2	6.0	61.4	61.4	14.0	32.8	32.8	22.2	41.0	41.0
Actuated g/C Ratio	0.01	0.42	0.42	0.05	0.46	0.46	0.11	0.25	0.25	0.17	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	21	1493	668	155	1631	730	361	871	390	295	1089	487
v/s Ratio Prot	0.00	c0.46		c0.05	0.30		c0.12	0.18		0.15	c0.33	
v/s Ratio Perm			0.25			0.04			0.14			0.03
v/c Ratio	0.33	1.08	0.39	1.14	0.66	0.04	1.17	0.73	0.37	0.90	1.06	0.04
Uniform Delay, d1	65.9	38.5	26.6	63.6	27.8	19.7	59.6	46.1	41.6	54.4	46.1	32.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	48.8	0.4	113.3	1.0	0.0	101.8	3.0	0.6	28.6	46.1	0.0
Delay (s)	75.1	87.3	27.0	176.9	28.9	19.8	161.4	49.1	42.2	83.0	92.2	32.4
Level of Service	E	F	C	F	C	B	F	D	D	F	F	C
Approach Delay (s)		75.3			48.2			85.1			88.8	
Approach LOS		E			D			F			F	

Intersection Summary			
HCM Average Control Delay	74.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	133.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

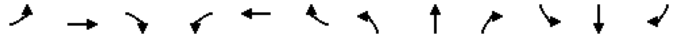
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.99		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3498		1770	3280		1770	5077		1770	5083	
Flt Permitted	0.18	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	339	3498		369	3280		1770	5077		1770	5083	
Volume (vph)	3	580	49	10	489	468	39	2143	24	166	1379	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	630	53	11	532	509	42	2329	26	180	1499	5
RTOR Reduction (vph)	0	8	0	0	110	0	0	2	0	0	0	0
Lane Group Flow (vph)	3	675	0	11	931	0	42	2353	0	180	1504	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.0	22.0		22.0	22.0		3.6	39.6		8.0	44.0	
Effective Green, g (s)	22.0	22.0		22.0	22.0		3.6	39.6		8.0	44.0	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.04	0.49		0.10	0.54	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	91	943		99	884		78	2464		174	2741	
v/s Ratio Prot		0.20			c0.32		0.02	c0.46		c0.10	0.30	
v/s Ratio Perm	0.01			0.03								
v/c Ratio	0.03	0.72		0.11	1.05		0.54	0.96		1.03	0.55	
Uniform Delay, d1	22.0	27.0		22.4	29.8		38.2	20.1		36.8	12.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.6		0.5	45.4		7.0	9.7		77.6	0.2	
Delay (s)	22.1	29.6		22.9	75.2		45.2	29.8		114.4	12.5	
Level of Service	C	C		C	E		D	C		F	B	
Approach Delay (s)		29.5			74.7			30.1			23.4	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.97	0.91	0.91	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	3433	5085	5085	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	3433	5085	5085	1583
Volume (vph)	911	126	227	4844	3217	563
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	990	137	247	5265	3497	612
RTOR Reduction (vph)	0	71	0	0	0	126
Lane Group Flow (vph)	990	66	247	5265	3497	486
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	33.0	33.0	9.0	109.0	96.0	96.0
Effective Green, g (s)	33.0	33.0	9.0	109.0	96.0	96.0
Actuated g/C Ratio	0.22	0.22	0.06	0.73	0.64	0.64
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	755	348	206	3695	3254	1013
v/s Ratio Prot			0.07	c1.04	0.69	
v/s Ratio Perm	0.29	0.09				0.39
v/c Ratio	1.31	0.19	1.20	1.42	1.07	0.48
Uniform Delay, d1	58.5	47.6	70.5	20.5	27.0	14.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	149.5	0.3	126.8	192.8	40.3	0.4
Delay (s)	208.0	47.9	197.3	213.3	67.3	14.4
Level of Service	F	D	F	F	E	B
Approach Delay (s)	188.5			212.6	59.4	
Approach LOS	F			F	E	

Intersection Summary				
HCM Average Control Delay	151.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.40			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	126.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5085	1583	3433	5085	1583	3433	5085	2787
Volume (vph)	840	1777	964	107	1161	25	1014	1263	114	26	933	685
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	913	1932	1048	116	1262	27	1102	1373	124	28	1014	745
RTOR Reduction (vph)	0	0	422	0	0	17	0	0	62	0	0	465
Lane Group Flow (vph)	913	1932	626	116	1262	10	1102	1373	62	28	1014	280
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	31.0	56.0	56.0	5.0	30.0	30.0	37.0	62.2	62.2	2.4	27.6	27.6
Effective Green, g (s)	31.0	56.0	56.0	5.0	30.0	30.0	37.0	62.2	62.2	2.4	27.6	27.6
Actuated g/C Ratio	0.22	0.40	0.40	0.04	0.21	0.21	0.26	0.44	0.44	0.02	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	752	2011	1102	121	1077	335	897	2234	695	58	991	543
v/s Ratio Prot	c0.27	0.38		0.03	c0.25		c0.32	0.27		0.01	0.20	
v/s Ratio Perm			0.38			0.02			0.08			0.27
v/c Ratio	1.21	0.96	0.57	0.96	1.17	0.03	1.23	0.61	0.09	0.48	1.02	0.52
Uniform Delay, d1	55.3	41.7	33.4	68.2	55.8	44.3	52.3	30.5	23.2	69.0	57.0	51.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	108.4	12.1	0.7	68.1	87.4	0.0	112.7	0.5	0.1	6.2	34.6	0.8
Delay (s)	163.7	53.9	34.0	136.3	143.2	44.3	165.0	31.0	23.2	75.2	91.6	51.8
Level of Service	F	D	C	F	F	D	F	C	C	E	F	D
Approach Delay (s)		74.3			140.7			87.4			74.8	
Approach LOS		E			F			F			E	

Intersection Summary				
HCM Average Control Delay	87.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.24			
Actuated Cycle Length (s)	141.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	106.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1583	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1583	5085	1583	3433	5085
Volume (vph)	390	367	1697	755	367	1424
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	399	1845	821	399	1548
RTOR Reduction (vph)	0	212	0	423	0	0
Lane Group Flow (vph)	424	187	1845	398	399	1548
Turn Type		custom		Perm	Prot	
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	12.9	12.9	24.1	24.1	8.0	36.1
Effective Green, g (s)	12.9	12.9	24.1	24.1	8.0	36.1
Actuated g/C Ratio	0.23	0.23	0.42	0.42	0.14	0.63
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	777	358	2150	669	482	3221
v/s Ratio Prot			0.36		c0.12	0.30
v/s Ratio Perm	0.12	0.25		0.52		
v/c Ratio	0.55	0.52	0.86	0.59	0.83	0.48
Uniform Delay, d1	19.5	19.3	14.9	12.7	23.8	5.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.4	3.6	1.4	11.2	0.1
Delay (s)	20.3	20.7	18.5	14.1	35.0	5.6
Level of Service	C	C	B	B	D	A
Approach Delay (s)	20.5		17.2			11.6
Approach LOS	C		B			B

Intersection Summary				
HCM Average Control Delay	15.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	64.4%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91	1.00	0.97	0.91					0.95	0.91	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.94	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		5085	1583	3433	5085					1681	1546	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		5085	1583	3433	5085					1681	1546	1504
Volume (vph)	0	2581	304	589	2253	0	0	0	0	595	0	496
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2805	330	640	2449	0	0	0	0	647	0	539
RTOR Reduction (vph)	0	0	98	0	0	0	0	0	0	0	7	7
Lane Group Flow (vph)	0	2805	232	640	2449	0	0	0	0	399	410	363
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases			4									6
Actuated Green, G (s)		66.0	66.0	22.0	92.0					30.0	30.0	30.0
Effective Green, g (s)		66.0	66.0	22.0	92.0					30.0	30.0	30.0
Actuated g/C Ratio		0.51	0.51	0.17	0.71					0.23	0.23	0.23
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2582	804	581	3599					388	357	347
v/s Ratio Prot		c0.55		c0.19	0.48					0.24	c0.27	
v/s Ratio Perm			0.21									0.25
v/c Ratio		1.09	0.29	1.10	0.68					1.03	1.15	1.05
Uniform Delay, d1		32.0	18.5	54.0	10.7					50.0	50.0	50.0
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		46.2	0.2	68.2	0.5					53.1	94.5	60.9
Delay (s)		78.2	18.7	122.2	11.3					103.1	144.5	110.9
Level of Service		E	B	F	B					F	F	F
Approach Delay (s)		72.0			34.2			0.0			120.1	
Approach LOS		E			C			A			F	

Intersection Summary				
HCM Average Control Delay	63.9	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.11			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	98.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	0.97	0.91			0.91	1.00	0.95	0.91	0.95			
Frt	1.00	1.00			1.00	0.85	1.00	0.88	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (prot)	3433	5085			5085	1583	1681	1474	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (perm)	3433	5085			5085	1583	1681	1474	1504			
Volume (vph)	420	2756	0	0	2289	571	552	0	826	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	457	2996	0	0	2488	621	600	0	898	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	246	0	1	1	0	0	0
Lane Group Flow (vph)	457	2996	0	0	2488	375	504	525	467	0	0	0
Turn Type	Prot					Perm	Prot		Perm			
Protected Phases	7	4			8		5	2				
Permitted Phases						8			2			
Actuated Green, G (s)	14.0	69.0			51.0	51.0	33.0	33.0	33.0			
Effective Green, g (s)	14.0	69.0			51.0	51.0	33.0	33.0	33.0			
Actuated g/C Ratio	0.13	0.63			0.46	0.46	0.30	0.30	0.30			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	437	3190			2358	734	504	442	451			
v/s Ratio Prot	c0.13	0.59			c0.49		0.30	c0.36				
v/s Ratio Perm						0.39			0.31			
v/c Ratio	1.05	0.94			1.06	0.51	1.00	1.19	1.04			
Uniform Delay, d1	48.0	18.6			29.5	20.7	38.5	38.5	38.5			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	55.5	6.3			35.1	0.6	40.1	105.5	52.0			
Delay (s)	103.5	24.9			64.6	21.3	78.6	144.0	90.5			
Level of Service	F	C			E	C	E	F	F			
Approach Delay (s)		35.3			56.0			105.3			0.0	
Approach LOS		D			E			F			A	

Intersection Summary			
HCM Average Control Delay	56.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3500		3433	3436	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3500		3433	3436	
Volume (vph)	263	1420	312	23	957	211	162	842	67	301	952	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	286	1543	339	25	1040	229	176	915	73	327	1035	250
RTOR Reduction (vph)	0	0	134	0	0	146	0	7	0	0	24	0
Lane Group Flow (vph)	286	1543	205	25	1040	83	176	981	0	327	1261	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	9.7	32.7	32.7	1.6	24.6	24.6	5.0	28.8		10.7	34.5	
Effective Green, g (s)	9.7	32.7	32.7	1.6	24.6	24.6	5.0	28.8		10.7	34.5	
Actuated g/C Ratio	0.11	0.36	0.36	0.02	0.27	0.27	0.06	0.32		0.12	0.38	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	371	1852	576	61	1393	434	191	1122		409	1320	
v/s Ratio Prot	c0.08	c0.30		0.01	0.20		0.05	0.28		c0.10	c0.37	
v/s Ratio Perm			0.21			0.14						
v/c Ratio	0.77	0.83	0.36	0.41	0.75	0.19	0.92	0.87		0.80	0.96	
Uniform Delay, d1	39.0	26.1	20.9	43.6	29.8	25.0	42.2	28.8		38.5	26.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.5	3.4	0.4	4.4	2.2	0.2	43.3	7.8		10.5	15.2	
Delay (s)	48.5	29.4	21.2	48.1	32.0	25.2	85.5	36.6		49.0	42.1	
Level of Service	D	C	C	D	C	C	F	D		D	D	
Approach Delay (s)		30.7			31.1			44.0			43.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	198	1982	273	324	1820	94	274	844	502	183	1237	114
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	2154	297	352	1978	102	298	917	546	199	1345	124
RTOR Reduction (vph)	0	0	94	0	0	40	0	0	91	0	0	49
Lane Group Flow (vph)	215	2154	203	352	1978	62	298	917	455	199	1345	75
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	53.0	53.0	12.0	56.0	56.0	10.0	50.0	50.0	9.0	49.0	49.0
Effective Green, g (s)	9.0	53.0	53.0	12.0	56.0	56.0	10.0	50.0	50.0	9.0	49.0	49.0
Actuated g/C Ratio	0.06	0.38	0.38	0.09	0.40	0.40	0.07	0.36	0.36	0.06	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	1925	599	294	2034	633	245	1264	565	221	1239	554
v/s Ratio Prot	0.06	c0.42		c0.10	c0.39		c0.09	0.26		0.06	c0.38	
v/s Ratio Perm			0.19			0.06			0.34			0.08
v/c Ratio	0.97	1.12	0.34	1.20	0.97	0.10	1.22	0.73	0.81	0.90	1.09	0.13
Uniform Delay, d1	65.4	43.5	31.0	64.0	41.2	26.2	65.0	39.0	40.6	65.1	45.5	31.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	52.5	61.2	0.3	117.0	14.0	0.1	128.6	2.1	8.2	34.8	52.1	0.1
Delay (s)	117.9	104.7	31.4	181.0	55.2	26.3	193.6	41.1	48.8	99.9	97.6	31.1
Level of Service	F	F	C	F	E	C	F	D	D	F	F	C
Approach Delay (s)		97.6			72.2			69.3			92.9	
Approach LOS		F			E			E			F	

Intersection Summary			
HCM Average Control Delay	83.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	1.00		1.00	0.96		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4878		1770	5081		1770	3415		1770	3324	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4878		1770	5081		1770	3415		1770	3324	
Volume (vph)	269	1269	472	153	1222	6	346	254	77	12	309	211
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	1379	513	166	1328	7	376	276	84	13	336	229
RTOR Reduction (vph)	0	67	0	0	1	0	0	25	0	0	122	0
Lane Group Flow (vph)	292	1825	0	166	1334	0	376	335	0	13	443	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	17.0	37.0		9.0	29.0		21.0	30.8		6.2	16.0	
Effective Green, g (s)	17.0	37.0		9.0	29.0		21.0	30.8		6.2	16.0	
Actuated g/C Ratio	0.17	0.37		0.09	0.29		0.21	0.31		0.06	0.16	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	304	1823		161	1488		375	1062		111	537	
v/s Ratio Prot	c0.17	c0.39		0.09	0.26		c0.21	0.11		0.01	c0.17	
v/s Ratio Perm												
v/c Ratio	0.96	1.00		1.03	0.90		1.00	0.31		0.12	0.82	
Uniform Delay, d1	40.7	31.0		45.0	33.6		39.0	26.0		43.8	40.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.9	21.3		79.3	7.5		47.1	0.2		0.5	9.9	
Delay (s)	81.5	52.3		124.3	41.0		86.1	26.2		44.3	50.1	
Level of Service	F	D		F	D		F	C		D	D	
Approach Delay (s)		56.2			50.2			56.8			49.9	
Approach LOS		E			D			E			D	

Intersection Summary			
HCM Average Control Delay	53.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5018		1770	5060		1770	3425		1770	3517	
Flt Permitted	0.95	1.00		0.95	1.00		0.27	1.00		0.27	1.00	
Satd. Flow (perm)	1770	5018		1770	5060		500	3425		500	3517	
Volume (vph)	63	1192	116	133	1102	38	66	566	155	47	808	36
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	1296	126	145	1198	41	72	615	168	51	878	39
RTOR Reduction (vph)	0	22	0	0	7	0	0	50	0	0	6	0
Lane Group Flow (vph)	68	1400	0	145	1232	0	72	733	0	51	911	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	2.2	16.4		4.4	18.6		14.9	14.9		14.9	14.9	
Effective Green, g (s)	2.2	16.4		4.4	18.6		14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.05	0.34		0.09	0.39		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	82	1725		163	1973		156	1070		156	1099	
v/s Ratio Prot	0.04	c0.28		c0.08	0.24			0.23			c0.26	
v/s Ratio Perm							0.14			0.10		
v/c Ratio	0.83	0.81		0.89	0.62		0.46	0.68		0.33	0.83	
Uniform Delay, d1	22.6	14.2		21.4	11.7		13.2	14.3		12.6	15.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.1	3.0		39.9	0.6		2.2	1.8		1.2	5.3	
Delay (s)	69.6	17.3		61.3	12.4		15.3	16.2		13.8	20.5	
Level of Service	E	B		E	B		B	B		B	C	
Approach Delay (s)		19.7			17.5			16.1			20.1	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		1.00	0.95					1.00		1.00
Frt		0.97		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3447		1770	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3447		1770	3539					1770		1583
Volume (vph)	0	1170	246	296	1570	0	0	0	0	360	0	121
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1272	267	322	1707	0	0	0	0	391	0	132
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	28
Lane Group Flow (vph)	0	1520	0	322	1707	0	0	0	0	391	0	104
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		40.0		17.0	61.0					21.0		21.0
Effective Green, g (s)		40.0		17.0	61.0					21.0		21.0
Actuated g/C Ratio		0.44		0.19	0.68					0.23		0.23
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1532		334	2399					413		369
v/s Ratio Prot		c0.45		c0.18	0.48					c0.22		
v/s Ratio Perm												0.08
v/c Ratio		0.99		0.96	0.71					0.95		0.28
Uniform Delay, d1		24.8		36.2	9.0					33.9		28.3
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		21.0		39.4	1.0					30.7		1.9
Delay (s)		45.8		75.6	10.0					64.7		30.2
Level of Service		D		E	B					E		C
Approach Delay (s)		45.8			20.4			0.0			56.0	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0		4.0			
Lane Util. Factor	1.00	0.95			0.95		1.00		1.00			
Frt	1.00	1.00			0.96		1.00		0.85			
Flt Protected	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (prot)	1770	3539			3406		1770		1583			
Flt Permitted	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (perm)	1770	3539			3406		1770		1583			
Volume (vph)	43	1487	0	0	1356	454	510	0	499	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	1616	0	0	1474	493	554	0	542	0	0	0
RTOR Reduction (vph)	0	0	0	0	25	0	0	0	21	0	0	0
Lane Group Flow (vph)	47	1616	0	0	1942	0	554	0	521	0	0	0
Turn Type	Prot						Prot		custom			
Protected Phases	7	4			8		5					
Permitted Phases									2			
Actuated Green, G (s)	4.0	80.0			72.0		42.0		42.0			
Effective Green, g (s)	4.0	80.0			72.0		42.0		42.0			
Actuated g/C Ratio	0.03	0.62			0.55		0.32		0.32			
Clearance Time (s)	4.0	4.0			4.0		4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)	54	2178			1886		572		511			
v/s Ratio Prot	0.03	c0.46			c0.58		0.31					
v/s Ratio Perm									0.34			
v/c Ratio	0.87	0.74			1.03		0.97		1.02			
Uniform Delay, d1	62.7	17.7			29.0		43.3		44.0			
Progression Factor	1.00	1.00			1.00		1.00		1.00			
Incremental Delay, d2	76.6	1.4			28.7		29.4		44.9			
Delay (s)	139.4	19.1			57.7		72.8		88.9			
Level of Service	F	B			E		E		F			
Approach Delay (s)		22.5			57.7			80.7			0.0	
Approach LOS		C			E			F			A	

Intersection Summary			
HCM Average Control Delay	50.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Volume (vph)	200	1182	604	335	762	28	908	774	222	9	700	140
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	1285	657	364	828	30	987	841	241	10	761	152
RTOR Reduction (vph)	0	0	367	0	0	23	0	0	127	0	0	120
Lane Group Flow (vph)	217	1285	290	364	828	7	987	841	114	10	761	32
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.5	22.0	22.0	10.0	22.5	22.5	25.0	43.9	43.9	0.8	19.7	19.7
Effective Green, g (s)	9.5	22.0	22.0	10.0	22.5	22.5	25.0	43.9	43.9	0.8	19.7	19.7
Actuated g/C Ratio	0.10	0.24	0.24	0.11	0.24	0.24	0.27	0.47	0.47	0.01	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	352	1207	376	370	1234	384	926	2408	750	30	1081	336
v/s Ratio Prot	0.06	0.25		c0.11	0.16		c0.29	0.17		0.00	c0.15	
v/s Ratio Perm			0.41			0.02			0.15			0.10
v/c Ratio	0.62	1.06	0.77	0.98	0.67	0.02	1.07	0.35	0.15	0.33	0.70	0.10
Uniform Delay, d1	39.9	35.4	33.0	41.3	31.8	26.7	33.9	15.4	13.8	45.7	33.8	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	45.0	9.5	42.2	1.4	0.0	48.8	0.1	0.1	6.5	2.1	0.1
Delay (s)	43.1	80.3	42.5	83.4	33.2	26.7	82.6	15.5	13.9	52.1	35.9	29.5
Level of Service	D	F	D	F	C	C	F	B	B	D	D	C
Approach Delay (s)		65.1			48.0			47.3			35.0	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	51.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	92.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3505		3433	3438		3433	3477		3433	3516	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3505		3433	3438		3433	3477		3433	3516	
Volume (vph)	139	674	47	189	783	185	67	1007	134	277	1099	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	733	51	205	851	201	73	1095	146	301	1195	54
RTOR Reduction (vph)	0	6	0	0	23	0	0	12	0	0	3	0
Lane Group Flow (vph)	151	778	0	205	1029	0	73	1229	0	301	1246	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.0	25.0		7.0	27.0		3.2	34.4		8.0	39.2	
Effective Green, g (s)	5.0	25.0		7.0	27.0		3.2	34.4		8.0	39.2	
Actuated g/C Ratio	0.06	0.28		0.08	0.30		0.04	0.38		0.09	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	969		266	1027		122	1323		304	1525	
v/s Ratio Prot	0.04	0.22		c0.06	c0.31		0.02	c0.36		c0.09	0.36	
v/s Ratio Perm												
v/c Ratio	0.79	0.80		0.77	1.00		0.60	0.93		0.99	0.82	
Uniform Delay, d1	42.2	30.4		40.9	31.7		43.0	26.8		41.2	22.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.1	4.9		12.9	28.5		7.7	11.4		48.8	3.5	
Delay (s)	62.3	35.3		53.8	60.2		50.6	38.3		89.9	26.0	
Level of Service	E	D		D	E		D	D		F	C	
Approach Delay (s)		39.6			59.2			39.0			38.4	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM Average Control Delay	43.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1840		1770	1862		1770	3423		1770	3470	
Flt Permitted	0.61	1.00		0.48	1.00		0.28	1.00		0.33	1.00	
Satd. Flow (perm)	1142	1840		897	1862		514	3423		621	3470	
Volume (vph)	118	295	27	140	214	1	8	536	150	3	724	109
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	321	29	152	233	1	9	583	163	3	787	118
RTOR Reduction (vph)	0	9	0	0	1	0	0	61	0	0	28	0
Lane Group Flow (vph)	128	341	0	152	233	0	9	685	0	3	877	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.3	11.3		11.3	11.3		14.5	14.5		14.5	14.5	
Effective Green, g (s)	11.3	11.3		11.3	11.3		14.5	14.5		14.5	14.5	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.43	0.43		0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	382	615		300	623		221	1468		266	1489	
v/s Ratio Prot		c0.19			0.13			0.22			c0.26	
v/s Ratio Perm	0.11			0.17			0.02			0.00		
v/c Ratio	0.34	0.55		0.51	0.37		0.04	0.47		0.01	0.59	
Uniform Delay, d1	8.4	9.2		9.0	8.6		5.6	6.9		5.5	7.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.1		1.3	0.4		0.1	0.2		0.0	0.6	
Delay (s)	9.0	10.3		10.4	8.9		5.7	7.1		5.6	8.0	
Level of Service	A	B		B	A		A	A		A	A	
Approach Delay (s)		9.9			9.5			7.1			8.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	33.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.99		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3430		1770	3508		1770	3476		1770	3356	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3430		1770	3508		1770	3476		1770	3356	
Volume (vph)	262	748	193	10	669	42	105	521	71	11	592	311
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	285	813	210	11	727	46	114	566	77	12	643	338
RTOR Reduction (vph)	0	26	0	0	6	0	0	12	0	0	84	0
Lane Group Flow (vph)	285	997	0	11	767	0	114	631	0	12	897	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.9	35.0		0.8	21.9		6.0	32.3		0.8	27.1	
Effective Green, g (s)	13.9	35.0		0.8	21.9		6.0	32.3		0.8	27.1	
Actuated g/C Ratio	0.16	0.41		0.01	0.26		0.07	0.38		0.01	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	290	1414		17	905		125	1322		17	1071	
v/s Ratio Prot	c0.16	0.30		0.01	c0.22		c0.06	0.19		0.01	c0.29	
v/s Ratio Perm												
v/c Ratio	0.98	0.70		0.65	0.85		0.91	0.48		0.71	0.84	
Uniform Delay, d1	35.4	20.7		41.9	29.9		39.2	19.9		41.9	26.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.8	1.6		62.0	7.4		54.0	0.3		84.0	5.8	
Delay (s)	83.2	22.3		103.9	37.3		93.2	20.2		125.9	32.7	
Level of Service	F	C		F	D		F	C		F	C	
Approach Delay (s)		35.6			38.3			31.2			33.8	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM Average Control Delay	34.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	2787	3433	5056		3433	3315		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	2787	3433	5056		3433	3315		1770	3539	1583
Volume (vph)	334	1297	1368	325	771	31	1291	756	551	41	547	233
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	363	1410	1487	353	838	34	1403	822	599	45	595	253
RTOR Reduction (vph)	0	0	824	0	3	0	0	99	0	0	0	143
Lane Group Flow (vph)	363	1410	663	353	869	0	1403	1322	0	45	595	110
Turn Type	Prot		Perm	Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									6
Actuated Green, G (s)	16.5	33.0	33.0	13.0	29.5		48.0	64.0		4.8	20.8	20.8
Effective Green, g (s)	16.5	33.0	33.0	13.0	29.5		48.0	64.0		4.8	20.8	20.8
Actuated g/C Ratio	0.13	0.25	0.25	0.10	0.23		0.37	0.49		0.04	0.16	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	433	1283	703	341	1140		1260	1622		65	563	252
v/s Ratio Prot	0.11	0.28		c0.10	0.17		c0.41	0.43		0.03	c0.17	
v/s Ratio Perm			0.53									0.16
v/c Ratio	0.84	1.10	0.94	1.04	0.76		1.11	0.82		0.69	1.06	0.44
Uniform Delay, d1	55.8	48.9	48.0	58.9	47.4		41.4	28.4		62.3	55.0	49.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.3	56.8	21.1	58.1	3.1		62.5	3.3		27.3	53.8	1.2
Delay (s)	69.1	105.7	69.0	117.0	50.4		103.9	31.7		89.5	108.8	50.9
Level of Service	E	F	E	F	D		F	C		F	F	D
Approach Delay (s)		84.9			69.6			67.6			91.4	
Approach LOS		F			E			E			F	

Intersection Summary				
HCM Average Control Delay	77.4	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.38			
Actuated Cycle Length (s)	130.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	99.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3323		1770	3448		1770	3482		1770	3436	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3323		1770	3448		1770	3482		1770	3436	
Volume (vph)	242	441	303	44	322	67	294	502	61	204	678	164
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	479	329	48	350	73	320	546	66	222	737	178
RTOR Reduction (vph)	0	137	0	0	20	0	0	10	0	0	23	0
Lane Group Flow (vph)	263	671	0	48	403	0	320	602	0	222	892	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.5	26.5		3.1	15.1		17.3	26.4		15.3	24.4	
Effective Green, g (s)	14.5	26.5		3.1	15.1		17.3	26.4		15.3	24.4	
Actuated g/C Ratio	0.17	0.30		0.04	0.17		0.20	0.30		0.18	0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	294	1009		63	596		351	1053		310	960	
v/s Ratio Prot	c0.15	c0.24		0.03	0.12		c0.18	0.18		0.13	c0.27	
v/s Ratio Perm												
v/c Ratio	0.89	0.67		0.76	0.68		0.91	0.57		0.72	0.93	
Uniform Delay, d1	35.7	26.5		41.7	33.8		34.3	25.7		34.0	30.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.2	1.7		41.2	3.0		27.0	0.8		7.7	14.7	
Delay (s)	62.9	28.2		82.9	36.9		61.2	26.4		41.6	45.3	
Level of Service	E	C		F	D		E	C		D	D	
Approach Delay (s)		36.7			41.6			38.4			44.6	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM Average Control Delay	40.2	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3465	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	3539	3465	
Volume (vph)	222	490	304	1083	1391	225
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	533	330	1177	1512	245
RTOR Reduction (vph)	0	243	0	0	14	0
Lane Group Flow (vph)	241	290	330	1177	1743	0
Turn Type		custom	Prot			
Protected Phases			5	2	6	
Permitted Phases	4	4				
Actuated Green, G (s)	16.0	16.0	16.0	66.0	46.0	
Effective Green, g (s)	16.0	16.0	16.0	66.0	46.0	
Actuated g/C Ratio	0.18	0.18	0.18	0.73	0.51	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	315	281	315	2595	1771	
v/s Ratio Prot			c0.19	0.33	c0.51	
v/s Ratio Perm	0.14	0.34				
v/c Ratio	0.77	1.03	1.05	0.45	0.98	
Uniform Delay, d1	35.2	37.0	37.0	4.8	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.6	61.8	63.7	0.6	17.9	
Delay (s)	45.8	98.8	100.7	5.4	39.6	
Level of Service	D	F	F	A	D	
Approach Delay (s)	82.3			26.2	39.6	
Approach LOS	F			C	D	

Intersection Summary				
HCM Average Control Delay	42.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.19			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	84.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00		1.00	0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539		3433	3417		3433	5085		3433	5085	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3539		3433	3417		3433	5085		3433	5085	1583
Volume (vph)	543	1389	1	120	874	260	73	2287	0	286	1183	327
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	590	1510	1	130	950	283	79	2486	0	311	1286	355
RTOR Reduction (vph)	0	0	0	0	19	0	0	0	0	0	0	199
Lane Group Flow (vph)	590	1511	0	130	1214	0	79	2486	0	311	1286	156
Turn Type	Prot			Prot			Prot		Perm	Prot		custom
Protected Phases	7			3	8		5	2		1	6	
Permitted Phases		4							2			1
Actuated Green, G (s)	20.0	57.0		5.0	42.0		6.9	61.0		11.0	65.1	11.0
Effective Green, g (s)	20.0	57.0		5.0	42.0		6.9	61.0		11.0	65.1	11.0
Actuated g/C Ratio	0.13	0.38		0.03	0.28		0.05	0.41		0.07	0.43	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	458	1345		114	957		158	2068		252	2207	116
v/s Ratio Prot	c0.17			0.04	c0.36		0.02	c0.49		0.09	0.25	
v/s Ratio Perm		0.43										0.22
v/c Ratio	1.29	1.12		1.14	1.27		0.50	1.20		1.23	0.58	1.34
Uniform Delay, d1	65.0	46.5		72.5	54.0		69.9	44.5		69.5	32.2	69.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	145.4	65.8		127.0	129.3		2.5	95.9		134.8	1.1	200.9
Delay (s)	210.4	112.3		199.5	183.3		72.3	140.4		204.3	33.3	270.4
Level of Service	F	F		F	F		E	F		F	C	F
Approach Delay (s)		139.9			184.8			138.3			103.7	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	138.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.91	1.00		0.91	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		5085	1583		5085	1583	1770		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		5085	1583		5085	1583	1770		1583			
Volume (vph)	0	2292	57	0	2103	130	254	0	493	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2491	62	0	2286	141	276	0	536	0	0	0
RTOR Reduction (vph)	0	0	30	0	0	68	0	0	1	0	0	0
Lane Group Flow (vph)	0	2491	32	0	2286	73	276	0	535	0	0	0
Turn Type			Perm			Perm	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			4			8			2			
Actuated Green, G (s)		36.0	36.0		36.0	36.0	26.0		26.0			
Effective Green, g (s)		36.0	36.0		36.0	36.0	26.0		26.0			
Actuated g/C Ratio		0.51	0.51		0.51	0.51	0.37		0.37			
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)		2615	814		2615	814	657		588			
v/s Ratio Prot		c0.49			0.45		0.16					
v/s Ratio Perm			0.04			0.09			0.34			
v/c Ratio		0.95	0.04		0.87	0.09	0.42		0.91			
Uniform Delay, d1		16.2	8.4		15.0	8.7	16.4		20.9			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		9.0	0.0		3.6	0.0	2.0		20.6			
Delay (s)		25.1	8.4		18.6	8.7	18.4		41.5			
Level of Service		C	A		B	A	B		D			
Approach Delay (s)		24.7			18.0			33.6			0.0	
Approach LOS		C			B			C			A	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0		4.0
Lane Util. Factor		0.95		1.00	0.95					1.00		1.00
Frt		0.98		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3471		1770	3539					1770		1583
Flt Permitted		1.00		0.95	1.00					0.95		1.00
Satd. Flow (perm)		3471		1770	3539					1770		1583
Volume (vph)	0	1391	204	172	961	0	0	0	0	347	0	266
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1512	222	187	1045	0	0	0	0	377	0	289
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	0	0	0	107
Lane Group Flow (vph)	0	1719	0	187	1045	0	0	0	0	377	0	182
Turn Type				Prot						Prot		custom
Protected Phases		4		3	8					1		
Permitted Phases												6
Actuated Green, G (s)		38.0		8.0	50.0					17.0		17.0
Effective Green, g (s)		38.0		8.0	50.0					17.0		17.0
Actuated g/C Ratio		0.51		0.11	0.67					0.23		0.23
Clearance Time (s)		4.0		4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1759		189	2359					401		359
v/s Ratio Prot		c0.50		c0.11	0.30					c0.21		
v/s Ratio Perm												0.18
v/c Ratio		0.98		0.99	0.44					0.94		0.51
Uniform Delay, d1		18.1		33.5	5.9					28.5		25.3
Progression Factor		1.00		1.00	1.00					1.00		1.00
Incremental Delay, d2		16.2		61.7	0.1					30.1		5.1
Delay (s)		34.2		95.2	6.0					58.6		30.4
Level of Service		C		F	A					E		C
Approach Delay (s)		34.2			19.6			0.0			46.4	
Approach LOS		C			B			A			D	

Intersection Summary				
HCM Average Control Delay	31.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0		4.0			
Lane Util. Factor	1.00	0.95			0.95		1.00		1.00			
Frt	1.00	1.00			0.94		1.00		0.85			
Flt Protected	0.95	1.00			1.00		0.95		1.00			
Satd. Flow (prot)	1770	3539			3315		1770		1583			
Flt Permitted	0.15	1.00			1.00		0.95		1.00			
Satd. Flow (perm)	276	3539			3315		1770		1583			
Volume (vph)	173	1550	0	0	839	614	244	0	652	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	188	1685	0	0	912	667	265	0	709	0	0	0
RTOR Reduction (vph)	0	0	0	0	240	0	0	0	6	0	0	0
Lane Group Flow (vph)	188	1685	0	0	1339	0	265	0	703	0	0	0
Turn Type	Perm						Prot		custom			
Protected Phases		4			8		5					
Permitted Phases	4								2			
Actuated Green, G (s)	27.0	27.0			27.0		20.0		20.0			
Effective Green, g (s)	27.0	27.0			27.0		20.0		20.0			
Actuated g/C Ratio	0.49	0.49			0.49		0.36		0.36			
Clearance Time (s)	4.0	4.0			4.0		4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)	135	1737			1627		644		576			
v/s Ratio Prot		0.48			0.48		0.15					
v/s Ratio Perm	c0.68								0.45			
v/c Ratio	1.39	0.97			0.82		0.41		1.22			
Uniform Delay, d1	14.0	13.6			12.0		13.1		17.5			
Progression Factor	1.00	1.00			1.00		1.00		1.00			
Incremental Delay, d2	215.4	15.1			3.5		0.4		114.0			
Delay (s)	229.4	28.7			15.5		13.5		131.5			
Level of Service	F	C			B		B		F			
Approach Delay (s)		48.8			15.5			99.4			0.0	
Approach LOS		D			B			F			A	

Intersection Summary				
HCM Average Control Delay	48.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.32			
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	89.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.91	1.00	0.97	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1504	5085	1583	3433	5085
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1504	5085	1583	3433	5085
Volume (vph)	169	80	3160	98	580	1802
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	87	3435	107	630	1959
RTOR Reduction (vph)	0	78	0	22	0	0
Lane Group Flow (vph)	184	9	3435	85	630	1959
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	16.0	16.0	96.0	96.0	26.0	126.0
Effective Green, g (s)	16.0	16.0	96.0	96.0	26.0	126.0
Actuated g/C Ratio	0.11	0.11	0.64	0.64	0.17	0.84
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	189	160	3254	1013	595	4271
v/s Ratio Prot	c0.10		c0.68		c0.18	0.39
v/s Ratio Perm		0.06		0.07		
v/c Ratio	0.97	0.06	1.06	0.08	1.06	0.46
Uniform Delay, d1	66.8	60.2	27.0	10.3	62.0	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	57.4	0.2	33.0	0.0	53.4	0.1
Delay (s)	124.1	60.4	60.0	10.3	115.4	3.2
Level of Service	F	E	E	B	F	A
Approach Delay (s)	103.7		58.5			30.5
Approach LOS	F		E			C

Intersection Summary			
HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3341		1770	3507		1770	3527		1770	3466	
Flt Permitted	0.54	1.00		0.26	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1009	3341		484	3507		1770	3527		1770	3466	
Volume (vph)	231	486	290	28	296	19	157	912	22	5	822	131
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	528	315	30	322	21	171	991	24	5	893	142
RTOR Reduction (vph)	0	153	0	0	8	0	0	3	0	0	22	0
Lane Group Flow (vph)	251	690	0	30	335	0	171	1012	0	5	1013	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	15.4	15.4		15.4	15.4		5.1	24.2		0.7	19.8	
Effective Green, g (s)	15.4	15.4		15.4	15.4		5.1	24.2		0.7	19.8	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.10	0.46		0.01	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	297	984		143	1033		173	1632		24	1312	
v/s Ratio Prot		c0.25			0.10		c0.10	0.29		0.00	c0.30	
v/s Ratio Perm	0.25			0.06								
v/c Ratio	0.85	0.70		0.21	0.32		0.99	0.62		0.21	0.77	
Uniform Delay, d1	17.3	16.4		13.9	14.4		23.6	10.6		25.5	14.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.3	2.3		0.7	0.2		64.4	0.7		4.3	2.9	
Delay (s)	36.6	18.7		14.6	14.6		88.0	11.3		29.8	17.2	
Level of Service	D	B		B	B		F	B		C	B	
Approach Delay (s)		22.8			14.6			22.4			17.2	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95		0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3446		3433	3447	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3446		3433	3447	
Volume (vph)	187	1948	177	149	1820	406	168	653	139	496	496	104
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	2117	192	162	1978	441	183	710	151	539	539	113
RTOR Reduction (vph)	0	0	98	0	0	191	0	18	0	0	18	0
Lane Group Flow (vph)	203	2117	94	162	1978	250	183	843	0	539	634	0
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	6.0	40.0	40.0	5.0	39.0	39.0	9.4	24.0		15.0	29.6	
Effective Green, g (s)	6.0	40.0	40.0	5.0	39.0	39.0	9.4	24.0		15.0	29.6	
Actuated g/C Ratio	0.06	0.40	0.40	0.05	0.39	0.39	0.09	0.24		0.15	0.30	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	2034	633	172	1983	617	323	827		515	1020	
v/s Ratio Prot	c0.06	c0.42		0.05	0.39		0.05	c0.25		c0.16	0.19	
v/s Ratio Perm			0.12			0.28						
v/c Ratio	0.99	1.04	0.15	0.94	1.00	0.41	0.57	1.02		1.05	0.62	
Uniform Delay, d1	47.0	30.0	19.1	47.4	30.5	22.1	43.4	38.0		42.5	30.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	58.1	31.5	0.1	51.6	19.5	0.4	2.3	36.2		52.4	1.2	
Delay (s)	105.0	61.5	19.2	98.9	49.9	22.5	45.6	74.2		94.9	31.6	
Level of Service	F	E	B	F	D	C	D	E		F	C	
Approach Delay (s)		61.8			48.3			69.2			60.2	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM Average Control Delay	57.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.95		0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3462		3433	3523		3433	3517		3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3462		3433	3523		3433	3517		3433	3539	1583
Volume (vph)	339	1793	307	11	1698	53	306	310	14	34	392	323
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	368	1949	334	12	1846	58	333	337	15	37	426	351
RTOR Reduction (vph)	0	10	0	0	1	0	0	2	0	0	0	124
Lane Group Flow (vph)	368	2273	0	12	1903	0	333	350	0	37	426	227
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	16.0	92.8		1.6	78.4		13.0	29.6		3.2	19.8	19.8
Effective Green, g (s)	16.0	92.8		1.6	78.4		13.0	29.6		3.2	19.8	19.8
Actuated g/C Ratio	0.11	0.65		0.01	0.55		0.09	0.21		0.02	0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	384	2244		38	1929		312	727		77	489	219
v/s Ratio Prot	c0.11	c0.66		0.00	0.54		c0.10	0.10		0.01	0.12	
v/s Ratio Perm												0.22
v/c Ratio	0.96	1.01		0.32	0.99		1.07	0.48		0.48	0.87	1.04
Uniform Delay, d1	63.3	25.2		70.3	31.9		65.1	50.0		69.2	60.5	61.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.8	22.3		4.7	17.2		69.9	0.5		4.7	15.5	70.6
Delay (s)	98.0	47.5		75.0	49.1		135.0	50.5		73.8	76.0	132.3
Level of Service	F	D		E	D		F	D		E	E	F
Approach Delay (s)		54.5			49.2			91.6			100.2	
Approach LOS		D			D			F			F	

Intersection Summary			
HCM Average Control Delay	63.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	143.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
76: Main St. & Peach Ave

7/9/2009
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.97		1.00	0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5013		1770	4949		1770	3243		1770	3346	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5013		1770	4949		1770	3243		1770	3346	
Volume (vph)	155	1050	110	431	878	191	83	298	376	303	243	139
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	1141	120	468	954	208	90	324	409	329	264	151
RTOR Reduction (vph)	0	13	0	0	33	0	0	228	0	0	77	0
Lane Group Flow (vph)	168	1248	0	468	1129	0	90	505	0	329	338	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.9	24.0		26.0	36.1		8.2	16.8		18.0	26.6	
Effective Green, g (s)	13.9	24.0		26.0	36.1		8.2	16.8		18.0	26.6	
Actuated g/C Ratio	0.14	0.24		0.26	0.36		0.08	0.17		0.18	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	1194		457	1772		144	541		316	883	
v/s Ratio Prot	0.09	c0.25		c0.26	0.23		0.05	c0.23		c0.19	0.12	
v/s Ratio Perm												
v/c Ratio	0.69	1.05		1.02	0.64		0.62	0.93		1.04	0.38	
Uniform Delay, d1	41.4	38.4		37.4	26.9		44.8	41.4		41.4	30.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.8	38.7		48.4	0.8		8.2	23.2		61.7	0.3	
Delay (s)	49.2	77.1		85.8	27.7		53.0	64.7		103.1	30.7	
Level of Service	D	E		F	C		D	E		F	C	
Approach Delay (s)		73.8			44.3			63.4			62.7	
Approach LOS		E			D			E			E	

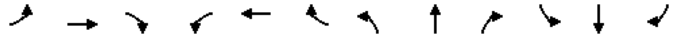
Intersection Summary			
HCM Average Control Delay	59.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Hesperia GP Update
77: Danbury Ave & I Avenue

7/9/2009
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3490		1770	3514		1770	3443	
Flt Permitted	0.95	1.00		0.95	1.00		0.22	1.00		0.22	1.00	
Satd. Flow (perm)	1770	3525		1770	3490		414	3514		414	3443	
Volume (vph)	65	603	17	21	530	54	14	770	38	40	761	167
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	655	18	23	576	59	15	837	41	43	827	182
RTOR Reduction (vph)	0	3	0	0	14	0	0	7	0	0	35	0
Lane Group Flow (vph)	71	670	0	23	621	0	15	871	0	43	974	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7			3	8			2			6	
Permitted Phases		4					2			6		
Actuated Green, G (s)	2.4	16.2		0.6	14.4		18.0	18.0		18.0	18.0	
Effective Green, g (s)	2.4	16.2		0.6	14.4		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.05	0.35		0.01	0.31		0.38	0.38		0.38	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	91	1220		23	1074		159	1352		159	1324	
v/s Ratio Prot	c0.04			0.01	0.18			0.25			c0.29	
v/s Ratio Perm		0.19					0.04			0.10		
v/c Ratio	0.78	0.55		1.00	0.58		0.09	0.64		0.27	0.74	
Uniform Delay, d1	21.9	12.4		23.1	13.6		9.2	11.8		9.9	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	34.1	0.5		187.7	0.8		0.3	1.1		0.9	2.2	
Delay (s)	56.0	12.9		210.8	14.4		9.5	12.8		10.8	14.5	
Level of Service	E	B		F	B		A	B		B	B	
Approach Delay (s)		17.0			21.3			12.8			14.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.94		1.00	0.98		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4766		1770	4979		1770	3298		1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4766		1770	4979		1770	3298		1770	3539	1583
Volume (vph)	779	575	415	220	443	72	300	233	193	86	349	508
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	847	625	451	239	482	78	326	253	210	93	379	552
RTOR Reduction (vph)	0	142	0	0	25	0	0	149	0	0	0	323
Lane Group Flow (vph)	847	934	0	239	535	0	326	314	0	93	379	229
Turn Type	Prot			Prot			Prot			Prot		Over
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases												
Actuated Green, G (s)	23.0	22.6		14.4	14.0		17.4	24.8		7.3	14.7	23.0
Effective Green, g (s)	23.0	22.6		14.4	14.0		17.4	24.8		7.3	14.7	23.0
Actuated g/C Ratio	0.27	0.27		0.17	0.16		0.20	0.29		0.09	0.17	0.27
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	928	1266		300	819		362	961		152	611	428
v/s Ratio Prot	0.25	c0.23		0.14	0.11		c0.18	0.14		0.05	c0.11	c0.35
v/s Ratio Perm												
v/c Ratio	0.91	0.74		0.80	0.65		0.90	0.33		0.61	0.62	0.54
Uniform Delay, d1	30.1	28.5		33.9	33.3		33.0	23.6		37.5	32.6	26.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.0	2.3		13.6	1.9		24.5	0.2		7.1	2.0	1.3
Delay (s)	43.1	30.8		47.6	35.2		57.5	23.8		44.6	34.6	27.8
Level of Service	D	C		D	D		E	C		D	C	C
Approach Delay (s)		36.2			38.9			37.7			31.8	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	36.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		1.00	0.91					0.95	0.91	0.95
Frt		0.97		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		4947		1770	5085					1681	1610	1504
Flt Permitted		1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		4947		1770	5085					1681	1610	1504
Volume (vph)	0	2208	490	23	1658	0	0	0	0	978	0	260
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2400	533	25	1802	0	0	0	0	1063	0	283
RTOR Reduction (vph)	0	39	0	0	0	0	0	0	0	0	0	15
Lane Group Flow (vph)	0	2894	0	25	1802	0	0	0	0	532	531	268
Turn Type				Prot						Prot		Perm
Protected Phases		4		3	8					1	6	
Permitted Phases												6
Actuated Green, G (s)		45.8		1.6	51.4					20.6	20.6	20.6
Effective Green, g (s)		45.8		1.6	51.4					20.6	20.6	20.6
Actuated g/C Ratio		0.57		0.02	0.64					0.26	0.26	0.26
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2832		35	3267					433	415	387
v/s Ratio Prot		c0.59		0.01	c0.35					0.32	c0.33	
v/s Ratio Perm												0.19
v/c Ratio		1.02		0.71	0.55					1.23	1.28	0.69
Uniform Delay, d1		17.1		39.0	7.9					29.7	29.7	26.8
Progression Factor		1.00		1.22	0.21					1.00	1.00	1.00
Incremental Delay, d2		22.7		33.2	0.1					121.8	143.2	9.8
Delay (s)		39.8		80.6	1.8					151.5	172.9	36.6
Level of Service		D		F	A					F	F	D
Approach Delay (s)		39.8			2.9			0.0			135.8	
Approach LOS		D			A			A			F	

Intersection Summary				
HCM Average Control Delay	49.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.11			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	163.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1770	5085			5085	1583	1681	1610	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	1770	5085			5085	1583	1681	1610	1504			
Volume (vph)	323	1885	0	0	1681	1029	490	0	52	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	351	2049	0	0	1827	1118	533	0	57	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	342	0	0	15	0	0	0
Lane Group Flow (vph)	351	2049	0	0	1827	776	267	266	42	0	0	0
Turn Type	Prot					Perm	Prot		Perm			
Protected Phases	7	4			8		5	2				
Permitted Phases						8			2			
Actuated Green, G (s)	15.0	55.0			36.0	36.0	17.0	17.0	17.0			
Effective Green, g (s)	15.0	55.0			36.0	36.0	17.0	17.0	17.0			
Actuated g/C Ratio	0.19	0.69			0.45	0.45	0.21	0.21	0.21			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	332	3496			2288	712	357	342	320			
v/s Ratio Prot	c0.20	0.40			0.36		0.16	c0.17				
v/s Ratio Perm						0.71			0.04			
v/c Ratio	1.06	0.59			0.80	1.09	0.75	0.78	0.13			
Uniform Delay, d1	32.5	6.5			18.9	22.0	29.5	29.7	25.5			
Progression Factor	0.94	0.81			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	32.8	0.0			2.0	60.8	13.4	15.9	0.8			
Delay (s)	63.4	5.3			20.9	82.8	42.9	45.6	26.4			
Level of Service	E	A			C	F	D	D	C			
Approach Delay (s)		13.8			44.4			42.5			0.0	
Approach LOS		B			D			D			A	

Intersection Summary				
HCM Average Control Delay	31.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.26			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	163.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix C

- **Future Development Assumptions by TAZ**

Hesperia General Plan Update
SED by TAZ
Existing Conditions (2003)

Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
3560	864	864	342	0	0	262	0	262	31	91	32	35.02%	59	121	34473	2254	0
3561	1279	1279	506	0	0	388	0	388	0	194	68	35.02%	126	194	34473	2254	0
3562	1207	1207	478	0	0	366	0	366	0	23	8	35.02%	15	23	34473	2254	0
3563	0	0	0	0	0	0	0	0	56	533	187	35.02%	347	589	34473	2254	0
3564	1097	1097	371	0	0	210	123	333	131	37	25	67.18%	12	168	29479	2251	0
3565	1013	1013	342	0	0	240	67	307	88	75	50	67.18%	24	163	29479	2251	0
3566	1042	1042	352	0	0	243	73	316	5	187	126	67.18%	61	192	29479	2251	0
3567	694	694	235	0	0	187	24	210	23	94	63	67.18%	31	117	29479	2251	0
3568	832	832	281	0	0	209	43	252	18	156	104	67.18%	51	174	29479	2251	0
3569	984	984	332	0	0	206	92	298	51	29	19	67.18%	9	80	29479	2251	0
3570	730	730	251	0	0	189	33	221	94	99	70	70.87%	29	193	30209	2252	0
3571	659	659	227	0	0	200	0	200	197	106	75	70.87%	31	303	30209	2252	0
3597	1099	1067	435	0	29	333	0	333	0	27	10	35.02%	18	27	34473	2254	0
3607	465	465	157	0	0	141	0	141	0	12	8	67.18%	4	12	29479	2251	0
3608	372	372	126	0	0	113	0	113	7	10	6	67.18%	3	17	29479	2251	0
2188	559	559	189	0	0	124	0	124	0	2	77	67.18%	38	114	29479	2251	0
3609						54		54		112				0			21
3612	424	390	143	0	30	128	0	128	0	12	8	67.18%	4	12	29479	2251	0
3614	883	883	304	0	0	268	0	268	0	17	12	70.87%	5	17	30209	2252	0
2204	223	223	77	0	0	7	0	7	0	4	79	70.87%	33	112	30209	2252	0
3615						61		61		108				0			445
3616	0	0	0	0	0	0	0	0	13	880	308	35.02%	572	893	34473	2254	0
3618	169	169	67	0	0	51	0	51	0	6	2	35.02%	4	6	34473	2254	0
3623	479	479	189	0	0	145	0	145	0	15	5	35.02%	10	15	34473	2254	0
3625	162	156	52	0	5	49	0	49	0	4	3	66.35%	1	4	27995	2250	0
3626	130	130	52	0	0	1	39	40	24	122	43	35.02%	79	145	34473	2254	0
3627	445	445	144	0	0	135	0	135	0	12	8	66.35%	4	12	27995	2250	0
2205	1154	1154	374	0	0	250	0	250	0	17	17	66.35%	9	25	27995	2250	0
3628						100		100		8				0			0
3629	771	771	250	0	0	234	0	234	0	15	10	66.35%	5	15	27995	2250	0
3630	741	741	255	0	0	225	0	225	0	14	10	70.87%	4	14	30209	2252	0
2206	19	19	7	0	0	4	0	4	0	33	23	59.03%	16	38	30821	2249	0
3631						2		2		5				0			0
3638	18	18	6	0	0	5	0	5	0	29	19	66.35%	10	29	27995	2250	840
3639	0	0	0	0	0	0	0	0	0	235	102	43.37%	133	235	33321	2253	0
2207	608	608	228	0	0	53	120	173	34	343	202	59.03%	141	377	30821	2249	0
3640								0	34	343				34			0
3646	7	7	2	0	0	2	0	2	0	149	65	43.37%	85	149	33321	2253	0
2209	949	949	307	0	0	175	0	175	0	100	213	66.35%	108	322	27995	2250	0
3648						113		113		222				0			3166

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3649	1069	1069	346	0	0	324	0	324	0	20	13	66.35%	7	20	27995	2250	0
3650	1046	1046	360	0	0	317	0	317	0	19	14	70.87%	6	19	30209	2252	0
3651	1335	1335	458	0	0	405	0	405	0	104	45	43.37%	59	104	33321	2253	687
3652	1588	1577	545	0	10	481	0	481	0	38	17	43.37%	22	38	33321	2253	0
3654	1811	1811	621	0	0	549	0	549	0	46	20	43.37%	26	46	33321	2253	0
3655	191	191	65	0	0	58	0	58	0	5	2	43.37%	3	5	33321	2253	0
3656	596	596	193	0	0	181	0	181	0	15	10	66.35%	5	15	27995	2250	0
3657	129	129	42	0	0	1	38	39	0	86	57	66.35%	29	86	27995	2250	0
3658	903	903	311	0	0	187	86	274	0	82	58	70.87%	24	82	30209	2252	0
2210	37	37	13	0	0	3	0	3	0	30	285	43.37%	372	658	33321	2253	0
3659						8		8	200	628				200			0
3664	1	1	0	0	0	0	0	0	37	395	171	43.37%	224	431	33321	2253	0
2211	708	708	229	0	0	143	0	143	53	363	254	66.35%	129	436	27995	2250	0
3665						72		72	0	20				0			3
3666	0	0	0	0	0	0	0	0	0	4	2	59.03%	2	4	30821	2249	0
3667	536	536	173	0	0	162	0	162	0	76	50	66.35%	26	76	27995	2250	0
3668	979	979	337	0	0	297	0	297	9	19	13	70.87%	5	28	30209	2252	0
3669	950	950	327	0	0	139	149	288	146	317	225	70.87%	92	463	30209	2252	2977
3670	0	0	0	0	0	0	0	0	7	5	3	70.87%	1	12	30209	2252	0
3671	0	0	0	0	0	0	0	0	0	0	0	70.87%	0	0	30209	2252	0
3672	1429	1429	463	0	0	322	111	433	127	68	45	66.35%	23	195	27995	2250	0
3673	695	695	225	0	0	84	126	211	117	14	9	66.35%	5	131	27995	2250	0
3677	2	2	1	0	0	1	0	1	272	56	24	43.37%	32	329	33321	2253	0
3678	640	640	223	0	0	194	0	194	11	64	44	69.86%	19	74	31247	2245	0
3679	2803	2803	962	0	0	850	0	850	1	179	78	43.37%	102	180	33321	2253	689
3680	639	639	195	0	0	194	0	194	10	223	90	40.56%	132	233	39611	2246	0
3681	10	10	3	0	0	1	2	3	0	9	4	40.56%	5	9	39611	2246	0
2190	641	624	195	0	15	17	36	53	39	109	48	40.56%	70	156	39611	2246	0
3682						141	0	141		8			8	8			0
2212	196	196	60	0	0	59	0	59	0	4	2	40.56%	3	4	39611	2246	0
3683								0						0			0
2213	0	0	0	0	0	0	0	0	51	44	18	40.56%	26	94	39611	2246	0
3684								0	0	0				0			0
2214	0	0	0	0	0	0	0	0	0	0	84	32.14%	178	263	47794	2248	0
2215								0	0	0				0			0
3685								0	164	263				164			0
2220	2	2	1	0	0	1	0	1	0	0	20	32.14%	42	61	47794	2248	0
3686						0		0	2	61				2			0
3687	1	1	0	0	0	0	0	0	0	6	2	32.14%	4	6	47794	2248	0
2224	41	41	14	0	0	0	0	0	0	1	0	32.14%	1	1	47794	2248	0

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3691						4		4		0				0			0
3693	34	34	12	0	0	10	0	10	23	17	5	32.14%	11	39	47794	2248	0
3704	397	397	138	0	0	120	0	120	305	11	8	69.86%	3	316	31247	2245	0
3706	836	836	287	0	0	254	0	254	0	20	9	43.37%	11	20	33321	2253	0
3707	569	569	198	0	0	54	118	172	185	179	125	69.86%	54	364	31247	2245	63
3708	0	0	0	0	0	0	0	0	0	0	0	40.56%	0	0	39611	2246	0
3717	428	428	149	0	0	5	125	130	49	36	25	69.86%	11	85	31247	2245	1
3718	396	396	108	0	0	4	116	120	11	223	148	66.38%	75	234	25336	2244	0
3719	232	232	63	0	0	16	54	70	65	153	101	66.38%	51	218	25336	2244	1236
3720	877	877	301	0	0	266	0	266	0	17	8	43.37%	10	17	33321	2253	0
3721	731	731	200	0	0	7	214	222	222	136	91	66.38%	46	359	25336	2244	57
2227	3827	3827	1277	0	0	600	0	600	0	25	263	70.21%	112	375	32791	2243	0
3722						514	46	560	14	350				14			51
3723	575	575	201	0	0	174	0	174	0	84	59	69.86%	25	84	31247	2245	0
3724	363	363	111	0	0	110	0	110	0	10	4	40.56%	6	10	39611	2246	5
3725	567	567	198	0	0	172	0	172	0	15	10	69.86%	4	15	31247	2245	0
3727	559	559	195	0	0	170	0	170	0	15	10	69.86%	4	15	31247	2245	0
3730	40	40	14	0	0	12	0	12	0	47	33	69.86%	14	47	31247	2245	0
3731	327	327	89	0	0	2	98	99	0	5	3	66.38%	2	5	25336	2244	0
3732	1746	1746	582	0	0	265	264	529	0	35	25	70.21%	11	35	32791	2243	0
2228	1598	1598	437	0	0	341	41	382	0	0	139	66.38%	70	209	25336	2244	0
3733						18	84	102		209				0			3757
3734	571	571	174	0	0	173	0	173	0	79	32	40.56%	47	79	39611	2246	707
3740	811	756	283	0	49	246	0	246	0	22	15	69.86%	7	22	31247	2245	0
3741	753	753	263	0	0	228	0	228	0	20	14	69.86%	6	20	31247	2245	0
3742	652	652	227	0	0	198	0	198	0	18	12	69.86%	5	18	31247	2245	0
3743	166	166	58	0	0	50	0	50	0	5	3	69.86%	1	5	31247	2245	0
3744	233	233	81	0	0	70	0	70	0	34	24	69.86%	10	34	31247	2245	0
2230	88	88	27	0	0	1	0	1	13	3	1	40.56%	2	16	39611	2246	0
3745						0		0	0	0				0			0
3747	89	89	21	0	0	27	0	27	0	103	59	57.39%	44	103	42532	2241	0
3748						3		3						0			0
3749	3930	3930	1311	0	0	1191	0	1191	10	130	91	70.21%	39	140	32791	2243	902
3749	1248	1248	416	0	0	378	0	378	3	63	44	70.21%	19	66	32791	2243	0
3750	1795	1795	599	0	0	544	0	544	0	40	28	70.21%	12	40	32791	2243	0
3751	1217	1217	332	0	0	369	0	369	0	25	17	66.38%	8	25	25336	2244	0
3752	1420	1420	388	0	0	430	0	430	0	30	20	66.38%	10	30	25336	2244	0
3753	3757	3757	1027	0	0	1139	0	1139	11	80	53	66.38%	27	91	25336	2244	0
3755	522	522	182	0	0	158	0	158	0	15	11	69.86%	5	15	31247	2245	0
3756	951	951	332	0	0	281	8	288	0	26	18	69.86%	8	26	31247	2245	0

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3757	879	879	307	0	0	267	0	267	0	23	16	69.86%	7	23	31247	2245	0
3758	1365	1365	416	0	0	414	0	414	0	29	12	40.56%	17	29	39611	2246	0
3762	521	521	120	0	0	158	0	158	0	19	11	57.39%	8	19	42532	2241	0
2235	459	459	106	0	0	12	0	12	0	0	4	57.39%	3	8	42532	2241	0
2237						0		0		0				0			0
3764						127		127		8				0			0
2238	3655	3655	1393	0	0	608	0	608	0	252	101	40.00%	151	252	41776	2247	0
3765						500		500						0			0
3766	190	190	44	0	0	58	0	58	0	139	80	57.39%	59	139	42532	2241	0
2239	8	8	2	0	0	3	0	3	1	171	98	57.39%	73	171	42532	2241	0
3767								0						0			0
3768	3	3	1	0	0	1	0	1	0	75	43	57.39%	32	75	42532	2241	0
2240	35	26	8	0	8	10	0	10	18	43	24	57.39%	18	60	42532	2241	0
3769						1		1	0	0				0			0
2241	19	19	4	0	0	0	0	0	0	8	4	57.39%	3	8	42532	2241	0
3770						6		6						0			0
3771	630	630	145	0	0	191	0	191	0	122	70	57.39%	52	122	42532	2241	1424
3772	37	37	14	0	0	11	0	11	0	23	9	40.00%	14	23	41776	2247	0
2245	131	131	50	0	0	0	0	0	0	11	4	40.00%	6	11	41776	2247	0
2247						0		0	12	0				12			0
2252	4	4	0	0	0	0	0	0	0	0	33	52.74%	29	62	17057	2242	0
3790						1		1		62				0			0
3610						150		150		0				0			0
2198	355	355	121	0	0	0	0	0	0	0	3	77.45%	1	4	40119	2208	0
3611						135		135		4				0			4
3621						2		2		0				0			0
2221	173	173	60	0	0	15	0	15	0	3	1	32.14%	2	3	47794	2248	0
3688						37		37						0			0
3689	0	0	0	0	0	0	0	0	0	33	11	32.14%	23	33	47794	2248	0
3690						12		12		0				0			0
2222	276	276	95	0	0	18	0	18	0	0	2	32.14%	5	7	47794	2248	0
2223						62		62		7				0			0
3692	229	229	79	0	0	70	0	70	0	8	2	32.14%	5	8	47794	2248	0
2225	248	248	74	0	0	41	0	41	0	12	8	66.97%	4	12	35306	2206	0
3694						34		34		0				0			0
3695	23	23	7	0	0	7	0	7	0	1	1	66.97%	0	1	35306	2206	0
2226	87	87	26	0	0	7	0	7	0	0	4	66.97%	2	6	35306	2206	0
3696						19		19		6				0			0
3735	16	16	5	0	0	5	0	5	0	9	4	40.56%	6	9	39611	2246	0
3736	0	0	0	0	0	0	0	0	0	15	6	40.56%	9	15	39611	2246	0

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2233	118	118	36	0	0	13	0	13	0	0	0	40.56%	1	1	39611	2246	0
3737						23		23		1				0			0
3738	399	399	121	0	0	121	0	121	0	12	5	40.56%	7	12	39611	2246	0
3739	32	32	10	0	0	10	0	10	0	65	26	40.56%	39	65	39611	2246	743
2232						26		26	0	0				0			0
3746	159	159	49	0	0	48	0	48	0	2	1	40.56%	1	2	39611	2246	0
2231	34	34	8	0	0	7	0	7	0	78	45	57.39%	33	78	42532	2241	0
2234	113	113	34	0	0	21	0	21	0	35	14	40.56%	21	35	39611	2246	0
3759						13		13		0				0			0
3760	125	125	38	0	0	38	0	38	0	1	0	40.56%	1	1	39611	2246	0
2236						0		0		0				0			0
3773						40		40		0				0			0
2244	308	308	117	0	0	53	0	53	0	10	4	40.00%	6	10	41776	2247	0
3774						40		40		0				0			0
2246	333	333	127	0	0	36	0	36	30	26	10	40.00%	16	56	41776	2247	0
3775						65		65	0	0				0			0
2248	62	42	24	0	18	19	0	19	0	100	40	40.00%	60	100	41776	2247	0
3776						0		0		100				0			0
3778	49	49	11	0	0	15	0	15	0	1	1	57.39%	1	1	42532	2241	0
2249	0	0	0	0	0	0	0	0	0	0	8	52.74%	7	14	17057	2242	0
3780								0		14				0			0
2250	84	84	5	0	0	12	0	12	0	10	28	52.74%	25	53	17057	2242	0
3781						13		13		43				0			0
2251	30	30	2	0	0	0	0	0	0	0	1	52.74%	1	3	17057	2242	0
3782						9		9	16	3				16			0

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3560	1442	1442	590	0.41	0	451	0	451	591	337	121	13.05%	215	927	40663	2238	104
3561	1350	1350	553	0.41	0	411	0	411	51	261	92	29.49%	169	312	40663	2238	13
3562	1406	1406	575	0.41	0	431	0	431	72	101	36	20.93%	64	172	40663	2238	36
3563	0	0	0	0.00	0	0	0	0	62	1308	468	34.16%	840	1370	40663	2239	0
3564	2785	2785	967	0.35	0	270	551	821	484	150	100	15.77%	50	634	31663	2235	304
3565	1716	1716	596	0.35	0	284	227	511	487	180	120	18.02%	59	666	31663	2235	127
3566	1441	1441	501	0.35	113	279	152	431	63	275	184	54.44%	91	338	31663	2208	72
3567	1270	1270	441	0.35	0	266	111	377	93	201	135	45.76%	67	295	31663	2235	104
3568	1485	1485	516	0.35	0	272	169	441	55	261	175	55.38%	86	316	31663	2208	117
3569	1502	1502	522	0.35	0	277	171	448	111	129	86	35.83%	43	240	31663	2208	93
3570	866	866	308	0.36	0	229	33	262	104	173	126	45.49%	47	277	32447	2225	24
3571	720	720	256	0.36	0	218	0	218	491	424	316	34.54%	108	915	32447	2227	11
3597	1461	1424	598	0.41	0	452	0	452	0	179	65	36.31%	114	179	40663	2221	65
3607	508	508	176	0.35	0	153	0	153	0	57	38	66.67%	19	57	31663	2254	8
3608	422	422	146	0.35	0	127	0	127	130	42	28	16.28%	14	172	31663	2254	9
2188	613	613	213	0.35	0	183	0	183	0	0	0	0.00%	0	0	31663	2254	0
3609	235	235	82	0.35	0	70	0	70	0	72	48	33.57%	95	143	31663	2254	821
3612	477	477	166	0.35	0	144	0	144	0	59	39	67.24%	19	58	31663	2251	10
3614	900	900	320	0.36	0	273	0	273	0	53	39	73.58%	14	53	32447	2252	3
2204	2517	2517	895	0.36	0	757	0	757	1234	280	208	13.71%	75	1517	32447	2252	0
3615	7276	7276	2586	0.36	0	2188	0	2188	465	103	77	13.58%	25	567	32447	2249	2168
3616	0	0	0	0.00	0	0	0	0	77	1994	713	34.43%	1281	2071	40663	2208	0
3618	260	260	106	0.41	0	81	0	81	0	45	16	35.56%	29	45	40663	2208	16
3623	715	715	293	0.41	0	222	0	222	0	116	42	36.21%	74	116	40663	2207	43
3625	211	205	70	0.33	0	63	0	63	39	21	14	23.33%	7	60	30069	2207	9
3626	132	132	54	0.41	0	1	39	40	24	567	204	34.52%	363	591	40663	2207	0
3627	504	504	166	0.33	0	151	0	151	0	59	39	66.10%	20	59	30069	2208	11
2205	800	800	264	0.33	0	240	0	240	4	55	36	61.02%	19	59	30069	2208	
3628	487	487	161	0.33	0	146	0	146	4	55	36	61.02%	19	59	30069	2208	24
3629	815	815	269	0.33	0	246	0	246	0	49	32	65.31%	17	49	30069	2208	8
3630	755	755	268	0.35	0	229	0	229	0	43	32	74.42%	11	43	32447	2208	3
2206	13	13	6	0.46	0	4	0	4	56	2000	1133	55.11%	867	2056	37260	2208	
3631	6	6	3	0.50	0	2	0	2	200	1889	1070	51.22%	819	2089	37260	2208	0
3638	22	22	7	0.32	0	7	0	7	298	39	26	7.72%	13	337	30069	2249	841
3639	0	0	0	0.00	0	0	0	0	4	569	252	44.06%	316	572	36503	2271	0
2207	1770	1770	789	0.45	0	0	525	525	100	3099	1762	55.08%	1337	3199	37260	2275	0
3640	2987	2987	1332	0.45	0	886	0	886	1317	350	199	11.94%	151	1667	37260	2221	0
3646	10	10	3	0.30	0	3	0	3	0	542	242	44.65%	300	542	36503	2251	0
2209	641	641	211	0.33		190	0	190	11	125	83	60.58%	43	137	30069	2208	1550
3648	583	583	193	0.33		173	0	173	11	357	236	64.13%	121	368	30069	2208	1666
3649	1148	1148	379	0.33	30	346	0	346	0	69	45	65.22%	24	69	30069	2251	14

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3650	1063	1063	378	0.36	0	322	0	322	0	60	44	74.58%	15	59	32447	2251	3
3651	2454	2454	866	0.35	0	751	0	751	0	441	197	44.67%	244	441	36503	2252	889
3652	2027	2014	715	0.35		617	0	617	0	234	105	44.87%	129	234	36503	2252	79
3654	2247	2247	793	0.35	0	684	0	684	0	275	123	44.73%	152	275	36503	2249	79
3655	247	247	87	0.35	0	75	0	75	0	33	15	45.45%	18	33	36503	2254	10
3656	727	727	240	0.33	0	217	0	217	0	83	54	65.06%	29	83	30069	2249	23
3657	697	697	230	0.33	0	4	192	196	651	97	64	8.56%	33	748	30069	2249	102
3658	5217	5217	1854	0.36		1484	86	1570	426	263	195	28.30%	68	689	32447	2208	776
2210	10	10	4	0.40	0	3	0	3	0	1300	579	44.54%	721	1300	36503	2276	
3659	27	27	9	0.33	0	8	0	8	348	648	289	29.02%	359	996	36503	2254	0
3664	1	1	0	0.00		0	0	0	37	1531	684	43.62%	847	1568	36503	2250	0
2211	2792	2792	922	0.33	0	0	780	780	231	447	295	43.51%	152	678	30069	2250	
3665	2706	2706	893	0.33	0	356	400	756	47	90	59	43.07%	31	137	30069	2252	865
3666	1	1	0	0.00		0	0	0	0	897	508	56.63%	389	897	37260	2249	0
3667	663	663	219	0.33	0	197	0	197	98	121	80	36.53%	41	219	30069	2249	23
3668	995	995	354	0.36	0	302	0	302	45	58	43	41.75%	15	103	32447	2276	3
3669	3276	3276	1164	0.36	18	393	594	987	372	462	334	40.05%	128	834	32447	2276	3395
3670	29	29	10	0.34	0	0	9	9	570	9	6	1.04%	2	578	32447	2276	5
3671	1540	1540	547	0.36	0	9	454	463	907	3	2	0.22%	1	910	32447	2276	277
3672	1871	1871	618	0.33	0	322	233	555	140	119	78	30.23%	40	258	30069	2220	80
3673	1703	1703	562	0.33	0	84	404	488	176	37	24	11.27%	13	213	30069	2250	182
3677	2	2	1	0.50	0	1	0	1	413	649	292	27.50%	357	1062	36503	2221	0
3678	801	801	288	0.36	0	244	0	244	171	161	113	34.04%	48	332	36428	2223	29
3679	2872	2872	1013	0.35	0	871	0	871	1	328	145	44.07%	183	329	36503	2223	701
3680	714	714	229	0.32	0	214	0	214	27	269	114	38.38%	156	297	42545	2224	13
3681	4739	4739	1519	0.32	0	667	644	1311	242	97	48	14.16%	49	339	42545	2253	851
2190	2994	2994	960	0.32	0	0	36	36	273	251	115	21.95%	136	524	42545	2224	
3682	1570	1570	503	0.32		1243	0	1243	0	12	5	41.67%	7	12	42545	2250	706
2212	1440	1440	462	0.32	0	400	0	400	178	692	346	39.72%	347	871	42545	2250	
3683	2838	2838	909	0.32	0	788	0	788	0	0	0	0.00%	0	0	42545	2252	735
2213	0	0	0	0.00	0	0	0	0	1200	40	19	1.53%	21	1240	42545	2253	
3684	2888	2888	926	0.32	10	798	0	798	740	119	56	6.53%	62	858	42545	2253	520
2214	0	0	0	0.00	0	0	0	0	1074	108	38	3.21%	70	1182	51335	2205	
2215	0	0	0	0.00	0	0	0	0	1800	260	92	4.47%	168	2060	51335	2253	
3685	0	0	0	0.00	0	0	0	0	810	226	80	7.72%	146	1036	51335	2253	0
2220	3	3	1	0.00	0	1	0	1	30	359	134	34.45%	225	389	51335	2250	
3686	0	0	0	0.00	0	0	0	0	480	80	30	5.36%	50	560	51335	2250	0
3687	1202	1202	382	0.32	0	312	0	312	915	731	279	16.95%	452	1646	51335	2252	216
2224	27	27	9	0.33	0	7	0	7	0	5	2	40.00%	3	5	51335	2205	85
3691	64	64	20	0.31	0	17	0	17	2228	400	152	5.78%	248	2628	51335	2249	9
3693	228	228	72	0.32	0	61	0	61	1362	72	27	1.88%	46	1435	51335	2252	35

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3704	466	466	167	0.36	0	130	12	142	318	47	33	9.04%	14	365	36428	2246	12
3706	893	893	315	0.35		271	0	271	0	58	26	44.83%	32	58	36503	2246	10
3707	1058	1058	380	0.36		69	256	325	216	233	163	36.30%	70	449	36428	2246	151
3708	2195	2195	704	0.32		606	1	607	0	82	41	50.00%	41	82	42545	2248	395
3717	2476	2476	890	0.36		9	760	769	49	74	52	42.28%	22	123	36428	2206	369
3718	1629	1629	578	0.35	0	4	411	415	45	654	434	62.00%	221	700	27213	2206	222
3719	466	466	165	0.35		60	66	126	128	185	123	39.30%	62	313	27213	2206	1278
3720	910	910	321	0.35	0	276	0	276	0	56	25	44.64%	31	56	36503	2206	6
3721	1778	1778	630	0.35	0	258	214	472	308	782	518	47.52%	264	1090	27213	2206	245
2227	2096	2096	722	0.34	0	620	0	620	12	296	205	66.56%	91	308	39862	2206	72
3722	2299	2299	792	0.34	0	680	46	726	19	325	226	65.70%	99	344	39862	2206	82
3723	679	679	244	0.36	0	207	0	207	0	157	110	70.06%	47	157	36428	2206	19
3724	467	467	150	0.32	0	139	0	139	0	58	28	48.28%	30	58	42545	2206	24
3725	618	618	222	0.36	0	188	0	188	0	71	50	70.42%	21	71	36428	2205	9
3727	584	584	210	0.36	0	177	0	177	0	64	45	70.31%	19	64	36428	2205	4
3730	1105	1105	397	0.36	0	345	0	345	0	102	71	69.61%	31	102	36428	2245	192
3731	5297	5297	1878	0.35	0	80	1210	1290	0	89	59	66.29%	30	89	27213	2246	895
3732	2694	2694	928	0.34	0	575	264	839	0	211	145	68.72%	66	211	39862	2222	171
2228	731	731	259	0.35	0	80	843	923	0	0	0	0.00%	0	0	27213	2222	0
3733	6785	6785	2405	0.35	0	742	238	980	0	476	316	66.39%	160	476	27213	2222	4822
3734	845	845	271	0.32	0	249	0	249	9	195	90	44.12%	105	204	42545	2222	756
3740	883	821	317	0.36	0	268	0	268	0	104	73	70.19%	31	104	36428	2244	13
3741	815	815	293	0.36	0	248	0	248	0	95	67	69.79%	29	96	36428	2253	11
3742	697	697	251	0.36	0	212	0	212	0	80	56	70.00%	24	80	36428	2244	8
3743	229	229	82	0.36		70	0	70	0	34	24	70.59%	10	34	36428	2243	11
3744	280	280	101	0.36	0	85	0	85	0	87	61	70.11%	26	87	36428	2245	9
2230	36	36	11	0.31	0	10	0	10	338	234	117	20.45%	117	572	42545	2246	7
3745	107	107	34	0.32	0	30	0	30	390	0	0	0.00%	0	390	42545	2222	17
3747	176	176	70	0.40	0	49	0	49	0	183	108	59.02%	75	183	51494	2243	16
3748	315	315	125	0.40	0	82	0	82	0	208	83	39.90%	125	208	51494	2245	53
3749	4222	4222	1454	0.34	0	1287	0	1287	40	338	233	61.64%	105	378	39862	2244	954
3728	1454	1454	501	0.34	0	446	0	446	8	143	99	65.56%	44	151	39862	2243	37
3750	2248	2248	774	0.34		692	0	692	13	172	118	63.78%	54	185	39862	2244	81
3751	1267	1267	449	0.35	0	381	0	381	0	77	51	66.23%	26	77	27213	2246	9
3752	1761	1761	624	0.35	0	512	0	512	0	122	81	66.39%	41	122	27213	2246	61
3753	4281	4281	1518	0.35	0	1264	0	1264	15	278	184	62.80%	94	293	27213	2246	94
3755	613	613	220	0.36	0	187	0	187	0	113	79	69.91%	34	113	36428	2246	17
3756	1081	1081	388	0.36	0	321	8	329	0	130	91	70.00%	39	130	36428	2246	23
3757	923	923	332	0.36	49	280	0	280	0	102	72	69.90%	31	103	36428	2245	8
3758	1417	1417	454	0.32	0	428	0	428	19	99	47	39.83%	52	118	42545	2245	9
3762	1115	1115	443	0.40	0	311	0	311	0	100	60	60.00%	40	100	51494	2246	107

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2235	3164	3164	1256	0.40		816	0	816	0	0	0	0.00%	0	0	51494	2241	0
2237	6025	6025	2392	0.40	0	1554	0	1554	324	306	187	28.29%	150	661	51494	2243	884
3764	4191	4191	1664	0.40	0	1081	0	1081	93	95	58	28.57%	52	203	51494	2244	663
2238	3243	3243	1279	0.39	0	946	0	946	0	697	290	41.61%	407	697	50785	2244	182
3765	1748	1748	690	0.39	0	510	0	510	0	0	0	0.00%	0	0	50785	2244	99
3766	579	579	230	0.40	0	157	0	157	10	295	175	57.38%	120	305	51494	2222	70
2239	0	0	0	0.00	0	0	0	0	0	0	0	0.00%	0	0	51494	2245	0
3767	6153	6153	2372	0.39	0	1535	0	1535	333	332	198	27.39%	192	723	51494	2245	2290
3768	915	915	363	0.40	0	235	0	235	25	5	3	4.55%	38	66	51494	2245	203
2240	5765	5765	2289	0.40	0	889	0	889	71	263	160	42.55%	145	376	51494	2246	702
3769	12419	12419	4930	0.40		1915	0	1915	125	453	276	47.75%	177	578	51494		1226
2241	13440	13440	5335	0.40	0	3453	0	3453	371	82	50	10.87%	39	460	51494	2246	2422
3770	10109	10109	4013	0.40	0	2597	0	2597	278	61	37	10.60%	34	349	51494	2186	3854
3771	2394	2394	950	0.40	0	644	0	644	1	345	206	59.54%	139	346	51494	2241	317
3772	745	745	294	0.39	0	196	0	196	0	200	84	42.21%	115	199	50785	2186	127
2245	154	154	61	0.40		41	0	41	9	149	63	39.87%	86	158	50785		24
2247	42	42	17	0.40		11	0	11	1002	21	9	0.88%	12	1023	50785		14
2252	8429	8429	2235	0.27	0	2755	0	2755	295	120	63	14.82%	67	425	20735	2188	1514
3790	7573	7573	2008	0.27		2475	0	2475	267	107	56	12.25%	134	457	20735	2242	1358
3610	2042	2042	747	0.37	0	606	0	606	0	400	287	71.57%	114	401	48771	2251	469
2198	1645	1645	602	0.37	0	485	0	485	0	229	164	71.62%	65	229	48771	2251	263
3611	1347	1347	492	0.37	0	397	0	397	0	188	134	71.28%	54	188	48771	2251	215
3621	341	341	125	0.37	0	100	0	100	0	0	0	0.00%	0	0	48771	2207	861
2221	624	624	198	0.32		164	0	164	0	235	90	38.30%	145	235	51335	2253	104
3688	1450	1450	460	0.32	0	381	0	381	0	61	23	37.70%	38	61	51335	2207	238
3689	0	0	0	0.00	0	0	0	0	290	180	67	14.26%	113	470	51335	2205	0
3690	507	507	162	0.32	0	133	0	133	725	95	36	4.39%	59	820	51335	2205	4
2222	381	381	121	0.32	0	102	0	102	0	12	5	41.67%	7	12	51335	2253	56
2223	982	982	312	0.32		263	0	263	0	32	12	37.50%	20	32	51335	2250	142
3692	850	850	270	0.32	0	230	0	230	200	207	79	19.41%	128	407	51335	2250	112
2225	917	917	293	0.32	0	286	0	286	0	142	90	63.38%	52	142	42920	2252	147
3694	1373	1373	438	0.32	0	428	0	428	1	212	135	63.38%	77	213	42920	2252	221
3695	449	449	143	0.32	0	140	0	140	0	76	48	63.16%	28	76	42920	2252	77
2226	457	457	174	0.38	0	143	0	143	0	66	42	63.64%	24	66	42920	2250	78
3696	1184	1184	450	0.38	0	370	0	370	0	200	127	63.50%	73	200	42920	2250	202
3735	727	727	233	0.32	0	201	0	201	32	73	36	34.29%	37	105	42545	2222	128
3736	1565	1565	502	0.32	0	433	0	433	0	110	54	49.09%	56	110	42545	2222	282
2233	3462	3462	1110	0.32	0	960	0	960	0	13	6	46.15%	7	13	42545	2223	160
3737	613	613	196	0.32	0	170	0	170	647	244	122	13.69%	122	891	42545	2222	552
3738	2980	2980	955	0.32	0	834	0	834	51	174	86	38.22%	88	225	42545	2245	465
3739	1861	1861	597	0.32	0	515	0	515	0	237	112	47.26%	125	237	42545	2244	1072

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Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
2232	806	806	258	0.32	0	225	0	225	0	117	58	49.57%	59	117	42545	2245	131
3746	821	821	263	0.32	0	231	0	231	73	244	122	38.49%	122	317	42545	2245	119
2231	212	212	84	0.40	0	55	0	55	0	138	55	39.86%	83	138	51494	2222	36
2234	337	337	108	0.32	0	94	0	94	0	105	51	48.57%	54	105	42545	2245	54
3759	717	717	230	0.32	0	200	0	200	20	222	109	45.04%	113	242	42545	2245	115
3760	359	359	115	0.32	0	103	0	103	33	88	44	36.36%	44	121	42545	2245	42
2236	6319	6319	2509	0.40	0	1630	0	1630	282	270	165	33.07%	52	499	51494	2243	1990
3773	880	880	347	0.39		234	0	234	0	183	78	42.62%	105	183	50785		139
2244	783	783	309	0.39	0	210	0	210	94	207	88	29.24%	119	301	50785	2241	117
3774	995	995	393	0.39	0	267	0	267	94	263	112	31.37%	151	357	50785		148
2246	9286	9286	3665	0.39	0	2440	0	2440	0	1315	559	42.51%	756	1315	50785	2241	1200
3775	1926	1926	760	0.39		506	0	506	0	493	210	42.60%	283	493	50785		329
2248	3029	3029	1195	0.39	0	792	0	792	0	230	97	42.17%	133	230	50785	2241	540
3776	1236	1236	488	0.39	0	323	0	323	0	919	390	42.44%	529	919	50785	2247	217
3778	1712	1712	680	0.40		442	0	442	17	402	246	58.57%	157	420	51494	2247	299
2249	1422	1422	363	0.26		465	0	465	0	293	154	52.56%	139	293	20735	2247	256
3780	4895	4895	1251	0.26	0	1600	0	1600	7	682	358	55.25%	283	648	20735	2186	1314
2250	3384	3384	865	0.26	0	1105	0	1105	0	878	460	52.39%	418	878	20735	2241	602
3781	3783	3783	966	0.26	0	1235	0	1235	0	983	515	52.44%	467	982	20735	2185	673
2251	3825	3825	977	0.26		1250	0	1250	0	280	147	39.41%	226	373	20735	2242	922
3782	4103	4103	1048	0.26		1341	0	1341	154	335	175	27.26%	313	642	20735	2242	727

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3560	1341	1341	590	0.44	0	406	0	406	666	254	198	21.49%	56	919	40663	2238	325
3561	1065	1065	553	0.52	0	323	0	323	106	64	23	13.67%	41	171	40663	2238	258
3562	1089	1089	575	0.53	0	330	0	330	44	52	15	15.32%	37	95	40663	2238	264
3563	3	3	0	0.00	0	1	0	1	138	1579	658	38.33%	921	1717	40663	2239	1
3564	2009	2009	967	0.48	0	229	501	730	598	292	199	22.40%	93	890	31663	2235	584
3565	1526	1526	596	0.39	0	234	301	535	531	245	177	22.81%	68	776	31663	2235	428
3566	1331	1218	501	0.38	113	216	202	418	149	103	50	19.72%	53	252	31663	2208	334
3567	1037	1037	441	0.43	0	163	199	362	145	94	48	20.10%	46	239	31663	2235	290
3568	1193	1193	516	0.43	0	211	199	410	148	106	49	19.27%	57	254	31663	2208	328
3569	1326	1326	522	0.39	0	248	203	451	149	107	49	19.35%	57	256	31663	2208	361
3570	916	916	308	0.34	0	216	81	297	127	80	42	20.44%	38	207	32447	2225	238
3571	543	543	256	0.47	0	164	0	164	80	8988	27	0.30%	8961	9068	32447	2227	132
3597	1463	1463	598	0.41	0	443	0	443	0	56	0	0.00%	56	56	40663	2221	355
3607	362	362	176	0.49	0	110	0	110	0	14	0	0.00%	14	14	31663	2254	88
3608	356	356	146	0.41	0	108	0	108	152	65	51	23.53%	14	217	31663	2254	86
2188	363	363	213	0.59	0	110	0	110	0	14	0	0.00%	14	14	31663	2254	88
3609	235	235	82	0.35	0	70	0	70	0	143	48	33.57%	95	143	31663	2254	821
3612	475	475	166	0.35	0	144	0	144	0	18	0	0.00%	18	18	31663	2251	115
3614	690	690	320	0.46	0	209	0	209	0	27	0	0.00%	27	27	32447	2252	167
2204	1406	1406	895	0.64	0	426	0	426	0	15162	0	0.00%	15162	15162	32447	2252	341
3615	3290	3290	2586	0.79	0	997	0	997	501	15766	0	0.00%	15766	16267	32447	2249	798
3616	0	0	0	0.00	0	0	0	0	191	2506	1019	37.78%	1487	2698	40663	2208	0
3618	261	261	106	0.41	0	79	0	79	0	10	0	0.00%	10	10	40663	2208	63
3623	703	703	293	0.42	0	213	0	213	1	30	2	6.49%	28	31	40663	2207	170
3625	149	149	70	0.47	0	45	0	45	81	33	27	23.74%	6	114	30069	2207	36
3626	0	0	54	0.00	0	0	0	0	105	801	344	38.03%	456	906	40663	2207	0
3627	344	344	166	0.48	0	104	0	104	0	13	0	0.00%	13	13	30069	2208	83
2205	624	624	264	0.42	0	189	0	189	17	26	2	4.65%	24	43	30069	2208	151
3628	341	341	161	0.47	0	103	0	103	0	13	0	0.00%	13	13	30069	2208	83
3629	636	636	269	0.42	0	193	0	193	0	24	0	0.00%	24	24	30069	2208	154
3630	565	565	268	0.47	0	171	0	171	0	22	0	0.00%	22	22	32447	2208	137
2206	0	0	6	0.00	0	0	0	0	0	1411	0	0.00%	1411	1411	37260	2208	0
3631	0	0	3	0.00	0	0	0	0	419	2656	0	0.00%	2656	3075	37260	2208	0
3638	0	0	7	0.00	0	0	0	0	595	994	0	0.00%	994	1589	30069	2249	0
3639	0	0	0	0.00	0	0	0	0	0	1365	0	0.00%	1365	1365	36503	2271	0
2207	139	139	789	5.69	0	175	0	175	335	3237	0	0.00%	3237	3572	37260	2275	34
3640	423	423	1332	3.15	0	0	169	169	2005	4101	0	0.00%	4101	6106	37260	2221	135
3646	0	0	3	0.00	0	0	0	0	0	1365	0	0.00%	1365	1365	36503	2251	0
2209	499	499	211	0.42	0	151	0	151	24	98	2	1.65%	96	121	30069	2208	121
3648	840	840	193	0.23	0	255	0	255	18	2001	2	0.10%	1999	2019	30069	2208	204
3649	876	846	379	0.43	30	256	0	256	0	33	0	0.00%	33	33	30069	2251	205

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3650	766	766	378	0.49	0	232	0	232	0	29	0	0.00%	29	29	32447	2251	186
3651	1542	1542	866	0.56	0	467	0	467	0	80	0	0.00%	80	80	36503	2252	374
3652	1504	1504	715	0.48	0	456	0	456	0	58	0	0.00%	58	58	36503	2252	365
3654	1688	1688	793	0.47	0	512	0	512	0	68	0	0.00%	68	68	36503	2249	409
3655	176	176	87	0.49	0	53	0	53	0	7	0	0.00%	7	7	36503	2254	43
3656	747	747	240	0.32	0	226	0	226	0	13	0	0.00%	13	13	30069	2249	181
3657	1456	1456	230	0.16	0	1	581	582	948	994	0	0.00%	994	1942	30069	2249	466
3658	3238	3238	1854	0.57	0	981	0	981	0	30	0	0.00%	30	30	32447	2208	785
2210	0	0	4	0.00	0	0	0	0	0	3973	0	0.00%	3973	3973	36503	2276	0
3659	0	0	9	0.00	0	0	0	0	336	2358	0	0.00%	2358	2694	36503	2254	0
3664	1353	1353	0	0.00	0	0	541	541	0	3351	0	0.00%	3351	3351	36503	2250	1082
2211	2890	2890	922	0.32	0	401	627	1028	904	1775	775	28.93%	1000	2679	30069	2250	822
3665	866	866	893	1.03	0	180	109	289	0	18	0	0.00%	18	18	30069	2252	231
3666	0	0	0	0.00		0	0	0	0	996	0	0.00%	996	996	37260	2249	0
3667	972	972	219	0.23	0	230	85	315	0	22	0	0.00%	22	22	30069	2249	252
3668	948	948	354	0.37	0	232	73	305	89	24	0	0.00%	24	113	32447	2276	244
3669	2677	2659	1164	0.43	18	283	690	973	942	1990	0	0.00%	1990	2932	32447	2276	778
3670	698	698	10	0.01	0	60	200	260	348	144	0	0.00%	144	492	32447	2276	208
3671	1092	1092	547	0.50	0	140	252	392	1086	0	0	0.00%	0	1086	32447	2276	579
3672	3569	3569	618	0.17	0	808	361	1169	410	1315	1315	76.23%	0	1725	30069	2220	935
3673	1725	1725	562	0.33	0	0	690	690	406	0	0	0.00%	0	406	30069	2250	552
3677	5544	5544	1	0.00	0	0	1680	1680	762	283	0	0.00%	283	1045	36503	2221	1344
3678	1544	1544	288	0.19	0	349	157	506	0	26	3	11.66%	23	26	36428	2223	405
3679	2111	2111	1013	0.48	0	640	0	640	21	89	8	7.22%	81	111	36503	2223	512
3680	757	757	229	0.30	0	174	73	247	142	17	0	0.00%	17	159	42545	2224	198
3681	1151	1151	1519	1.32	0	259	0	259	1730	0	0	0.00%	0	1730	42545	2253	207
2190	793	793	960	1.21	0	222	24	246	516	0	0	0.00%	0	516	42545	2224	197
3682	1823	1823	503	0.28		552	0	552	0	70	0	0.00%	70	70	42545	2250	442
2212	1139	1139	462	0.41	0	345	0	345	835	42	0	0.00%	42	877	42545	2250	276
3683	3019	3019	909	0.30	0	915	0	915	0	0	0	0.00%	0	0	42545	2252	732
2213	259	259	0	0.00	0	4	2772	2776	2772	0	0	0.00%	0	2772	42545	2253	2221
3684	1882	1872	926	0.49	10	567	0	567	2027	62	0	0.00%	62	2089	42545	2253	454
2214	0	0	0	0.00	0	0	0	0	2673	0	0	0.00%	0	2673	51335	2205	0
2215	6933	6933	0	0.00	0	0	2773	2773	4154	0	0	0.00%	0	4154	51335	2253	2218
3685	0	0	0	0.00	0	0	0	0	0	1698	0	0.00%	1698	1698	51335	2253	0
2220	459	459	1	0.00	0	139	0	139	334	0	0	0.00%	0	334	51335	2250	111
3686	88	88	0	0.00	0	27	0	27	0	145	0	0.00%	145	145	51335	2250	22
3687	265	265	382	1.44	0	80	0	80	0	3403	0	0.00%	3403	3403	51335	2252	64
2224	416	416	9	0.02	0	126	0	126	1438	0	0	0.00%	0	1438	51335	2205	33
3691	274	274	20	0.07	0	83	0	83	448	0	0	0.00%	0	448	51335	2249	66
3693	0	0	72	0.00	0	0	0	0	2477	0	0	0.00%	0	2477	51335	2252	0

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3704	1160	1160	167	0.14	0	159	254	413	688	997	590	35.01%	407	1685	36428	2246	330
3706	677	677	315	0.47	0	205	0	205	0	26	0	0.00%	26	26	36503	2246	164
3707	1238	1238	380	0.31	0	72	400	472	636	342	314	32.10%	28	978	36428	2246	378
3708	1434	1434	704	0.49	0	435	0	435	0	55	0	0.00%	55	55	42545	2248	348
3717	1908	1908	890	0.47	0	0	763	763	270	0	0	0.00%	0	270	36428	2206	610
3718	2750	2750	578	0.21	0	250	770	1020	179	0	0	0.00%	0	179	27213	2206	816
3719	2613	2613	165	0.06	0	250	715	965	269	0	0	0.00%	0	269	27213	2206	772
3720	702	702	321	0.46	0	213	0	213	0	27	0	0.00%	27	27	36503	2206	170
3721	4128	4128	630	0.15	0	250	1321	1571	695	0	0	0.00%	0	695	27213	2206	1257
2227	1813	1813	722	0.40	0	549	0	549	0	80	0	0.00%	80	80	39862	2206	439
3722	2180	2180	792	0.36	0	661	0	661	69	91	7	4.38%	84	160	39862	2206	528
3723	412	412	244	0.59	0	125	0	125	0	16	0	0.00%	16	16	36428	2206	100
3724	303	303	150	0.50	0	92	0	92	0	12	0	0.00%	12	12	42545	2206	73
3725	438	438	222	0.51	0	133	0	133	0	17	0	0.00%	17	17	36428	2205	106
3727	410	410	210	0.51	0	124	0	124	0	16	0	0.00%	16	16	36428	2205	99
3730	1815	1815	397	0.22	0	0	726	726	0	0	0	0.00%	0	0	36428	2245	581
3731	2604	2604	1878	0.72	0	80	936	1016	0	10	0	0.00%	10	10	27213	2246	813
3732	2120	2120	928	0.44	0	643	0	643	0	100	19	18.98%	81	100	39862	2222	514
2228	2569	2569	259	0.10	0	69	936	1005	0	9	0	0.00%	9	9	27213	2222	804
3733	3254	3254	2405	0.74	0	302	828	1130	0	1025	2	0.20%	1023	1025	27213	2222	903
3734	335	335	271	0.81	0	101	0	101	0	34	0	0.00%	34	34	42545	2222	81
3740	628	628	317	0.50	0	190	0	190	0	24	0	0.00%	24	24	36428	2244	152
3741	594	594	293	0.49	0	180	0	180	0	23	0	0.00%	23	23	36428	2253	144
3742	492	492	251	0.51	0	149	0	149	0	19	0	0.00%	19	19	36428	2244	119
3743	163	163	82	0.50	0	49	0	49	0	6	0	0.00%	6	6	36428	2243	40
3744	197	197	101	0.51	0	60	0	60	0	8	0	0.00%	8	8	36428	2245	48
2230	46	46	11	0.24	0	14	0	14	1035	0	0	0.00%	0	1035	42545	2246	10
3745	83	83	34	0.41	0	25	0	25	527	0	0	0.00%	0	527	42545	2222	66
3747	252	252	70	0.28	0	76	0	76	0	10	0	0.00%	10	10	51494	2243	61
3748	367	367	125	0.34	0	111	0	111	0	14	0	0.00%	14	14	51494	2245	89
3749	3675	3675	1454	0.40	0	1114	0	1114	34	163	3	1.53%	160	197	39862	2244	891
3728	1338	1338	501	0.37	0	405	0	405	18	67	15	17.75%	52	85	39862	2243	324
3750	2036	2036	774	0.38	0	617	0	617	53	83	5	3.68%	78	136	39862	2244	494
3751	1124	1124	449	0.40	0	341	0	341	0	43	0	0.00%	43	43	27213	2246	273
3752	1561	1561	624	0.40	0	473	0	473	0	63	3	4.76%	60	63	27213	2246	378
3753	3649	3649	1518	0.42	0	1106	0	1106	31	145	4	2.28%	141	176	27213	2246	885
3755	389	389	220	0.57	0	118	0	118	0	15	0	0.00%	15	15	36428	2246	94
3756	765	765	388	0.51	0	232	0	232	0	29	0	0.00%	29	29	36428	2246	185
3757	1445	1396	332	0.23	49	422	0	422	0	54	0	0.00%	54	54	36428	2245	338
3758	1408	1408	454	0.32	0	427	0	427	0	54	0	0.00%	54	54	42545	2245	341
3762	798	798	443	0.56	0	242	0	242	0	30	0	0.00%	30	30	51494	2246	193

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2235	2568	2568	1256	0.49	0	658	158	816	0	104	0	0.00%	104	104	51494	2241	653
2237	6494	6494	2392	0.37	0	1968	0	1968	410	421	0	0.00%	421	831	51494	2243	1574
3764	3567	3567	1664	0.47	0	1081	0	1081	592	137	0	0.00%	137	729	51494	2244	865
2238	2686	2686	1279	0.48	0	814	0	814	11	129	0	0.00%	129	140	50785	2244	651
3765	1338	1338	690	0.52	0	405	0	405	0	697	290	41.59%	407	697	50785	2244	324
3766	518	518	230	0.44	0	157	0	157	52	379	218	50.57%	161	432	51494	2222	126
2239	74	74	0	0.00	0	22	0	22	0	50	0	0.00%	50	50	51494	2245	18
3767	6153	6153	2372	0.39	0	1535	0	1535	333	390	198	27.39%	192	723	51494	2245	2290
3768	777	777	363	0.47	0	235	0	235	25	121	53	36.41%	68	146	51494	2245	188
2240	3185	3185	2289	0.72	0	965	0	965	1000	122	0	0.00%	122	1122	51494	2246	772
3769	1640	1640	4930	3.01	0	497	0	497	125	360	64	13.20%	296	485	51494		398
2241	9791	9791	5335	0.54	0	1448	2005	3453	371	546	107	11.67%	439	917	51494	2246	2762
3770	6985	6985	4013	0.57	0	2117	0	2117	278	1169	839	58.00%	330	1447	51494	2186	1693
3771	1922	1922	950	0.49	0	582	0	582	0	141	0	0.00%	141	141	51494	2241	466
3772	545	545	294	0.54	0	165	0	165	0	20	0	0.00%	20	20	50785	2186	132
2245	70	70	61	0.88	0	21	0	21	448	0	0	0.00%	0	448	50785		17
2247	7	7	17	2.58	0	2	0	2	2703	0	0	0.00%	0	2703	50785		2
2252	8964	8964	2235	0.25	0	2569	194	2763	295	471	0	0.00%	471	766	20735	2188	2211
3790	4757	4757	2008	0.42	0	412	1359	1771	0	225	225	100.0%	0	225	20735	2242	1417
3610	887	887	747	0.84	0	269	0	269	0	34	0	0.00%	34	34	48771	2251	215
2198	860	860	602	0.70	0	261	0	261	0	33	0	0.00%	33	33	48771	2251	208
3611	655	655	492	0.75	0	198	0	198	0	25	0	0.00%	25	25	48771	2251	159
3621	189	189	125	0.66	0	57	0	57	0	7	0	0.00%	7	7	48771	2207	46
2221	301	301	198	0.66		82	0	82	0	5	0	0.00%	5	5	51335	2253	66
3688	1450	1450	460	0.32	0	381	0	381	0	61	23	37.70%	38	61	51335	2207	238
3689	891	891	0	0.00	0	270	0	270	0	109	0	0.00%	109	109	51335	2205	216
3690	230	230	162	0.71	0	70	0	70	0	5	0	0.00%	5	5	51335	2205	56
2222	374	374	121	0.32	0	113	0	113	0	14	0	0.00%	14	14	51335	2253	91
2223	748	748	312	0.42		227	0	227	0	29	0	0.00%	29	29	51335	2250	181
3692	899	899	270	0.30	0	272	0	272	345	32	0	0.00%	32	377	51335	2250	218
2225	683	683	293	0.43	0	207	0	207	0	26	0	0.00%	26	26	42920	2252	166
3694	500	500	438	0.88	0	152	0	152	0	19	0	0.00%	19	19	42920	2252	121
3695	227	227	143	0.63	0	69	0	69	0	9	0	0.00%	9	9	42920	2252	55
2226	292	292	174	0.60	0	89	0	89	0	11	0	0.00%	11	11	42920	2250	71
3696	506	506	450	0.89	0	153	0	153	0	19	0	0.00%	19	19	42920	2250	123
3735	608	608	233	0.38	0	184	0	184	25	26	3	5.88%	23	51	42545	2222	147
3736	1684	1684	502	0.30	0	510	0	510	0	65	0	0.00%	65	65	42545	2222	408
2233	2436	2436	1110	0.46	0	738	0	738	2	95	0	0.00%	95	97	42545	2223	591
3737	306	306	196	0.64	0	93	0	93	949	12	1	0.10%	11	961	42545	2222	74
3738	2073	2073	955	0.46	0	628	0	628	79	144	9	4.04%	135	223	42545	2245	503
3739	1178	1178	597	0.51	0	357	0	357	0	67	0	0.00%	67	67	42545	2244	286

Hesperia General Plan
SED by TAZ
High Intensity Buildout Scenario

Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
2232	650	650	258	0.40	0	197	0	197	111	62	37	21.38%	25	173	42545	2245	158
3746	766	766	263	0.34	0	232	0	232	198	52	22	8.80%	30	250	42545	2245	186
2231	45	45	84	1.87	0	14	0	14	0	4	0	0.00%	4	4	51494	2222	11
2234	381	381	108	0.28	0	115	0	115	0	15	0	0.00%	15	15	42545	2245	92
3759	1561	1561	230	0.15	0	473	0	473	162	73	18	7.68%	55	235	42545	2245	378
3760	362	362	115	0.32	0	110	0	110	91	24	10	8.70%	14	115	42545	2245	88
2236	5143	5143	2509	0.49	0	1368	252	1620	282	475	0	0.00%	475	757	51494	2243	1296
3773	809	809	347	0.43	0	245	0	245	0	31	0	0.00%	31	31	50785		196
2244	664	664	309	0.47	0	201	0	201	104	61	35	21.27%	26	165	50785	2241	161
3774	872	872	393	0.45	0	264	0	264	110	46	12	7.71%	34	156	50785		211
2246	2064	2064	3665	1.78	0	625	0	625	0	79	0	0.00%	79	79	50785	2241	500
3775	1500	1500	760	0.51	0	454	0	454	0	56	0	0.00%	56	56	50785		364
2248	924	924	1195	1.29	0	280	0	280	0	35	0	0.00%	35	35	50785	2241	224
3776	316	316	488	1.54	0	96	0	96	6	26	0	0.00%	26	31	50785	2247	77
3778	2783	2783	680	0.24	0	442	530	972	17	386	246	61.04%	140	403	51494	2247	777
2249	1831	1831	363	0.20	0	555	0	555	0	70	0	0.00%	70	70	20735	2247	444
3780	5030	5030	1251	0.25	0	1288	312	1600	19	885	447	49.42%	438	905	20735	2186	1280
2250	928	928	865	0.93	0	281	0	281	65	406	147	31.31%	258	471	20735	2241	225
3781	1389	1389	966	0.70	0	421	0	421	0	53	0	0.00%	53	53	20735	2185	337
2251	4726	4726	977	0.21	0	1432	0	1432	1000	184	0	0.00%	184	1184	20735	2242	1146
3782	3603	3603	1048	0.29	0	519	756	1275	39	199	1	0.42%	198	238	20735	2242	1020

Ontario General Plan Update
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Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
3560	1341	1341	549	0.41	0	406	0	406	666	254	198	21.5%	56	919	40663	2238	325
3561	1065	1065	436	0.41	0	323	0	323	106	64	23	13.7%	41	171	40663	2238	258
3562	1089	1089	445	0.41	0	330	0	330	44	52	15	15.3%	37	95	40663	2238	264
3563	3	3	0	0.00	0	1	0	1	138	970	658	59.4%	312	1108	40663	2239	1
3564	2009	2009	698	0.35	0	229	501	730	598	292	199	22.4%	93	890	31663	2235	584
3565	1526	1526	530	0.35	0	234	301	535	531	245	177	22.8%	68	776	31663	2235	428
3566	1331	1218	463	0.35	113	216	202	418	149	103	50	19.7%	53	252	31663	2208	334
3567	1037	1037	360	0.35	0	163	199	362	145	94	48	20.1%	46	239	31663	2235	290
3568	1193	1193	415	0.35	0	211	199	410	148	106	49	19.3%	57	254	31663	2208	328
3569	1326	1326	461	0.35	0	248	203	451	149	107	49	19.4%	57	256	31663	2208	361
3570	916	916	326	0.36	0	216	81	297	127	80	42	20.4%	38	207	32447	2225	238
3571	1061	1061	377	0.36	0	158	216	374	413	430	382	45.3%	48	843	32447	2227	299
3597	1463	1463	599	0.41	0	443	0	443	0	56	0	0.0%	56	56	40663	2221	355
3607	362	362	126	0.35	0	110	0	110	0	14	0	0.0%	14	14	31663	2254	88
3608	356	356	123	0.35	0	108	0	108	152	65	51	23.5%	14	217	31663	2254	86
2188	363	363	126	0.35	0	110	0	110	0	14	0	0.0%	14	14	31663	2254	88
3609	235	235	82	0.35	0	70	0	70	0	143	48	33.6%	95	143	31663	2254	821
3612	475	475	165	0.35	0	144	0	144	0	18	0	0.0%	18	18	31663	2251	115
3614	690	690	245	0.36	0	209	0	209	0	27	0	0.0%	27	27	32447	2252	167
2204	1284	1284	456	0.36	0	389	0	389	944	480	431	30.3%	49	1424	32447	2252	311
3615	2476	2476	880	0.36	0	734	22	756	601	767	601	43.9%	166	1368	32447	2249	604
3616	0	0	0	0.00	0	0	0	0	191	1266	1019	69.9%	247	1457	40663	2208	0
3618	261	261	106	0.41	0	79	0	79	0	10	0	0.0%	10	10	40663	2208	63
3623	703	703	288	0.41	0	213	0	213	1	30	2	6.5%	28	31	40663	2207	170
3625	149	149	49	0.33	0	45	0	45	81	33	27	23.7%	6	114	30069	2207	36
3626	0	0	0	0.41	0	0	0	0	105	801	344	38.0%	456	906	40663	2207	0
3627	344	344	113	0.33	0	104	0	104	0	13	0	0.0%	13	13	30069	2208	83
2205	624	624	206	0.33	0	189	0	189	17	26	2	4.6%	24	43	30069	2208	151
3628	341	341	113	0.33	0	103	0	103	0	13	0	0.0%	13	13	30069	2208	83
3629	636	636	210	0.33	0	193	0	193	0	24	0	0.0%	24	24	30069	2208	154
3630	565	565	201	0.35	0	171	0	171	0	22	0	0.0%	22	22	32447	2208	137
2206	7	7	3	0.46	0	2	0	2	149	845	0	0.0%	845	994	37260	2208	2
3631	0	0	0	0.50	0	0	0	0	445	1340	24	1.3%	1316	1785	37260	2208	0
3638	0	0	0	0.32	0	0	0	0	330	91	37	8.8%	54	421	30069	2249	0
3639	0	0	0	0.00	0	0	0	0	41	263	3	1.0%	260	304	36503	2271	0
2207	1189	1189	530	0.45	0	337	31	368	666	1738	89	3.7%	1649	2404	37260	2275	294
3640	1747	1747	779	0.45	0	5	692	697	1175	1264	1175	48.2%	89	2439	37260	2221	558
3646	0	0	0	0.30	0	0	0	0	28	300	0	0.0%	300	328	36503	2251	0
2209	499	499	164	0.33	0	151	0	151	24	98	2	1.6%	96	121	30069	2208	121
3648	667	667	221	0.33	0	202	0	202	20	78	2	2.0%	76	98	30069	2208	162
3649	876	846	289	0.33	30	256	0	256	0	33	0	0.0%	33	33	30069	2251	205

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3650	766	766	272	0.36	0	232	0	232	0	29	0	0.0%	29	29	32447	2251	186
3651	1542	1542	544	0.35	0	467	0	467	0	80	0	0.0%	80	80	36503	2252	374
3652	1504	1504	530	0.35	0	456	0	456	0	58	0	0.0%	58	58	36503	2252	365
3654	1688	1688	596	0.35	0	512	0	512	0	65	0	0.0%	65	65	36503	2249	409
3655	176	176	62	0.35	0	53	0	53	0	7	0	0.0%	7	7	36503	2254	43
3656	677	677	223	0.33	0	205	0	205	0	26	0	0.0%	26	26	30069	2249	164
3657	1406	1406	464	0.33	0	1	561	562	405	116	45	8.6%	71	521	30069	2249	450
3658	3053	3053	1085	0.36	0	757	222	979	561	688	561	44.9%	127	1249	32447	2208	783
2210	0	0	0	0.40	0	0	0	0	161	46	46	22.3%	0	207	36503	2276	0
3659	0	0	0	0.33	0	0	0	0	366	529	34	3.8%	495	895	36503	2254	0
3664	0	0	0	0.00	0	0	0	0	74	946	0	0.0%	946	1020	36503	2250	0
2211	2641	2641	872	0.33	0	295	667	962	424	222	47	7.3%	175	646	30069	2250	770
3665	785	785	259	0.33	0	238	0	238	132	90	60	27.0%	30	222	30069	2252	190
3666	0	0	0	0.00	0	0	0	0	91	519	0	0.0%	519	610	37260	2249	0
3667	756	756	250	0.33	0	229	0	229	86	115	86	42.8%	29	201	30069	2249	183
3668	759	759	270	0.36	0	230	0	230	65	79	4	2.8%	75	144	32447	2276	184
3669	3163	3145	1124	0.36	18	391	742	1133	455	455	260	28.6%	195	910	32447	2276	906
3670	573	573	197	0.34	0	0	229	229	388	417	0	0.0%	417	805	32447	2276	183
3671	2368	2368	841	0.36	0	166	728	894	356	348	0	0.0%	348	704	32447	2276	715
3672	2104	2104	695	0.33	0	436	266	702	120	102	0	0.0%	102	222	30069	2220	562
3673	1575	1575	520	0.33	0	0	630	630	131	95	0	0.0%	95	226	30069	2250	504
3677	0	0	0	0.50	0	0	0	0	429	610	39	3.8%	571	1039	36503	2221	0
3678	1066	1066	383	0.36	0	323	0	323	129	173	3	1.0%	170	302	36428	2223	258
3679	2111	2111	745	0.35	0	640	0	640	40	124	38	23.1%	86	164	36503	2223	512
3680	569	569	183	0.32	0	171	2	173	83	67	0	0.0%	67	150	42545	2224	138
3681	1371	1371	439	0.32	0	273	188	461	368	383	0	0.0%	383	751	42545	2253	369
2190	1068	1068	342	0.32	0	216	142	358	313	80	35	8.9%	45	393	42545	2224	286
3682	1823	1823	584	0.32	0	552	0	552	0	70	0	0.0%	70	70	42545	2250	442
2212	1450	1450	465	0.32	0	334	139	473	237	297	237	44.4%	60	533	42545	2250	378
3683	3019	3019	967	0.32	0	915	0	915	0	116	0	0.0%	116	116	42545	2252	732
2213	1393	1393	0	0.00	0	4	552	556	937	1008	937	48.2%	71	1945	42545	2253	445
3684	3852	3842	1235	0.32	10	1099	86	1185	147	298	0	0.0%	298	445	42545	2253	948
2214	1283	1283	0	0.00	0	0	513	513	872	939	871	48.1%	68	1811	51335	2205	410
2215	1918	1918	0	0.00	0	0	767	767	1303	1400	1303	48.2%	97	2703	51335	2253	614
3685	0	0	0	0.00	0	0	0	0	268	923	12	1.0%	911	1191	51335	2253	0
2220	824	824	0	0.00	0	196	71	267	300	486	135	17.2%	351	786	51335	2250	214
3686	9	9	0	0.00	0	2	1	3	116	645	2	0.3%	643	761	51335	2250	2
3687	287	287	91	0.32	0	87	0	87	331	1888	0	0.0%	1888	2219	51335	2252	70
2224	595	595	198	0.33	0	0	238	238	405	435	405	48.2%	30	840	51335	2205	190
3691	195	195	61	0.31	0	59	0	59	885	892	0	0.0%	892	1777	51335	2249	47
3693	590	590	186	0.32	0	3	232	235	942	606	0	0.0%	606	1548	51335	2252	188

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Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
3704	695	695	249	0.36	0	188	30	218	344	66	0	0.0%	66	410	36428	2246	174
3706	677	677	239	0.35	0	205	0	205	0	26	0	0.0%	26	26	36503	2246	164
3707	916	916	329	0.36	0	73	270	343	228	89	19	6.0%	70	317	36428	2246	274
3708	1434	1434	460	0.32	0	435	0	435	0	55	0	0.0%	55	55	42545	2248	348
3717	1350	1350	485	0.36	0	0	540	540	99	80	0	0.0%	80	179	36428	2206	432
3718	2255	2255	800	0.35	0	0	902	902	145	131	0	0.0%	131	276	27213	2206	722
3719	2100	2100	744	0.35	0	0	840	840	145	123	0	0.0%	123	268	27213	2206	672
3720	702	702	248	0.35	0	213	0	213	0	27	0	0.0%	27	27	36503	2206	170
3721	4725	4725	1674	0.35	0	0	1890	1890	335	279	2	0.3%	277	614	27213	2206	1512
2227	1813	1813	625	0.34	0	549	0	549	0	80	0	0.0%	80	80	39862	2206	439
3722	2180	2180	751	0.34	0	661	0	661	69	91	7	4.4%	84	160	39862	2206	528
3723	412	412	148	0.36	0	125	0	125	0	16	0	0.0%	16	16	36428	2206	100
3724	303	303	97	0.32	0	92	0	92	0	12	0	0.0%	12	12	42545	2206	73
3725	438	438	157	0.36	0	133	0	133	0	17	0	0.0%	17	17	36428	2205	106
3727	410	410	147	0.36	0	124	0	124	0	16	0	0.0%	16	16	36428	2205	99
3730	1525	1525	548	0.36	0	0	610	610	0	173	95	55.1%	78	173	36428	2245	488
3731	3404	3404	1207	0.35	0	80	1256	1336	0	170	0	0.0%	170	170	27213	2246	1069
3732	2120	2120	730	0.34	0	643	0	643	0	100	19	19.0%	81	100	39862	2222	514
2228	3190	3190	1130	0.35	0	69	1185	1254	0	159	0	0.0%	159	159	27213	2222	1003
3733	3997	3997	1417	0.35	0	343	1146	1489	0	399	210	52.6%	189	399	27213	2222	1191
3734	335	335	107	0.32	0	101	0	101	0	36	0	0.0%	36	36	42545	2222	81
3740	628	628	225	0.36	0	190	0	190	0	24	0	0.0%	24	24	36428	2244	152
3741	594	594	214	0.36	0	180	0	180	0	23	0	0.0%	23	23	36428	2253	144
3742	492	492	177	0.36	0	149	0	149	0	19	0	0.0%	19	19	36428	2244	119
3743	163	163	58	0.36	0	49	0	49	0	6	0	0.0%	6	6	36428	2243	40
3744	197	197	71	0.36	0	60	0	60	0	8	0	0.0%	8	8	36428	2245	48
2230	668	668	204	0.31	0	4	262	266	459	556	445	43.9%	111	1015	42545	2246	213
3745	56	56	18	0.32	0	17	0	17	415	140	0	0.0%	140	555	42545	2222	14
3747	252	252	100	0.40	0	76	0	76	0	10	0	0.0%	10	10	51494	2243	61
3748	367	367	146	0.40	0	111	0	111	0	14	0	0.0%	14	14	51494	2245	89
3749	3675	3675	1266	0.34	0	1114	0	1114	34	163	3	1.5%	160	197	39862	2244	891
3728	1338	1338	461	0.34	0	405	0	405	18	67	15	17.7%	52	85	39862	2243	324
3750	2036	2036	701	0.34	0	617	0	617	53	83	5	3.7%	78	136	39862	2244	494
3751	1124	1124	398	0.35	0	341	0	341	0	43	0	0.0%	43	43	27213	2246	273
3752	1561	1561	553	0.35	0	473	0	473	0	63	3	4.8%	60	63	27213	2246	378
3753	3649	3649	1294	0.35	0	1106	0	1106	31	145	4	2.3%	141	176	27213	2246	885
3755	389	389	140	0.36	0	118	0	118	0	15	0	0.0%	15	15	36428	2246	94
3756	765	765	275	0.36	0	232	0	232	0	29	0	0.0%	29	29	36428	2246	185
3757	1445	1396	520	0.36	49	422	0	422	0	54	0	0.0%	54	54	36428	2245	338
3758	1408	1408	451	0.32	0	427	0	427	0	54	0	0.0%	54	54	42545	2245	341
3762	798	798	317	0.40	0	242	0	242	0	30	0	0.0%	30	30	51494	2246	193

Ontario General Plan Update
SED by TAZ
Preferred Land Use Scenario

Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
2235	2568	2568	1020	0.40	0	658	158	816	0	104	0	0.0%	104	104	51494	2241	653
2237	6494	6494	2578	0.40	0	1968	0	1968	410	421	0	0.0%	421	831	51494	2243	1574
3764	3567	3567	1416	0.40	0	1081	0	1081	592	137	0	0.0%	137	729	51494	2244	865
2238	2686	2686	1059	0.39	0	814	0	814	11	129	0	0.0%	129	140	50785	2244	651
3765	1338	1338	528	0.39	0	405	0	405	0	341	290	85.0%	51	341	50785	2244	324
3766	518	518	206	0.40	0	157	0	157	52	379	218	50.6%	161	432	51494	2222	126
2239	74	74	0	0.00	0	22	0	22	0	50	0	0.0%	50	50	51494	2245	18
3767	6153	6153	2372	0.39	0	1535	0	1535	333	390	198	27.4%	192	723	51494	2245	2290
3768	777	777	308	0.40	0	235	0	235	25	121	53	36.4%	68	146	51494	2245	188
2240	3185	3185	1265	0.40	0	965	0	965	1000	122	0	0.0%	122	1122	51494	2246	772
3769	1640	1640	651	0.40	0	497	0	497	125	360	64	13.2%	296	485	51494	0	398
2241	9791	9791	3886	0.40	0	1448	2005	3453	371	546	107	11.7%	439	917	51494	2246	2762
3770	6985	6985	2773	0.40	0	2117	0	2117	278	1169	839	58.0%	330	1447	51494	2186	1693
3771	1922	1922	763	0.40	0	582	0	582	0	141	0	0.0%	141	141	51494	2241	466
3772	545	545	215	0.39	0	165	0	165	0	20	0	0.0%	20	20	50785	2186	132
2245	931	931	369	0.40	0	7	363	370	1201	729	682	35.3%	47	1930	50785	0	296
2247	1171	1171	474	0.40	0	7	459	466	779	838	779	48.2%	59	1617	50785	0	373
2252	8964	8964	2377	0.27	0	2569	194	2763	295	471	0	0.0%	471	766	20735	2188	2211
3790	4757	4757	1261	0.27	0	412	1359	1771	0	225	225	100.0%	0	225	20735	2242	1417
3610	887	887	324	0.37	0	269	0	269	0	34	0	0.0%	34	34	48771	2251	215
2198	860	860	315	0.37	0	261	0	261	0	33	0	0.0%	33	33	48771	2251	208
3611	655	655	239	0.37	0	198	0	198	0	25	0	0.0%	25	25	48771	2251	159
3621	189	189	69	0.37	0	57	0	57	0	7	0	0.0%	7	7	48771	2207	46
2221	370	370	117	0.32	0	112	0	112	0	14	0	0.0%	14	14	51335	2253	90
3688	541	541	172	0.32	0	164	0	164	11	84	0	0.0%	84	95	51335	2207	131
3689	10	10	0	0.00	0	3	0	3	97	550	0	0.0%	550	647	51335	2205	2
3690	440	440	141	0.32	0	56	102	158	173	193	0	0.0%	193	366	51335	2205	126
2222	374	374	119	0.32	0	113	0	113	0	14	0	0.0%	14	14	51335	2253	91
2223	748	748	238	0.32	0	227	0	227	0	29	0	0.0%	29	29	51335	2250	181
3692	1005	1005	319	0.32	0	266	51	317	209	168	0	0.0%	168	377	51335	2250	254
2225	683	683	218	0.32	0	207	0	207	0	26	0	0.0%	26	26	42920	2252	166
3694	500	500	160	0.32	0	152	0	152	0	19	0	0.0%	19	19	42920	2252	121
3695	227	227	72	0.32	0	69	0	69	0	9	0	0.0%	9	9	42920	2252	55
2226	292	292	111	0.38	0	89	0	89	0	11	0	0.0%	11	11	42920	2250	71
3696	506	506	192	0.38	0	153	0	153	0	19	0	0.0%	19	19	42920	2250	123
3735	608	608	195	0.32	0	184	0	184	25	26	3	5.9%	23	51	42545	2222	147
3736	1684	1684	540	0.32	0	510	0	510	0	65	0	0.0%	65	65	42545	2222	408
2233	2436	2436	781	0.32	0	738	0	738	2	95	0	0.0%	95	97	42545	2223	591
3737	769	769	246	0.32	0	95	182	277	310	344	0	0.0%	344	654	42545	2222	222
3738	2073	2073	664	0.32	0	628	0	628	79	144	9	4.0%	135	223	42545	2245	503
3739	1178	1178	378	0.32	0	357	0	357	0	67	0	0.0%	67	67	42545	2244	286

Ontario General Plan Update
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Hesperia model zone number	TotPop	ResPop	Workers	Work/Pop	GQPop	SDU	MDU	TotalDU	Retail	NonRetail	Service	%Svc.	Other	Total	MedInc		SchEnr SCAG TAZ
2232	650	650	208	0.32	0	197	0	197	111	62	37	21.4%	25	173	42545	2245	158
3746	766	766	245	0.32	0	232	0	232	198	52	22	8.8%	30	250	42545	2245	186
2231	45	45	18	0.40	0	14	0	14	0	4	0	0.0%	4	4	51494	2222	11
2234	381	381	122	0.32	0	115	0	115	0	15	0	0.0%	15	15	42545	2245	92
3759	1561	1561	501	0.32	0	473	0	473	162	78	18	7.5%	60	240	42545	2245	378
3760	362	362	116	0.32	0	110	0	110	91	24	10	8.7%	14	115	42545	2245	88
2236	5143	5143	2042	0.40	0	1368	252	1620	282	475	0	0.0%	475	757	51494	2243	1296
3773	809	809	319	0.39	0	245	0	245	0	31	0	0.0%	31	31	50785	0	196
2244	664	664	262	0.39	0	201	0	201	104	61	35	21.3%	26	165	50785	2241	161
3774	872	872	344	0.39	0	264	0	264	110	46	12	7.7%	34	156	50785	0	211
2246	2064	2064	815	0.39	0	625	0	625	0	79	0	0.0%	79	79	50785	2241	500
3775	1464	1464	578	0.39	0	442	2	444	4	60	0	0.0%	60	64	50785	0	355
2248	924	924	364	0.39	0	280	0	280	0	35	0	0.0%	35	35	50785	2241	224
3776	316	316	125	0.39	0	96	0	96	6	26	0	0.0%	26	31	50785	2247	77
3778	2783	2783	1105	0.40	0	442	530	972	17	370	246	63.6%	124	387	51494	2247	777
2249	1831	1831	467	0.26	0	555	0	555	0	70	0	0.0%	70	70	20735	2247	444
3780	5030	5030	1286	0.26	0	1288	312	1600	19	932	447	47.0%	485	951	20735	2186	1280
2250	928	928	237	0.26	0	281	0	281	65	406	147	31.3%	258	471	20735	2241	225
3781	1389	1389	355	0.26	0	421	0	421	0	53	0	0.0%	53	53	20735	2185	337
2251	4726	4726	1207	0.26	0	1432	0	1432	1000	184	0	0.0%	184	1184	20735	2242	1146
3782	3603	3603	920	0.26	0	519	756	1275	39	166	1	0.5%	165	205	20735	2242	1020

Appendix D

- **Recommended Intersection Lane Geometries Summary**

Ontario General Plan Update
Recommended Intersection Lane Geometry

		NUMBER OF LANES																			
		Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach				
Int. #		L	L+T	T	T+R	R	L	L+T	T	T+R	R	L	L+T	T	T+R	R	L	L+T	T	T+R	R
1	Summit Valley Rd and Hwy 138*	-	-	-	-	-	-	-	-	-	1	-	-	3	-	-	-	-	3	-	1
5	I-15 SB Ramp and Oak Hill Rd	-	-	-	-	-	1	-	-	-	1	-	-	1	1	-	2	-	2	-	-
6	I-15 NB Ramp and Mariposa Ave	2	-	3	-	-	-	-	3		1	2	-	-	-	1	-	-	-	-	-
9	Caliente and Ranchero Rd	2	-	-	1	1	2	-	-	1	1	1	-	2	1	-	2	-	2	1	1
10	I-15 SB Ramp and Ranchero Rd	-	-	-	-	-	1	-	1	-	1	-	-	3	-	2	2	-	3	-	-
11	I-15 NB Ramp and Ranchero Rd	2	-	-	-	1	-	-	-	-	-	2	-	3	-	-	-	-	3	-	1
12	Mariposa and Ranchero Rd	2	-	2	1	1	2	-	3	-	1	2	-	2	1	1	2	-	3	-	1
13	Escondido Ave and Ranchero Rd	1	-	1	1	-	1	-	1	1	-	1	-	2	1	-	1	-	2	1	-
14	Maple Ave and Ranchero Rd	1	-	1	1	-	1	-	1	1	-	1	-	2	1	-	1	-	2	1	-
15	I Ave and Ranchero Rd	1	-	2	1	-	1	-	1	1	-	1	-	2	1	-	1	-	1	1	-
16	Arrowhead Lake Rd and Ranchero Rd	1	-	3	-	-	-	-	1	1	-	0.5	-	-	-	0.5	-	-	-	-	-
17	Caliente and Joshua St	1	-	-	-	1	-	-	-	-	-	-	-	1	1	-	1	-	2	-	-
18	Mariposa and Joshua St	2	-	3	-	1	2	-	3	-	1	2	-	1	1	-	2	-	1	1	-
19	Escondido Ave and Muscatel	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-
20	Arrowhead Lake Rd/Main St & Rock Springs Rd	-	-	-	-	-	1	-	-	-	1	2	-	2	-	-	-	-	2	-	1
21	Baldy Mesa Dr and Phelan Rd/Main St	2	-	3	-	1	2	-	3	-	1	2	-	3	-	2	2	-	3	-	1
23	Maple Ave and Eucalyptus Rd	2	-	1	1	-	2	-	1	1	-	2	-	3	-	1	2	-	3	-	1
24	Mesa Linda and Main St.	1	-	-	-	1	-	-	-	-	-	-	-	2	1	-	1	-	3	-	-
25	Cataba Rd and Main St.	-	-	-	-	-	1	-	-	-	1	1	-	3	-	-	-	-	2	1	-
26	I-15 SB Ramp and Main St.	-	-	-	-	-	1	-	1	-	1	-	-	3	-	1	-	-	3	-	1
27	Escondido Ave and Main St	2	-	3	-	1	2	-	2	1	1	2	-	3	-	1	2	-	3	-	1
28	Maple Ave and Main St	2	-	1	1	-	2	-	1	1	-	2	-	3	-	1	2	-	3	-	1
29	I Ave and Bear Valley Rd	1	-	-	-	1	-	-	-	-	-	-	-	3	-	1	2	-	3	-	-
30	3rd Ave and Main St	1	-	1	-	1	1	-	2	-	1	2	-	1	1	-	2	-	1	1	-
31	C Ave and Main St	2	-	-	1	-	1	-	1	-	1	1	-	2	-	1	1	-	1	1	-
32	E Ave and Main St	2	-	1	1	-	2	-	1	1	-	2	-	1	1	-	2	-	1	1	-
33	I Ave and Main St	2	-	2	-	1	1	-	2	-	1	2	-	2	-	1	2	-	2	-	1
34	Baldy Mesa Dr and Smoke Tree	1	-	2	1	-	1	-	2	1	-	1	-	1	1	-	1	-	1	1	-
35	Hwy 395 and Smoke Tree	2	-	3	-	-	-	-	3	-	1	2	-	-	-	1	-	-	-	-	-
36	Mariposa and Mojave	2	-	3	-	1	2	-	3	-	2	2	-	3	-	2	2	-	3	-	1
37	Escondido Ave and Live Oak	-	-	3	-	1	2	-	3	-	-	-	-	-	-	-	2	-	-	-	1
38	I-15 SB Ramp and Mojave	-	-	-	-	-	1	-	1	-	1	-	-	3	-	1	2	-	3	-	-
39	I-15 NB Ramp and Mojave	1	-	1	-	1	-	-	-	-	-	2	-	3	-	-	-	-	3	-	1
40	Maple Ave and Mojave	2	-	1	1	-	2	-	1	1	-	2	-	3	-	1	2	-	3	-	1
41	Hesperia Rd and Bear Valley Rd	2	-	2	-	1	2	-	2	-	1	2	-	3	-	1	2	-	3	-	1
42	E Ave and Mauna Loa/Lemon	1	-	1	1	-	1	-	1	1	-	1	-	2	1	-	1	-	2	1	-
43	I Ave and Lemon	1	-	1	1	-	1	-	1	1	-	1	-	2	1	-	1	-	2	1	-
44	I-15 SB Ramp and Eucalyptus St	-	-	-	-	-	1	-	-	-	1	-	-	1	1	-	1	-	2	-	-
45	I-15 NB Ramp and Eucalyptus St	1	-	-	-	1	-	-	-	-	-	1	-	2	-	-	-	-	1	1	-
46	Mariposa and Eucalyptus St	2	-	3	-	1	2	-	3	-	1	2	-	3	-	1	2	-	3	-	1
47	Hesperia Rd and Eucalyptus St	2	-	1	1	-	2	-	1	1	-	2	-	1	1	-	2	-	1	1	-
48	E Ave and I Ave	1	-	1	1	-	1	-	1	1	-	1	-	-	1	-	1	-	-	1	-
49	I Ave and Eucalyptus St	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-
54	Santa Fe East and Ranchero Rd	2	-	1	1	-	1	-	2	-	1	2	-	3	-	2	2	-	2	1	-
55	E Ave and Sultana St	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-
56	I Ave and Sultana St	1	-	2	-	-	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-
57	Hwy 395 and Joshua St	2	-	3	-	1	2	-	3	-	1	2	-	1	1	-	2	-	1	1	-

Ontario General Plan Update
Recommended Intersection Lane Geometry

		NUMBER OF LANES																			
		Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach				
Int. #		L	L+T	T	T+R	R	L	L+T	T	T+R	R	L	L+T	T	T+R	R	L	L+T	T	T+R	R
58	I-15 NB Ramp and Main St	1	-	-	-	1	-	-	-	-	-	-	-	3	-	1	-	-	3	-	1
59	I-15 SB Ramp and Muscatel	-	-	-	-	-	1	-	-	-	1	-	-	1	1	-	1	-	2	-	-
60	I-15 NB Ramp and Muscatel	1	-	-	-	1	-	-	-	-	-	1	-	1	-	-	-	-	1	1	-
70	Hwy 395 and Poplar	-	-	3	-	1	2	-	3	-	-	-	-	-	-	-	0.5	-	-	-	1.5
71	Escondido Ave and Muscatel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	Maple Ave and Summit Valley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Maple Ave and Muscatel	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-
74	Main St and Cottonwood	2	-	1	1	-	2	-	1	1	-	2	-	3	-	1	2	-	3	-	1
75	Main St and 7th Ave	2	-	1	1	-	2	-	2	-	1	2	-	1	1	-	2	-	1	1	-
76	Main St and Peach Ave	1	-	1	1	-	1	-	1	1	-	1	-	2	1	-	1	-	2	1	-
77	I Ave and Danbury Ave	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-	1	-	1	1	-
78	Danbury Ave and Ranchero Rd	1	-	1	1	-	1	-	2	-	1	2	-	2	1	-	1	-	2	1	-
79	Hwy 395 NB and Phelan Rd/Main St*	1	-	1	-	1	-	-	-	-	-	1	-	3	-	-	-	-	3	-	1
80	Hwy 395 SB and Phelan Rd/Main St*	-	-	-	-	-	1	-	1	-	1	-	-	2	1	-	1	-	3	-	-

* Analyzed assuming a grade seperated intersection

OPEN SPACE TECHNICAL REPORT

CITY OF HESPERIA
GENERAL PLAN UPDATE

July 2009

Prepared for:
City of Hesperia
9700 Seventh Avenue
Hesperia, CA 92345

Prepared by:
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Introduction:

The Background Technical Report for the Open Space Element identifies the current conditions, issues, opportunities and constraints relating to parks, community facilities, and open space in the City of Hesperia. This report will measure progress since the original General Plan and provide a framework for decision makers to consider goals, policies, and implementation programs for open space and parks facilities for the "build-out" of the City.

The Background Technical Report begins with a review of the existing Open Space within the City of Hesperia. The existing natural resources are summarized, as well as the Hesperia Recreation and Park District properties and amenities. Issues, Opportunities, and Constraints are then identified to help the community, leaders, and staff choose between alternatives. Open space required for conservation and health and safety purposes are covered in the Conservation and Safety Elements of the General Plan.

Background:

The current General Plan states that "the City plans to protect, maintain and enhance its open space and recreational resources." Presently, the City of Hesperia has 2,126 acres designated as Open Space within the City and Sphere of Influence. The majority of the area currently designated Open Space consists of the City's eastern boundary, which parallels the Mojave River, the Oro Grande wash west of the Interstate 15 freeway, the un-named wash east of the Interstate 15 freeway, the Antelope Valley wash, and the Honda Valley wash east of the Antelope Valley wash. The majority of these Open Space designated areas are privately owned.

The Hesperia Recreation and Parks District is a separate entity that provides for and maintains parks and recreational facilities within the City of Hesperia. The City and Parks District have been working together since the 1991 General Plan to create additional parks to adequately serve the City's residents. Today's recreational uses within and near the City reflect passive uses such as equestrian trails, fishing, camping, and hiking, as well as active uses such as baseball, boating, golfing, and soccer.

Natural Setting:

The City of Hesperia and its Sphere of Influence is traversed by several washes, including the Oro Grande Wash and un-named wash located on either side of the Interstate 15 freeway, the Antelope Valley Wash, and the Honda Valley Wash (listed as Un-Named wash #2) (see Exhibit 1). In addition, the City contains varying topography that provides scenic views. There is a bluff in the Rancho Las Flores area in the southeastern portion of the City.

Washes

Oro Grande Wash: The Oro Grande Wash is located on the west side of the Interstate 15 freeway. The entire wash is located within the Oak Hills Community Plan and has been used as a buffer between the commercial/industrial uses located adjacent to the freeway and the residential uses within Oak Hills. The Oro Grande Wash is also identified as a Wash Protection Overlay in the Main Street Freeway Corridor Specific Plan. Within the wash there are pockets of areas that have seen little disturbance; predominately in the area from the southern edge of the City and Sphere of Influence north to the Union Pacific railroad.

Un-named Wash #1 east of Interstate 15: The un-named wash located on the eastern side of the Interstate 15 freeway (opposite the Oro Grande Wash) is almost entirely located within the Oak Hills Community Plan and the Main Street/Freeway Corridor Specific Plan. This wash also contains areas that have seen little disturbance, most significantly the area northwest of the Mission Crest development (located between the Interstate 15 freeway and Escondido Avenue, north of Hollister Street) and south of the Union Pacific railroad to the City and Sphere of Influence boundaries..

Antelope Valley Wash: The Antelope Valley Wash has seen the most development and active use recreation of all the washes within the City and Sphere of Influence. This wash contains many single-family residences on the north and south sides from Jenny Street at the south to the Mojave River at the north. In addition, a golf-course is located within the wash between Arrowhead Lake Road and I Avenue.

Honda Valley Wash (Un-named Wash #2): The Honda Valley Wash is located in the southeast section of the City. It is the least developed of the washes within the City and Sphere. This wash contains tremendous opportunities for passive recreational uses such as natural hiking and equestrian trails.

Bluffs

The topography of the City includes many areas that contain scenic value, including the bluff in the Rancho Las Flores area in the southeastern portion of the City.

Mojave River

The Mojave River is located along the eastern boundary of the City limits and Sphere of Influence. There are many agricultural properties located adjacent to the river, as well as large expanses of vacant property within and abutting the river. The Mojave River Forks Regional Park and Mojave Narrows Regional Park are both located along the river near Hesperia. The Mojave River Forks Regional Park is located just outside the City limits to the southeast. Mojave Narrows Regional Park is located 2.5 miles north of the City limits.

Exhibit 1A: North/East Wash Location Map

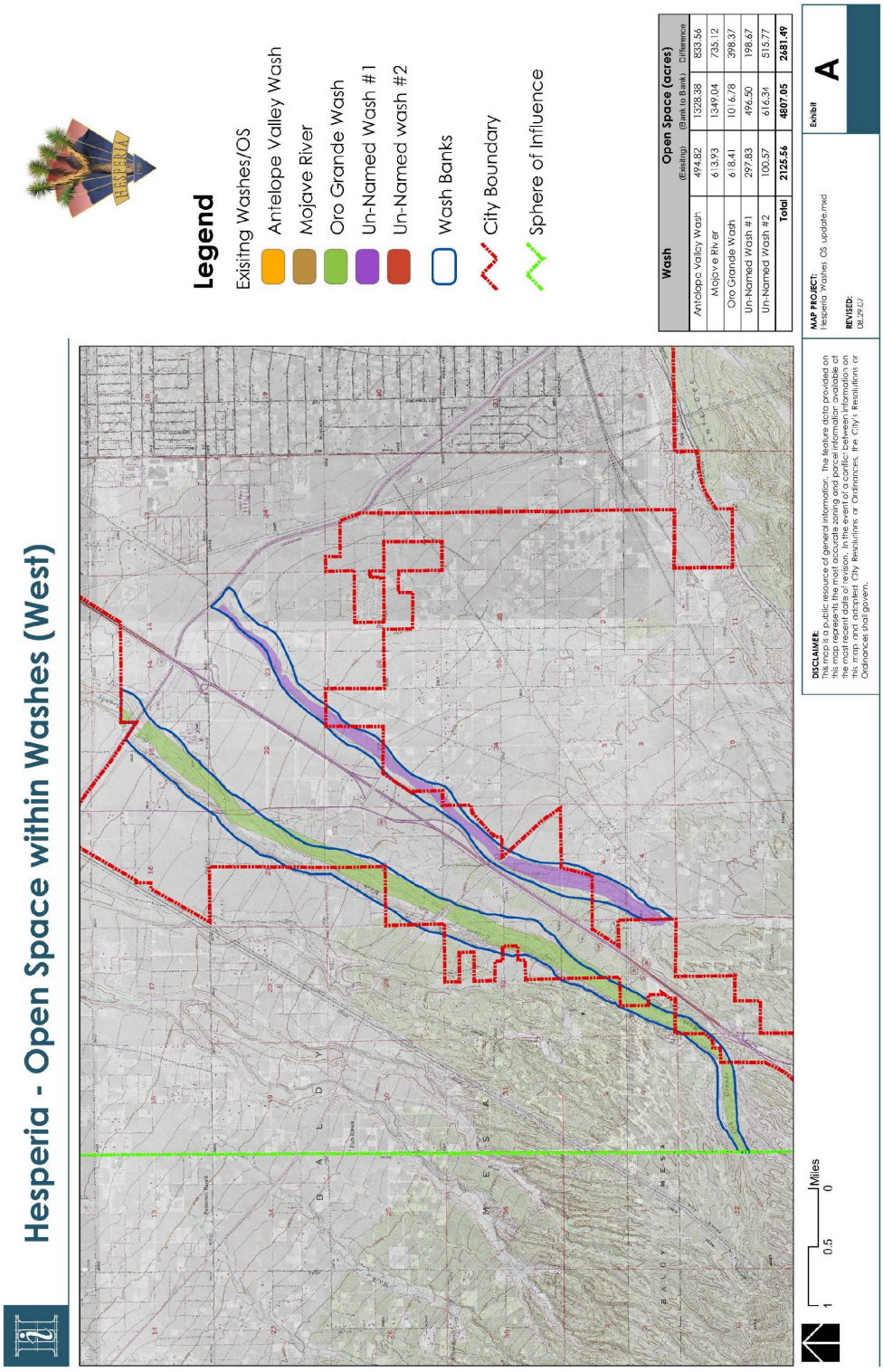


Exhibit 1B: West Wash Location Map

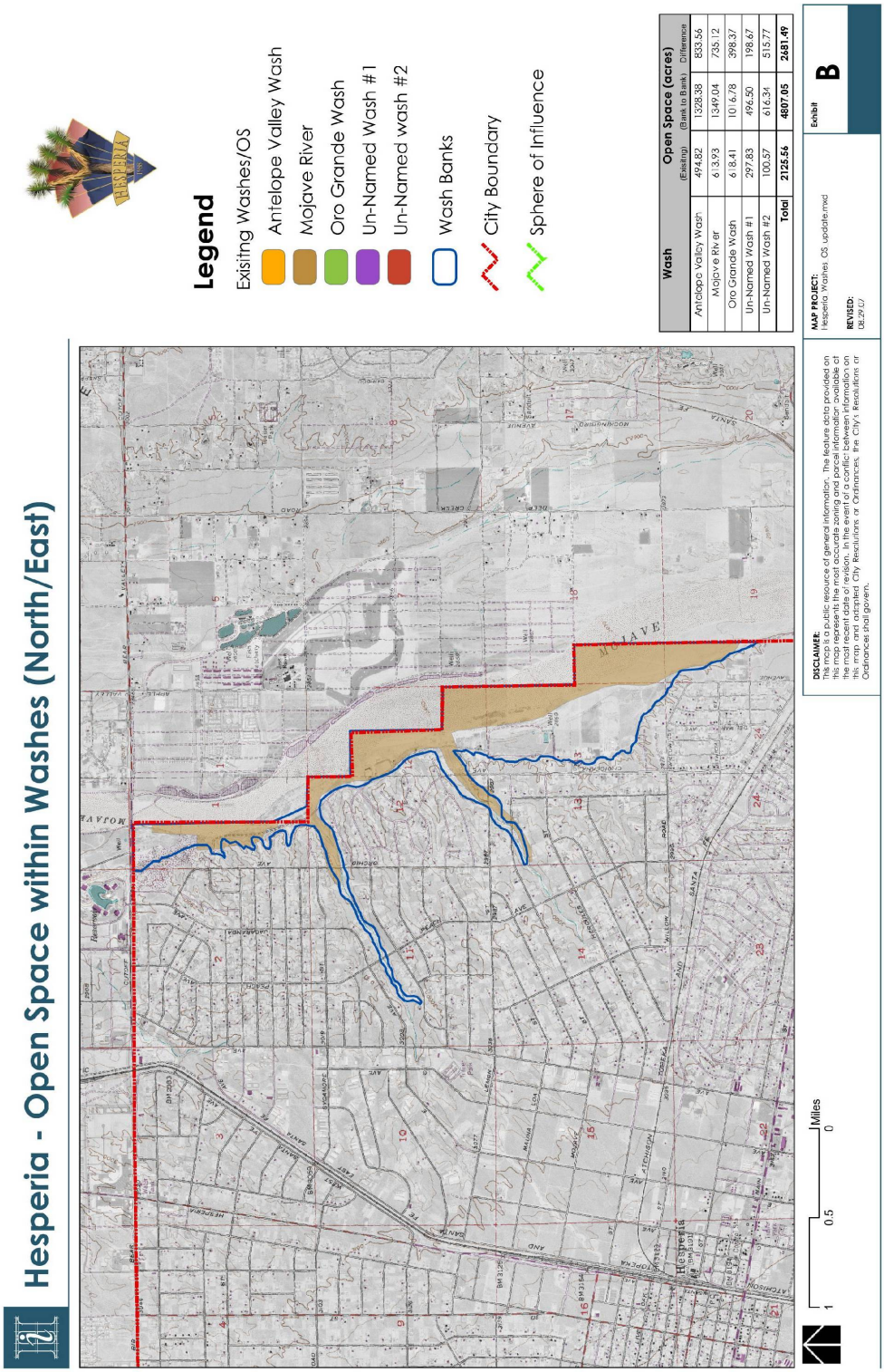
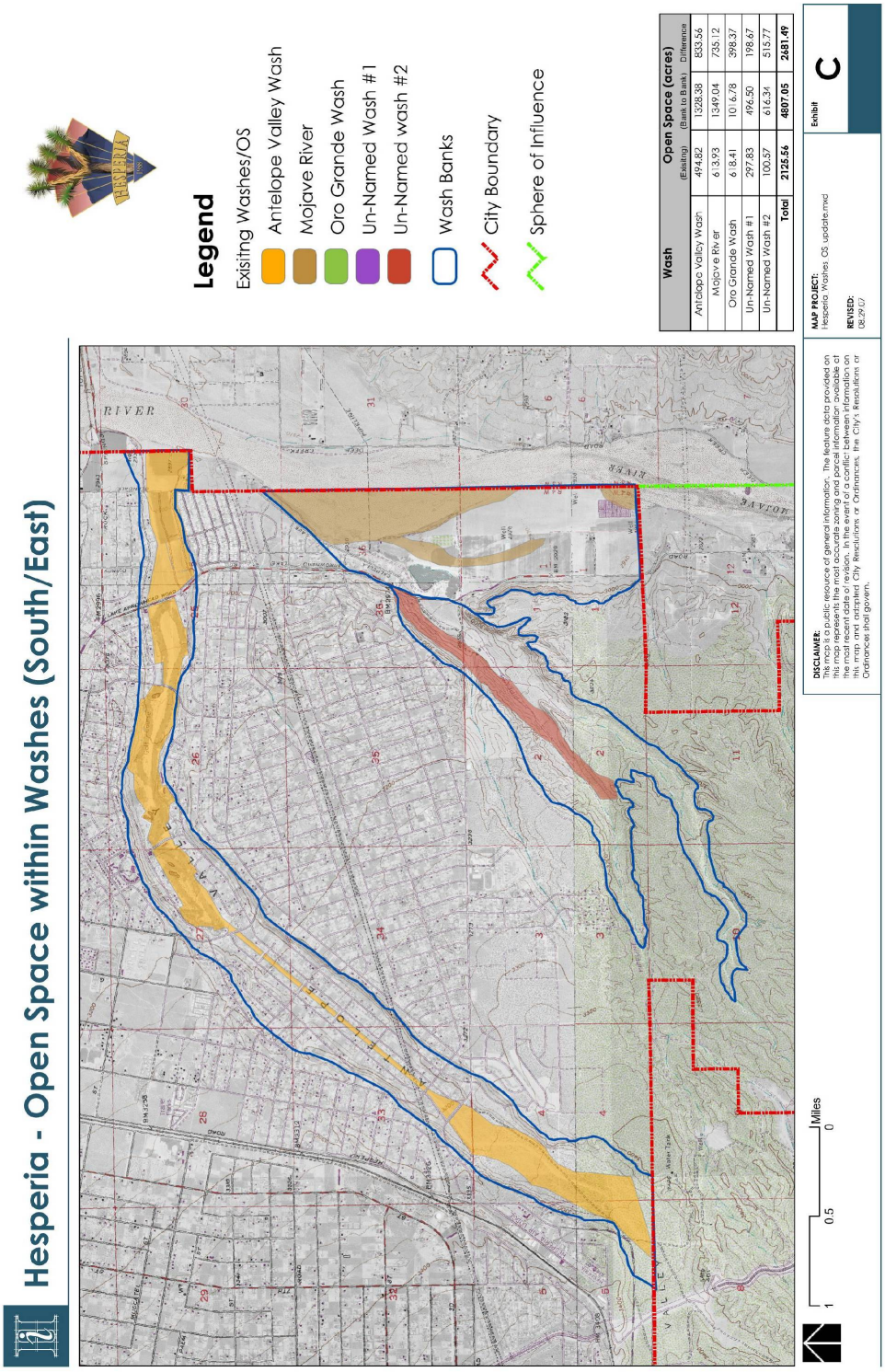


Exhibit 1C: South/East Location Map



Hesperia Recreation and Park District:

The Hesperia Recreation and Park District (HRPD) is an independent special district of the County of San Bernardino. HRPD was created in 1957 to meet the recreational needs of the growing community and is governed by a six-member Board of Directors who elects the General Manager that oversees the District Staff.

The Hesperia Recreation and Park District encompasses approximately 100 square miles, including the City of Hesperia and portions of the unincorporated area of Oak Hills, Summit Valley, and Phelan. The HRPD maintains parks, facilities, Landscape Maintenance Districts, and street lights. The Hesperia Recreation and Park District currently receives funding from property taxes, grants, developer dedication or in-lieu fees, and lighting and landscape assessment districts.

Park Maintenance and Operations

The Park District maintains recreation facilities, parks, street lights, and landscape maintenance districts (which often include retention basins) throughout the city and sphere of influence. The District is also supported through volunteers.

Parks and Facilities

Neighborhood Parks: The Park District's 1988 Master Plan identifies Neighborhood Parks as roughly two (2) to five (5) acres in size. These parks are intended to be located in areas of more intense development and to be within walking distance for residents of the neighborhood they serve. In 1988, there were two parks that were considered neighborhood parks: Timberlane and Live Oak Parks. Both of the parks have been expanded or improved and are now considered Community Parks. Today, there are three neighborhood parks totaling nine (9) acres in Hesperia: Belmont and Sapphire Parks are completed, and Mojave Park is planned.

Neighborhood parks are more convenient and have increased utilization in higher density areas. There was less demand for these parks when the Park District's Master Plan and the City's General Plan were originally created. However, with the development of many subdivisions with 10,000 square feet or less minimum lot sizes, more amenities for these neighborhoods is becoming essential.

Community Parks: Community Parks are identified in the Park District's 1988 Master Plan as approximately 10 to 20 acres in size. Hesperia Lake Park and Lime Street Park were identified as community parks, along with the use of Hesperia High School and Hesperia Junior High School fields in the Master Plan. Today, Hesperia Lake Park is considered a Regional/ Community park as it has expanded from 39 acres to 200 acres. Palm Street Park, Hesperia Community Park, and Malibu Park have been created since the original Master Plan. In addition, Live Oak, Timberlane, and Lime Street Parks are all considered Community Parks, for a total of 114 acres of community parks for residents.

Civic Center Park: The City recently constructed an approximately seven acre park site at the west side of the Civic Center, which includes the City Hall and library and is located on Seventh Avenue. The park includes an amphitheatre and facilitates a gathering place for the community and fosters a downtown feel to the Civic Center area. A farmers market is held once a week during the months of June through October.

Regional Parks: Hesperia Lake Park is the only regional park located within the City and within the Park District. This park has camping, equestrian camping, picnic sites, and fishing facilities within the park. The park is utilized by residents as well as others from the high-desert region.

Facilities: In addition to parkland within the City, the Park District provides several community facilities that are available to City residents. These include the Rick Novack Community Center at Palm Street Park, the Percy Bakker Community Center, the Green Flag Raceway for slot car races, and the Epicentre and Powerplay centers for teens.

Equestrian Facilities: Equestrian facilities are located at Lime Street Park and Hesperia Lake Park. Lime Street Park includes the Val Shearer Equestrian Center and is available for riding events, and Hesperia Lake Park includes an equestrian campground with corrals.

Table 1 identifies the existing parks and their facilities within the City of Hesperia:

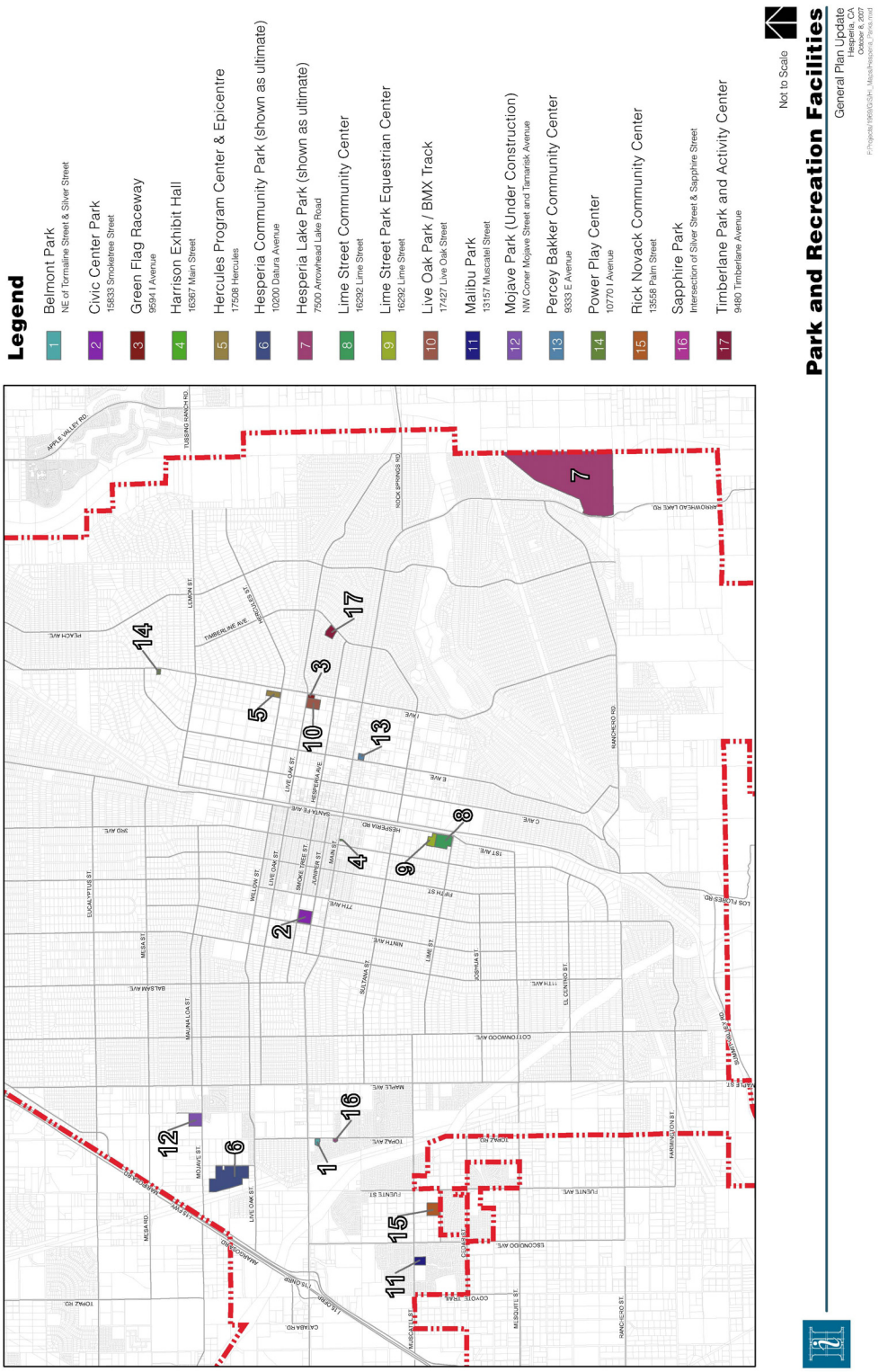
Table 1: Park Facilities

PARK FACILITIES GUIDE & LEGEND	Park Acreage	Playground Equipment	Rest Rooms	Basketball Courts	Lake Fishing	Picnic Areas	Group Picnic	Swimming Pool	Tennis Courts	Lighted Ballfields	Unlighted Ballfields	Soccer Fields	Rodeo Arena	Equestrian Area	Gymnasium	Campground	Community Building	Museum	Bicycle/Moto-X Track
Lime Street Park Community Serving	20	* ♿	* ♿	½ ♿		1 ♿	1 ♿	1 ♿	2	4			*	*			* ♿		
Timberlane Park Community Serving	7	* ♿	* ♿			1 ♿					* ♿						* ♿		
Live Oak Park Community Serving	9	* ♿	* ♿			1 ♿				1 ♿									*
Hesperia Lake Park Community/Regional	200	* ♿	* ♿		* ♿	* ♿	* ♿					5		*		* ♿		* ♿	
High School soccer fields Community Serving	3											3							
Palm Street Park Community Serving	10	* ♿	* ♿	* ♿											* ♿		* ♿		
Hesperia Community Park Community Serving	50		* ♿							8 ♿									
Trails End Park Community Serving	7																		
Belmont Neighborhood Park	2	* ♿		2 ♿		* ♿													
Sapphire Neighborhood Park	1					* ♿													
Malibu Park Community Serving	8	* ♿	* ♿	* ♿		* ♿					2	2							
Mojave Park Community Serving	6	* ♿				* ♿					1	1							

From the Hesperia Recreation and Parks District 2006 Master Plan Update
*** Asterisks indicate that services are available at this site.**

♿ **Indicates facilities accessible to individuals with disabilities.**

Exhibit 2: Park and Facilities Locations Map



Regional Recreational Opportunities:

There are several areas for recreational opportunities for residents that are located near the City of Hesperia but outside of the Park District (see Exhibit 3). These include:

Mojave Narrows Regional Park

Mojave Narrows Regional Park is located in Victorville, east of Interstate 15 off Bear Valley Road and Ridge Crest. It consists of 840 acres along the Mojave River. Mojave Narrows Regional Park provides recreational opportunities such as camping, fishing, boating, playgrounds, equestrian trails, horse and pony rentals, hiking, ecology, nature, and handicap-accessible trails, and an archery range.

Mojave River Forks Regional Park

Mojave River Forks Regional Park is located on Highway 173 in Summit Valley. It offers camping, equestrian camping, hiking and equestrian trails with direct access to the Pacific Crest Trail. The Mojave River Forks Regional Parks consists of approximately 1,100 acres.

Silverwood Lake State Recreation Area

Silverwood Lake State Recreation Area is located 11 miles east of Interstate 15 via Highway 138 and encompasses approximately 2,400 acres. Silverwood Lake was formed by the 249-foot Cedar Springs Dam. At 3,350 feet, it is the reservoir with the highest elevation in the State Water Project. The park features hiking trails, swimming beaches, and designated areas for boating, water-skiing, and fishing. The lake has trout, large-mouth bass, catfish, and bluegill. The park has picnic areas, including three that can only be reached by boat. The lake attracts waterfowl, raptors, and songbirds.

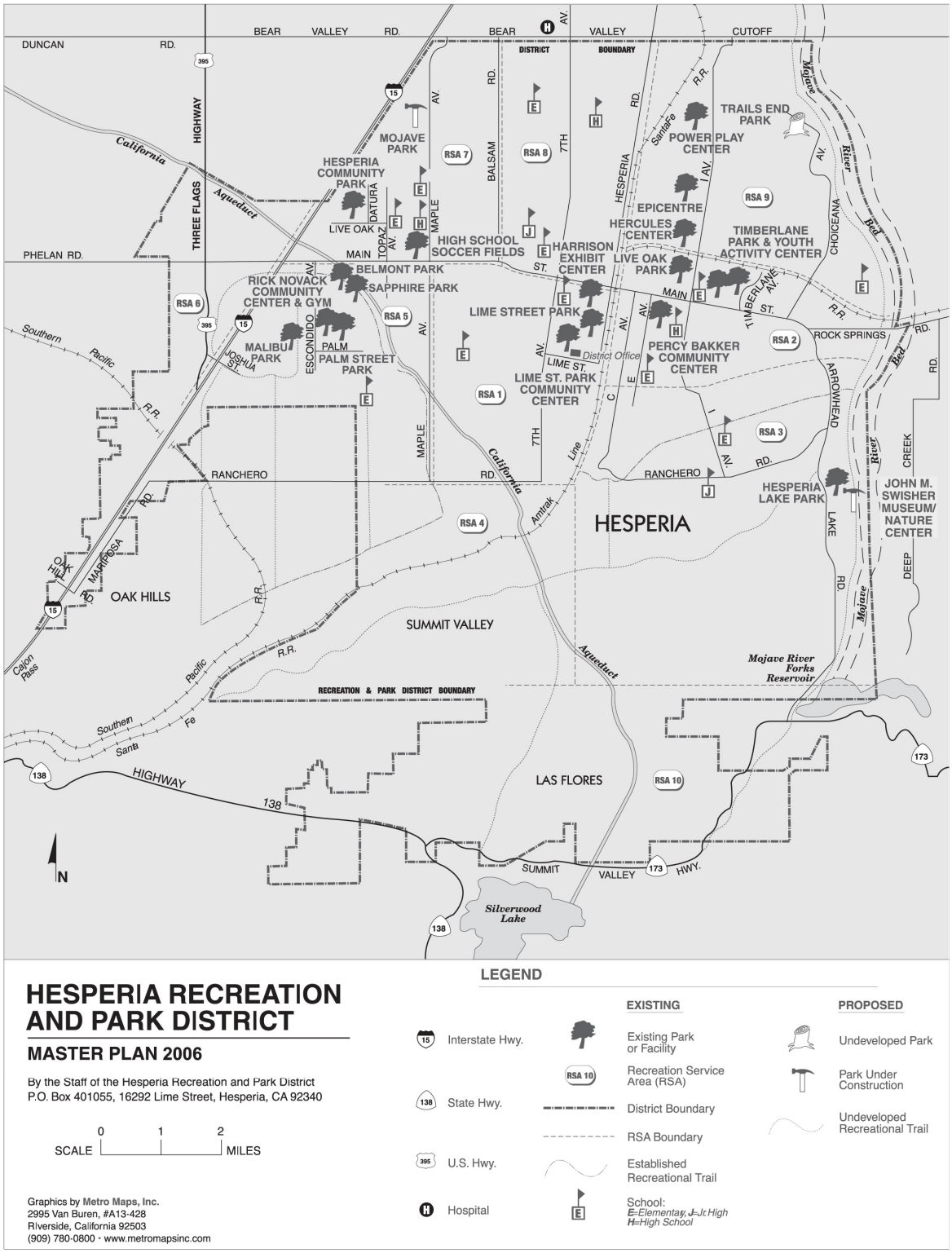
Pacific Crest National Trail

The Pacific Crest Trail (PCT) is a 2,650-mile national scenic trail that runs from Mexico to Canada through California, Oregon and Washington. Largely through the efforts of hikers and equestrians, the PCT was eventually designated one of the first scenic trails in the National Trails System authorized by Congress in 1968, and was dedicated in 1993.

California Aqueduct

The California Aqueduct provides 16 designated spots for fishing; however, none of these designated spots occurs within the City or Sphere of Influence. Walk-in fishing is allowed at some open canal sections along the Aqueduct.

Exhibit 3: Regional Recreational Facilities Map



Trails Systems:

Trails Map

The City of Hesperia coordinates with Hesperia Recreation and Park District when approving proposed projects that may connect to the equestrian and recreation trails. The City also utilizes the Urban Design Framework map (Exhibit 4). Consequently, the Class II and Class III bike trails are included in the street sections, and therefore have not required additional dedication to provide area for the bike lanes.

Tamarisk Avenue Paseo

A paseo adjacent to Tamarisk Avenue spanning 35-feet in width and abutting several small lot subdivisions was approved in 2005 as part of a residential subdivision. The paseo will extend north along Tamarisk Avenue from a 10 acre proposed park at the northwest corner of Tamarisk Avenue and Mojave Street. A portion of this paseo will be constructed above storm drain culverts. Since 2005, other tentative tracts have been approved in this area. As a result, the planned paseo has been expanded along Mojave Road, Topaz Avenue, and Datura Road. The paseo widths range from 10-feet to 35-feet and will connect Mojave Park to Hesperia Community Park.

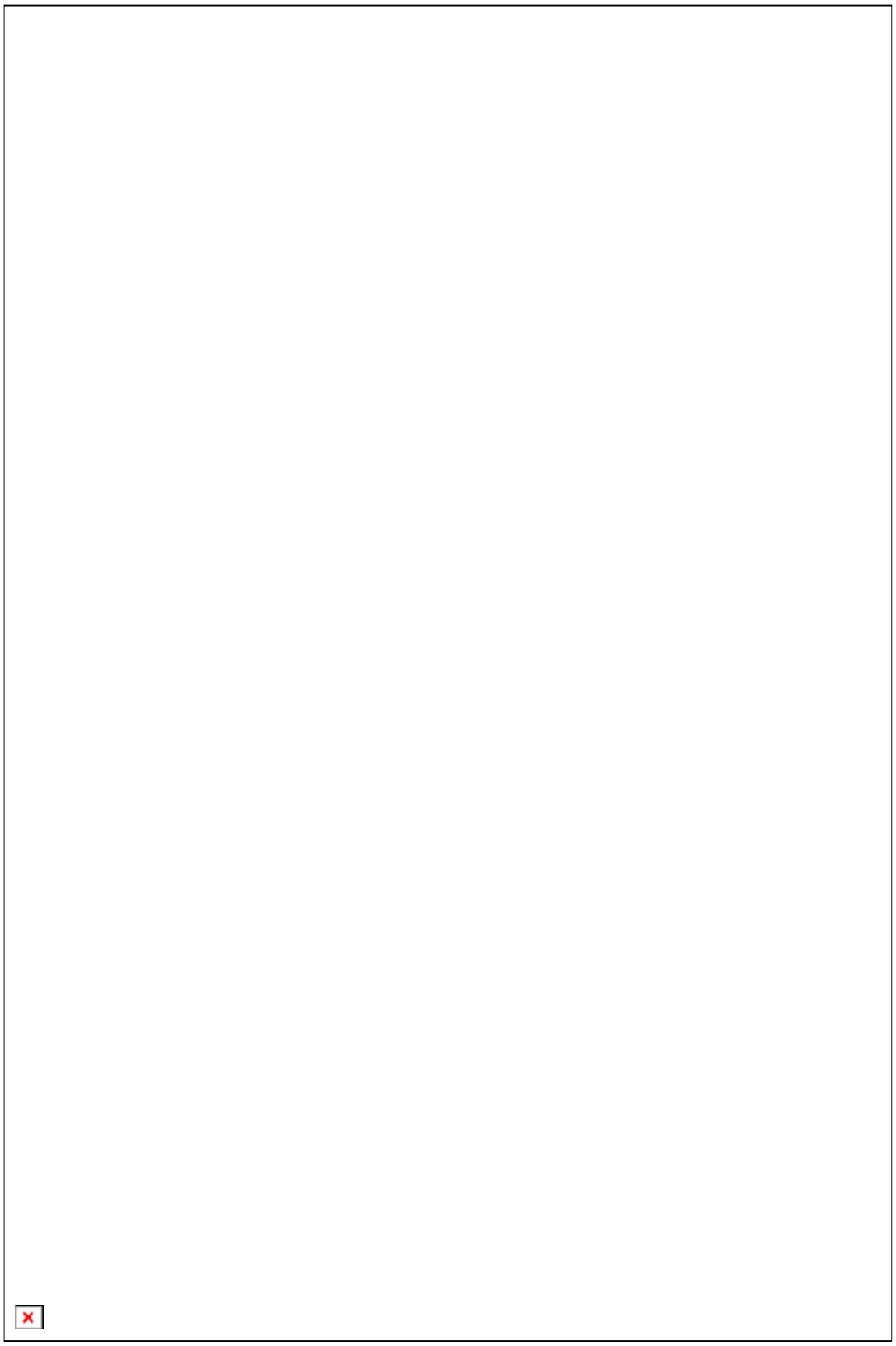
Equestrian Trail

There is an established equestrian trail that is located within the Southern California Edison power line easement from the Burlington, Northern, and Santa Fe railroad and Ranchero Road to the Mojave River. It was the first equestrian trail established by the Park District and was designated in 1990.

Downtown Revitalization Project

The City is in the process of implementing a Downtown Revitalization Plan that will include bicycle and pedestrian paths, as well as an exercise loop. The exercise loop will consist of 1.1 miles of trail and provide several exercise stations as well as a bicycle path. The Revitalization area is generally located between Hesperia Road, Seventh Avenue, Willow Street, and Olive Street. Main Street, Yucca Street, and Walnut Street are not included in the Revitalization area.

Exhibit 4: Trails System Map



Progress:

Parks

The City's 1991 General Plan identified 73 acres of park facilities within the City of Hesperia. The Hesperia Recreation and Park District's 2006 Master Plan Update identifies 320 acres of park acreage, with an additional 3 acres of High School soccer fields that serve the community of Hesperia. The Park District's 2006 Master Plan Update also identifies a planned new park facility, Maple Park, which will provide an additional 40 acres for a total of 360 acres of parks within the City of Hesperia.

Trails

The City has actively designed and implemented a bike trails system. The City has also coordinate with Hesperia Recreation and Park District in establishing equestrian trails. Developments located adjacent to the trails shown on the Urban Design Framework map are required to provide adequate dedications for these recreational trails.

Streetscapes

The Park District maintains landscape planters adjacent to public streets within the District's Landscape and Lighting Assessment District. The Park District begins maintenance of these planters after the developer annexes into the Assessment District. As a result, drought tolerant landscaping and irrigation have been installed in many of the landscaping planters adjacent to public streets.

Open Space Designations

The 100-year flood plains located along the Mojave River and Antelope Valley washes were designated as Open Space in the 1991 General Plan. This designation is intended to limit potential dangers to residents and structures within these areas.

The Main Street and Freeway Corridor Specific Plan designates the Oro Grande Wash and Unnamed Wash #1 as a Wash Protection Overlay. The overlay promotes maintaining washes in their natural undeveloped condition. Three portions of these washes will be designated as preservation areas. Other portions of the wash must maintain their function as drainage channels and may serve as links to connect the preservation areas.

Previous Open Space Plan:

Several opportunities were identified within the previous Open Space Plan. These include expanding park and recreation facilities, restoring the Deep Creek area, providing open spaces at the Interstate 15 and Mojave River entrances to the City, designating scenic roads, connecting trails, and maintaining rural estate and low density residential designations.

Park and recreation facilities were expanded, including increasing the size of Hesperia Lake Park from 39 acres to 200 acres and adding twelve (12) parks and facilities to the district. Rural estate and lower density residential designations have been maintained throughout the City, allowing residents to preserve a rural lifestyle.

Restoration of the Deep Creek area, providing open spaces at the City's southern and eastern entrances, and designating scenic roads have not occurred, but do present opportunities for the City and Park District to achieve in the future.

Issues, Opportunities, and Constraints:

Issues

Ratio of Acres-per-1,000 Residents

The current General Plan recommends dedication for parks at a ratio of five (5) acres per 1,000 residents. The Hesperia Recreation and Park District adopted a resolution in 2006 (Resolution Number 06-9-3) that requires a dedication of three (3) acres per 1,000 residents for all new subdivisions. The discrepancy between the current General Plan and the current Park District requirements should be resolved with the General Plan update. Based upon the current 2007 Hesperia Recreation and Park District population estimate of 91,627 there are 3.93 acres of parks per person.

Dam Inundation and 100-Year Floodplain

A portion of residential housing is located within the dam inundation area and/or the 100-year flood plain. The 100-year floodplain limits were the basis for the original Open Space designation in the Antelope Valley wash and adjacent to the Mojave River, but the dam inundation areas were not mapped as part of the 1991 General Plan. In addition, there are many vacant parcels located within these areas that are currently zoned for residential or agricultural uses under the existing General Plan.

Neighborhood Parks

The Park District's 1988 Master Plan stated that there was little need for Neighborhood Parks due to the large lot size (generally ½ acre or larger) of single-family residences. However, in recent times there have been an increased number of developments approved with minimum lot sizes of 10,000 square feet or less. This has drastically increased the need for Neighborhood Parks within the community.

Parks for Oak Hills Community Plan

There are no existing parks within the Oak Hills Community Plan. Because homes are located on large lots (most over 2½ acres in size) in Oak Hills neighborhood parks are not needed to

serve these residents. However, a larger community park that would service residents within this community may be useful, especially if it provided equestrian facilities for the many horse-owners in the area.

Opportunities:

Pacific Crest Trail

The City of Hesperia is one of a few cities that have the opportunity to connect its local trails system to a national trail. The Pacific Crest Trail runs near the southern City borders, south of Highway 138 and north of Silverwood Lake, to the Mojave River Forks Regional Park. The City has tremendous opportunity to allow residents to connect to a national trail which would significantly expand the recreational opportunities for all residents, especially for future residents of Rancho Las Flores.

Equestrian/Hiking Trails

There is great opportunity for trails along the Oro Grande Wash west of the Interstate 15 freeway and the un-named wash east of the freeway. These trails would be ideal for equestrian purposes as well as hiking, giving residents the opportunity to venture into a more natural setting while remaining close to home.

Passive Recreational Opportunities

There are several areas that would be ideal for larger expanses of passive recreation, such as south of the Union Pacific railroad on the west side of the Interstate 15 freeway, and northeast of Mission Crest on the east side. These areas have remained relatively undisturbed and still contain many Juniper and Joshua trees, presenting an opportunity to preserve portions of the desert environment.

Mojave River

The Mojave River provides many opportunities for use in its natural state. Trails near or within the river could be utilized by nearby equestrian users as well as for hiking purposes. The Mojave River could provide connectivity for residents to the Mojave River Forks Regional Park and Mojave River Dam with trails running north along the river. In addition, the river provides opportunities for groundwater recharge, scenic views, and habitat preservation.

California Aqueduct

The California Aqueduct runs northwest to southeast through the City. The City may be able to utilize existing easements for pedestrian and bicycle trails. This corridor is located near single-family residential developments and could provide recreational opportunities for many residents.

Major Entrances to the City

The previous General Plan identified the southern entrance to the City at the Interstate 15 freeway and the eastern entries at the Mojave River as ideal places to provide entry statements for the City. These areas have remained as open space with little disturbance and continue to provide opportunities to conserve natural resources, preserve habitat, and to preserve community character.

Streetscapes and Scenic Corridors

Bluffs throughout the southern portion of the City provide opportunities for scenic corridors, specifically along Arrowhead Lake Road and Summit Valley Road.

Constraints:

Limited Area to Develop Parkland

There is no community park located in the area bounded by Maple Avenue to the west and Seventh Avenue to the east, from Bear Valley Road to the southern city border. This area has been largely developed with single-family residences, and there are very few vacant parcels within the City borders that could be combined to form a community park. In these areas residents are forced to drive some distance to the nearest park. In addition, neighborhood parks are less desirable in most of these areas as they contain ½ acre or larger properties, which is too great of a distance for many residents to walk to the park.

Trail Barriers

The Union Pacific railroad restricts movement through the Oro Grande wash and the un-named wash on the east side of the Interstate 15 freeway. In addition, the California Aqueduct, Main Street, and Highway 395 and the motocross park on the west side of the Interstate 15 freeway would create barriers to trails within the two washes.

Development in Open Space Designations

The current General Plan designates areas in the Oro Grande wash, the un-named wash east of the Interstate 15 freeway, the Antelope Valley wash, the Honda Valley wash, and along the Mojave River as Open Space. Both residential and commercial development has occurred within the Open Spaces in these areas, which may make trail connectivity within the washes difficult.

Private Ownership of Open Space

The majority of property currently designated as Open Space is under private ownership. This can create conflict if the City is attempting to develop trails or leave the area as Open Space when a landowner prefers to develop the property for residential, commercial, or industrial purposes.

DRAFT NOISE TECHNICAL REPORT

CITY OF HESPERIA
2007 GENERAL PLAN UPDATE

April 8, 2010

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094504000

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Appendices

Appendix A. City of Hesperia General Plan Land Use Map

1.0 INTRODUCTION

This report has been prepared as part of the City of Hesperia's General Plan Update and provides a technical analysis of the noise and vibration conditions in the City. The analysis of the Preferred Plan serves as the basis for the development of goals and policies for minimizing noise in the Noise Element of the General Plan Update. The City is shown in its regional setting on Figure 1. Regional access to the area is provided by Interstate 15, which runs through the western portion of the city in a northeast-southwest direction.

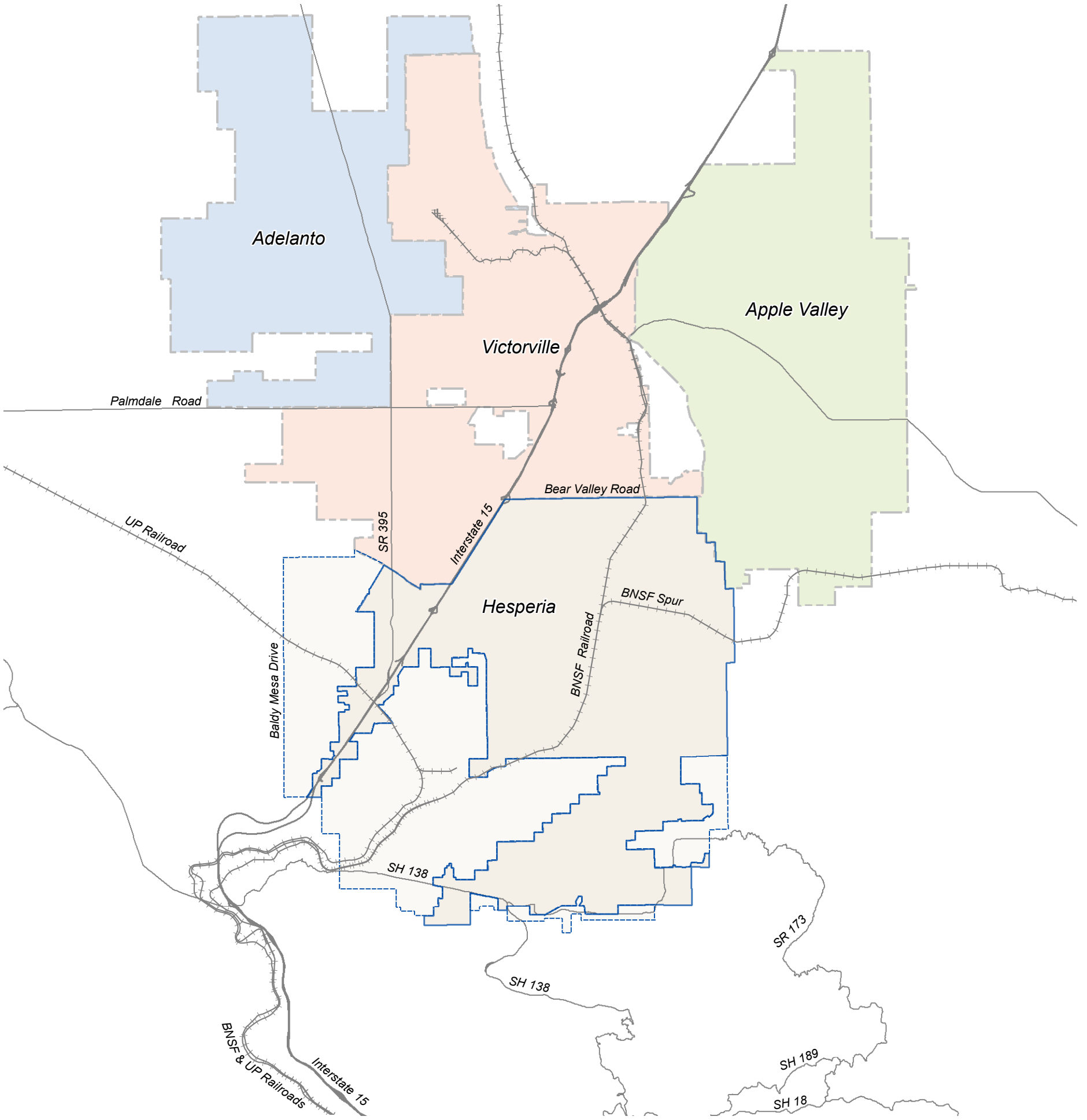
A noise element is related to land use and housing elements in that its key objective is to provide noise exposure information employed in land use planning. When integrated with a land use element, a noise element will show acceptable land uses in relation to existing and projected noise contours. The noise exposure information should be considered when planning new noise-sensitive land uses.

The key feature of a noise element is the quantification of the community noise environment in terms of noise exposure contours of both existing and future transportation activities. The contours serve as guidelines to achieve noise compatible land uses to minimize the exposure of community residents to excessive noise and to provide baseline noise levels.

California State guidelines are very specific about the content of a General Plan noise element. At a minimum, the guidelines require the element to assess noise levels for the following:

- Highways and freeways;
- Primary arterial and major local streets;
- Passenger and freight railroad operations and ground rapid transit systems;
- Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation;
- Local industrial plants, including but not limited to railroad classification yards; and
- Other ground sources identified by the local agencies as contributing to the community noise environment.

Hesperia General Plan Update



Legend

- City Of Hesperia Boundary
- Hesperia Sphere of Influence Boundary
- Railroad

Miles

0 1.5 3 6

February 2007

Kimley-Horn and Associates, Inc.

Figure 1

Vicinity Map

1.1 NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. The human environment is characterized by a certain consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels. If a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the human ear's sensitivity within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Table 1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	
Civil Defense Siren (100 ft)		130	
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Motorcycle (25 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck, 40 mph (50 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft) Electronic Typewriter (10 ft)		70	Reference Loudness **Moderately Loud**
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Private Business Office	50	1/4 as loud
Bird Calls (distant)	Lower Limit of Urban Ambient Sound	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Quiet Bedroom	30	
	Recording Studio	20	**Just Audible**
			Threshold of Hearing

Source: Compiled by Kimley-Horn and Associates, Inc.

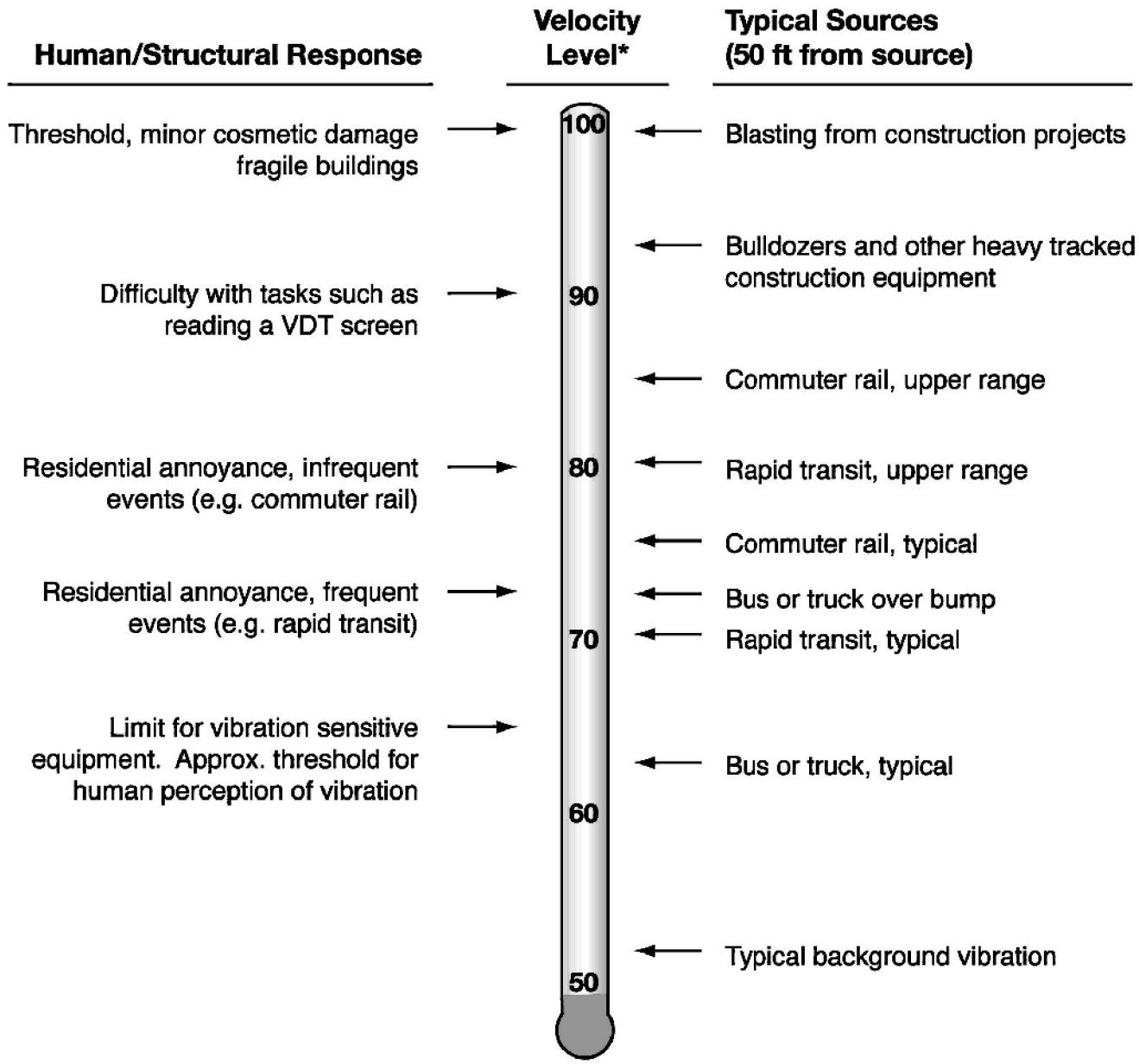
1.2 VIBRATION BACKGROUND

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation. Input excitation, generally in the form of an applied force or displacement, is the mechanism required to start some type of vibratory response. Sources of earthborne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or manmade (explosions, machinery, traffic, construction equipment, etc.). Vibration sources may be transient, steady-state or continuous, or pseudo steady-state. Examples of transient construction vibrations are those that occur from blasting with explosives, impact pile driving, demolition, and wrecking balls. Steady-state vibrations may be generated by vibratory pile drivers. Pseudo steady-state vibrations are of a random nature, but at short enough intervals to approach a steady-state condition. These include jackhammers, pavement breakers, trucks, bulldozers, cranes, and scrapers.

Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be comprised of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hz. Most environmental vibrations consist of a composite, or "spectrum" of many frequencies, and are generally classified as broadband or random vibrations. The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal in inches per second. The RMS of a signal is the average of the squared amplitude of the signal in VdB, ref 1 micro-inch per second. Although PPV is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response. Since it takes some time for the human body to respond to vibration signals, RMS amplitude is more appropriate to evaluate human response to vibration. For sources such as trucks or motor vehicles, peak vibration levels are typically 6 to 14 dB higher than RMS levels. The Federal Transit Administration (FTA) uses the abbreviation "VdB" for vibration decibels to reduce the potential for confusion with sound decibels.

Figure 2 illustrates common vibration sources and the human and structural responses to ground-borne vibration. As shown in the figure, the threshold of perception for human response is approximately 65 VdB; however, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Vibration tolerance limits for sensitive instruments such as Magnetic Resonance Imaging (MRI) or electron microscopes could be much lower than the human vibration perception threshold.



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: FTA (2006)

Figure 2

Typical Levels of Ground-Borne Vibration

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Engineering, Planning and Environmental Consultants

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1.3 REGULATORY SETTING

A number of federal and state agencies have prepared guidelines that identify standards and regulations concerning noise compatibility in the workplace and in residences. The following has been adopted by the various agencies directly relate to the Noise Element and assist in its implementation.

Federal

Noise Control Act of 1972 (PL 92-574): The Noise Control Act established a national policy "to promote an environment for all Americans free from noise that jeopardizes their public health and welfare." The Act provides for a division of powers between the Federal, state and local governments, in which the primary Federal responsibility is for noise source emission control, with the states and other agencies retaining the rights to control noise sources and the level of noise within their communities and jurisdiction. The Noise Control Act was supplemented by the Quiet Communities Act of 1978 (PL 95-609).

Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006: The FTA has developed acceptable vibration criteria for transportation related sources (Table 2). The criteria are based in part on the frequency of events and related to groundborne vibration that can cause human annoyance or interference with the use of vibration-sensitive equipment. The criteria for acceptable groundborne vibration are expressed in terms of RMS velocity levels in VdB and are based on the maximum levels for a single event (Lmax). Land uses are grouped into three categories: Category 1, Category 2 and Category 3.

Table 2. FTA Groundborne Vibration Criteria for General Assessment

Land Use Category	Frequent Events	Occasional Events	Infrequent Events
Category 1: Buildings were vibration would interfere with interior operations.	65 VdB	65 VdB	65 VdB
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primary daytime use.	75 VdB	78 VdB	83 VdB

VdB re 1 micro-inch/second
Source: FTA 2006

Notes:

"Frequent Events" is defined as more than 70 vibration events of the same source per day.
"Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
"Infrequent Events" is defined as more than 30 vibration events of the same kind per day.

The Category 1 criterion limits are based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels.

State of California

Airport Land Use Compatibility Plans (ALUCP) (Public Utilities Code, §21670, et seq.): The ALUCPs promote compatibility between public use and military airports and the land uses that surround them to the extent that these areas are not already devoted to incompatible land uses. The City is required to modify its land use plans and ordinances to be consistent with the ALUCPs or to take steps to overrule the Airport Land Use Commission (ALUC).

California Environmental Quality Act (CEQA): CEQA considers exposure to excessive noise an environmental impact. Implementation of CEQA ensures that during the decision-making stage of development, City officials and the public will be informed of any potentially excessive noise levels and available mitigation measures to reduce them to acceptable levels.

California Noise Insulation Standards (California Code of Regulations, Title 24): Title 24 establishes an interior noise standard of 45 dBA CNEL for multiple unit and hotel/motel structures. Acoustical studies must be prepared for proposed multiple unit residential and hotel/motel structures within the CNEL noise contours of 60 dBA or greater. The studies must demonstrate that the design of the building will reduce interior noise in habitable rooms to 45 dBA CNEL or lower.

California Airport Noise Standards (California Code of Regulations Title 21): Division 2.5, Chapter 6, Section 5012 of Title 21 establishes that the 65 dBA CNEL is the acceptable level of aircraft noise for persons living near an airport.

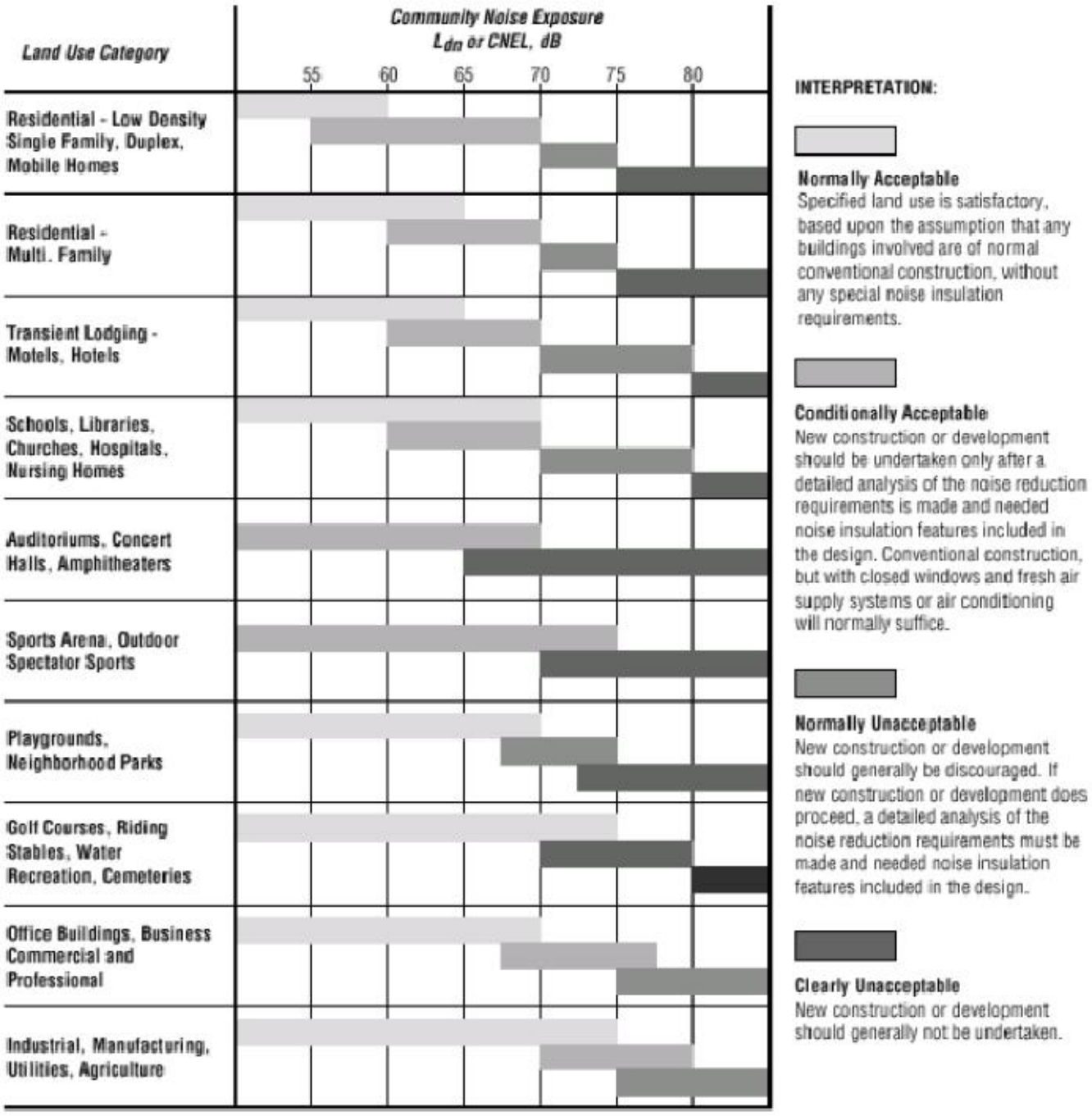
Caltrans Project Development Procedures Manual (Section 2 of Chapter 30: Highway Traffic Noise Abatement) and 23 CFR 772: These documents specify the Noise Abatement Criteria (NAC) for noise-sensitive land uses. These criteria are presented in Table 3. The NAC is applicable to new highways and changes to the horizontal or vertical alignment of existing highways and is required for Caltrans and local agency projects that receive federal funding or require Federal Highway Administration (FHWA) approval action.

Table 3. Federal and California State Traffic Noise Abatement Criteria

Activity Category	Noise Abatement Criteria (Leq(h), dBA)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA 2006

The State of California Office of Noise Control has developed land use compatibility guidelines for a variety of land uses as shown in the Land Use Compatibility Plan (Figure 3). The compatibility guidelines are used in conjunction with the future noise exposure contours to identify projects or activities which may require special treatment to minimize noise exposure.



Source: State of California General Plan Guidelines (2003)

Figure 3

State of California Land Use Compatibility Plan

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City of Hesperia

The City has developed policies related to land use and acceptable noise levels as shown in Table 4. The table is a primary tool which allows the City to ensure integrated planning compatibility between land uses and outdoor noise compatibility guidelines. The information is used to identify projects or activities which may require special treatment to minimize noise exposure.

Table 4. Interior and Exterior Noise Standards

Land Use Categories		Community Noise Equivalent Level (CNEL)	
Categories	**Land Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single Family, Duplex, Multiple Family	45[3]	65
	Mobile Homes	n/a	65[4]
Commercial Industrial Institutional	Hotel, Motel, Transient Lodging	45	65[5]
	Commercial Retail, Bank, Restaurant	55	n/a
	Office Building, Research and Development, Professional Offices, City Office Building	50	n/a
	Amphitheatre, Concert Hall, Meeting Hall	45	n/a
	Gymnasium (Multipurpose)	50	n/a
	Sports Club	55	n/a
	Manufacturing, Warehousing, Wholesale, Utilities	65	n/a
	Movie Theatres	45	n/a
Institutional	Hospitals, School Classrooms	45	65
	Church, Library	45	n/a
Open Space	Parks	n/a	65

Interpretation

1. Indoor environment excluding: Bathrooms, toilets, closets, corridors.
2. Outdoor environment limited to:
   Private yard of single family
   Multi-family private patio or balcony which is served by a means of exit from inside.
   Mobile home park
   Hospital patio
   Park picnic area
   School playground
   Hotel and motel recreation area
3. Noise level requirement with closed windows.
   Mechanical ventilation system or other means of natural ventilation
   shall be provided per Building Code.
4. Exterior noise level should be such that interior noise level will not exceed 45 dBA CNEL.
5. Except those areas affected by aircraft noise.

Article V: General Performance Standards, Section 16.20.125: Noise of the City Municipal Code identifies noise standards across property lines. The Section states the following:

A. Noise Measurement. Noise will be measured with a sound level meter, which meets the standards of the American National Standards Institute (ANSI Section S1.4-1979, Type 1 or Type 2). Noise levels shall be measured using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micro-newtons per meter squared). The unit of measure shall be designated as dB(A). The building official shall be the noise control officer.

B. Noise Standards.

1. The following table describes the noise standard for emanations from any source, as it affects adjacent properties:

NOISE STANDARDS

Affected Land Use (Receiving Noise)	Maximum Noise Level	Time Period
A-1, A-2, R-1, R-3, and RR Zone Districts	55 dB(A)	10:00 p.m. – 7:00 a.m.
A-1, A-2, R-1, R-3, and RR Zone Districts	60 dB(A)*	7:00 a.m. – 10:00 p.m.
C-1, C-2, C-3, C-4, C-R, AP, and P-I Zone Districts	65 dB(A)*	Anytime
I-1 and I-2 Zone Districts	70 dB(A)*	Anytime

* Due to wind noise, the maximum permissible noise level may be adjusted so that it is no greater than 5 dB(A) above the ambient noise level.

2. No person shall operate or cause to be operated any source of sound at any location or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level, when measured on any other property, either incorporated or unincorporated, to exceed:

a. The noise standard for that receiving land use (as specified in subsection (B)(1) of this section) for a cumulative period of more than thirty (30) minutes in any hour; or

b. The noise standard plus five dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or

c. The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour; or

d. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one minute in any hour; or

e. The noise standard plus twenty (20) dB(A) for any period of time.

C. If the measured ambient level exceeds any of the first four noise limit categories above, the allowable noise exposure standard will be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

D. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in subsection (B)(1) of this section shall be reduced by five dB(A).

E. Exempt Noises. The following sources of noise are exempt:

1. Motor vehicles not under the control of the industrial use;

2. Emergency equipment, vehicles and devices;

3. Temporary construction, repair, or demolition activities between seven a.m. and seven p.m. except Sundays and federal holidays.

Article V: General Performance Standards, Section 16.20.130: Vibration of the City Municipal Code identifies vibration standards. The Section states the following:

A. Vibration Standard. No ground vibration shall be allowed which can be felt without the aid of instruments at or beyond the lot line; nor will any vibration be permitted which produces a particle velocity greater than or equal to 0.2 inches per second measured at or beyond the lot line.

B. Vibration Measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity or acceleration. Readings are to be made at points of maximum vibration along any lot line next to a residential or commercial district or a community industrial lot.

C. Exempt Vibrations. The following sources of vibration are not regulated by this code:

1. Motor vehicles not under the control of the industrial use;

2. Temporary construction, maintenance or demolition activities between seven a.m. and seven p.m. except Sundays and federal holidays.

2.0 EXISTING NOISE ENVIRONMENT

The major source of noise in the City and the City Sphere of Influence is vehicular traffic. This includes automobiles, trucks, buses and motorcycles. Other sources of noise include railroad, aircraft, industrial and commercial activity, and construction.

Many land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise, such as residential dwellings, transient lodging, dormitories, hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise. Habitat for threatened and endangered wildlife species is also considered noise-sensitive.

Noise-sensitive receptors within the City include single- and multi-family residential, schools, parks, libraries, hospitals, churches, habitat, and open space. Refer to the City general plan land use map (Hogle-Ireland 2006) in Appendix A for further details.

2.1 VEHICULAR TRAFFIC

Vehicular traffic noise is the predominant noise source within the City.

Major east-west roadways include SR-138, Summit Valley Road, Ranchero Road, Mesquite Street, Muscatel Street, Sultana Street, Phelan Road, Main Street, Rock Springs Road, Mauna Loa Street, Lemon Street, Eucalyptus Street, and Bear Valley Road.

Major north-south roadways include Baldy Mesa Road, Caliente Road, Highway 395, I-15, Mariposa Road, Escondido Avenue, Fuente Avenue, Maple Avenue, Cottonwood Avenue, 7th Avenue, 3rd Avenue, Santa Fe Avenue East, Hesperia Road, E Avenue, I Avenue, Peach Avenue, and Arrowhead Lake Road.

The level of vehicular traffic noise varies with many factors, including traffic volume, vehicle mix (truck percentage), traffic speed, and distance from the roadway.

2.1.1 Roadway Ambient Noise Survey

An ambient sound level survey was conducted during November 2006 to quantify the existing noise environment from vehicular traffic within the City and City Sphere of Influence. Measurement locations were selected to represent the various noise-sensitive land uses in the study area, and included single- and multi-family residential and educational land uses. Twenty attended one-hour noise measurements were conducted near exterior noise-sensitive areas. Traffic counts were conducted during the measurements. The measurements were taken during the morning peak traffic period (6:00 a.m. to 9:00 a.m.) or the afternoon peak traffic period (3:00 p.m. to 7:00 p.m.).

The data collection devices included one Larson Davis Model 820 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (SLM) and two Larson Davis Model 720 ANSI Type 2 Integrating SLMs; the meters were field-calibrated with a Larson Davis Model CAL150 or CAL200 acoustic calibrator. The meters were set for "slow" time response and A-weighting for all measurements.

In all cases, the microphone was equipped with a windscreen and was placed five feet above the ground to simulate the average height of the human ear. Weather conditions during the measurements were calm, with clear skies and low humidity. The results of these measurements are summarized in Table 4 and correspond to the locations depicted on Figure 3. All sound level measurements were in accordance with ISO 1996a, b, and c. The accuracy of the equipment is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology (NIST). The equipment meets the requirements of the American National Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651.

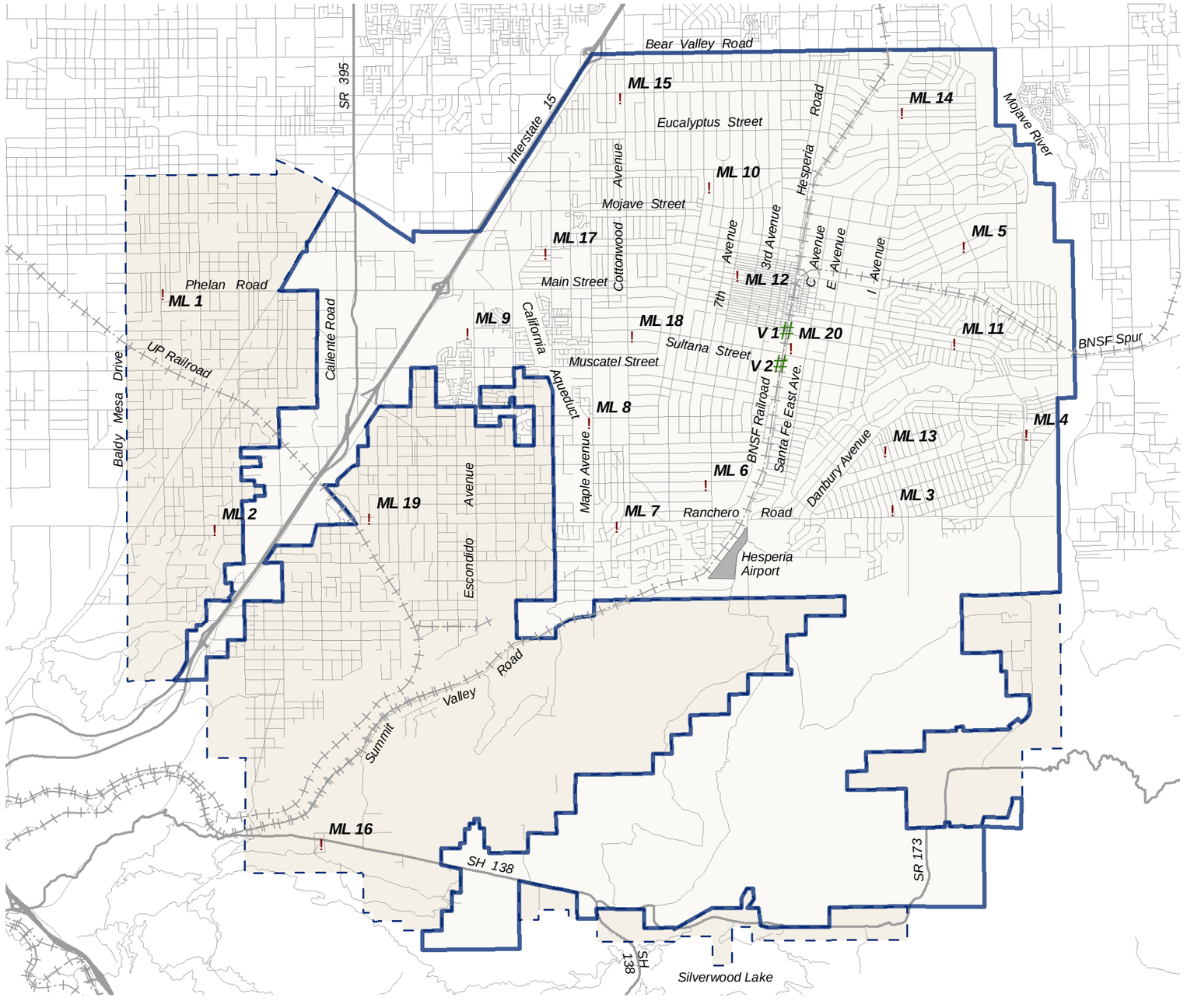
All measurements were conducted at a distance of 50 feet from the roadway centerline, with the exception of ML8, which was conducted at 43 feet to minimize interference with the concrete wall along the property line of the residential area. The results of the roadway ambient noise survey are shown in Table 5. Refer to Figure 4 for measurement locations.

Table 5. Roadway Sound Level Measurements (dBA)

Measurement	Date	Time	Leq	Lmin	Lmax	L10	L50	L90	Vehicles (C/M/H)
ML1	11/08/06	0615 – 0715	74.4	51.6	85.9	77.9	72.9	61.7	1144 / 64 / 16
ML2	11/08/06	0800 – 0900	60.6	42.2	84.8	62.4	50.3	44.8	96 / 16 / 0
ML3	11/08/06	1450 – 1550	63.0	44.4	81.9	66.3	59.6	51.6	360 / 0 / 12
ML4	11/08/06	1555 – 1655	65.9	42.9	80.5	70.1	61.6	52.4	340 / 20 / 0
ML5	11/08/06	1700 – 1800	60.4	41.6	78.9	63.9	53.8	45.9	412 / 24 / 0
ML6	11/09/06	0600 – 0700	61.4	40.7	79.2	65.9	51.9	44.9	68 / 8 / 4
ML7	11/09/06	0700 – 0800	67.1	44.8	82.8	70.6	64.9	52.4	560 / 32 / 8
ML8	11/09/06	0800 – 0900	68.2	39.3	88.2	72.6	60.7	46.6	176 / 12 / 4
ML9	11/09/06	1500 – 1600	70.9	45.3	84.0	74.7	68.2	57.1	928 / 32 / 8
ML10	11/09/06	1600 – 1700	65.3	40.1	77.9	69.3	61.9	49.2	532 / 16 / 8
ML11	11/09/06	1700 – 1800	75.0	49.8	92.2	78.2	73.7	62.6	1336 / 60 / 4
ML12	11/15/06	0620 – 0720	69.0	47.8	80.9	72.8	67.1	56.9	564 / 16 / 0
ML13	11/15/06	0740 – 0840	67.8	36.5	89.1	71.2	65.1	50.6	856 / 12 / 0
ML14	11/15/06	1530 – 1630	71.9	51.1	85.1	74.6	71.1	65.2	1224 / 52 / 8
ML15	11/15/06	1645 – 1745	66.9	44.2	89.1	70.1	64.6	53.6	428 / 0 / 0
ML16	11/16/06	0800 – 0900	67.2	36.1	87.5	72.1	54.1	41.3	343 / 0 / 0
ML17	11/16/06	0650 – 0750	60.7	49.2	77.9	63.7	58.4	53.2	489 / 6 / 5
ML18	11/16/06	0800 – 0900	60.9	45.1	85.9	63.1	55.2	48.8	291 / 3 / 6
ML19	11/16/06	1530 – 1630	68.8	47.6	82.4	72.7	65.8	52.8	592 / 28 / 8
ML20	11/16/06	1645 – 1745	65.6	48.7	83.7	69.3	58.2	52.4	236 / 4 / 0

C/M/H = Cars / Medium Trucks / Heavy Trucks.

Hesperia General Plan Update



Legend

- City Of Hesperia Boundary
- Sphere of Influence Boundary
- ML x — Sound Level Measurement Location
- V x — Vibration Measurement Location

N

Feet

8,000 4,000 0 8,000

March 2007

Figure 4

Measurement Locations

2.1.2 Roadway Existing Noise Calculations

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) (Version 2.5) was used to estimate existing traffic noise levels for roadway segments adjacent to sensitive land uses. The modeling effort considered the average daily traffic volume, posted vehicle speed, and estimated vehicle mix. The existing traffic counts and speed limits on the roadway segments were obtained from the Transportation Technical Report (KHA 2009). The existing traffic volumes were used to generate the CNEL at a distance of 50 feet from the center of the closest lane of each roadway segment and the line-of-sight distance from the roadway centerline to the 75, 70, 65, and 60, dBA CNEL noise contours. The model assumed "hard soil" site propagation conditions. Sound levels caused by line sources; relatively long, variable or moving sound sources such as traffic, decrease at a rate of 3.0 to 4.5 dB when the distance from the road is doubled, depending on the surface hardness between the source and the receiving property. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography. Table 6 shows the calculated existing traffic noise levels near roadways in the City and City Sphere of Influence.

The accuracy of noise exposure predictions is generally no better than ±3 dBA. In the near vicinity of the source, the accuracy may be within ±1 dBA, but as the distance from the source increases, the accuracy may fall to ±5 dBA. In addition, situations outside of normal conditions may contradict the contour lines. For example, a building located adjacent to an elevated freeway may have higher noise levels at the upper floors than at ground level. Also, according to sound penetration studies, a row of houses can generally provide as much as three to five decibels of reduction to the area behind the houses. Walls or dense vegetation can further reduce noise levels.

Table 6. Calculated Existing Roadway Noise Levels (dBA)

Segment	Existing ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
SR 138											
West of Summit Valley Rd	4,945	2	55	95%	4%	1%	67	-	-	80	185
East of Summit Valley Rd	1,909	2	55	95%	4%	1%	63	-	-	-	95
Summit Valley Rd											
North of SR 138	3,518	2	55	95%	4%	1%	66	-	-	60	145
Oak Hill Rd											
I-15 SB ramp – I-15 NB ramp	5,326	2	35	95%	4%	1%	62	-	-	-	80
Ranchero Rd											
Mariposa Rd – Escondido Ave	7,951	2	45	95%	4%	1%	67	-	-	75	175
Escondido Ave – Maple Ave	8,282	2	45	95%	4%	1%	67	-	-	75	180
Maple Ave – Cottonwood Ave	7,762	2	45	95%	4%	1%	66	-	-	70	170
Cottonwood Ave – 7th Ave	7,128	2	45	95%	4%	1%	66	-	-	65	160
Santa Fe Ave – I Ave	4,001	2	45	99%	1%	0%	63	-	-	-	90
I Ave – Peach Ave	1,685	2	45	99%	1%	0%	59	-	-	-	-
Mesquite St											
East of Maple Ave	1,160	2	40	99%	1%	0%	56	-	-	-	-
East of 7th St	1,701	2	40	99%	1%	0%	57	-	-	-	-
Snowline Rd											
Baldy Mesa Rd – Verbena Rd											
Joshua St											
US 395 – I-15 SB ramp	6,171	2	35	78%	10%	12%	67	-	-	75	175
NB I-15 ramp – Mariposa Rd	3,233	2	35	95%	4%	1%	60	-	-	-	55
Poplar St											
East of Hwy 395	632	2	45	99%	1%	0%	54	-	-	-	-
Muscatel St											
Escondido Ave – Fuente Ave	690	2	35	99%	1%	0%	51	-	-	-	-
Sultana St											
7th Ave – Hesperia Rd	1,530	2	40	99%	1%	0%	57	-	-	-	-
E Ave - I Ave	2,717	2	40	99%	1%	0%	59	-	-	-	-
Phelan Rd											
Baldy Mesa Rd – Hwy 395	13,945	4	55	94%	5%	2%	71	-	85	200	475

Segment	Existing ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Main St											
Cataba Rd – SB I-15 ramp	39,858	6	50	92%	6%	2%	74	70	165	390	925
NB I-15 ramp – Mariposa Rd	49,660	6	45	90%	8%	2%	74	70	165	390	925
Mariposa Rd – Maple Ave	28,890	4	45	90%	8%	2%	72	-	100	240	575
Maple Ave – Cottonwood Ave	33,893	4	45	90%	8%	2%	73	-	115	275	650
Cottonwood Ave – 7th Ave	31,589	4	45	87%	10%	3%	73	-	120	285	675
7th Ave – Hesperia Rd	41,403	4	45	90%	7%	3%	74	55	135	325	775
C Ave – E Ave	40,922	4	45	90%	7%	3%	74	55	135	325	775
E Ave – I Ave	38,312	4	45	90%	7%	3%	74	55	135	325	775
I Ave – Peach Ave	22,488	4	45	90%	7%	3%	71	-	85	205	485
Peach Ave – Rock Springs Rd	12,920	4	50	90%	7%	3%	70	-	70	170	400
Rock Springs Rd											
At Mojave River	10,225	2	45	91%	7%	2%	68	-	-	100	235
Mauna Loa St											
Maple Ave – Cottonwood Ave	2,354	2	40	99%	1%	0%	59	-	-	-	-
Cottonwood Ave – 7th Ave	2,072	2	40	99%	1%	0%	58	-	-	-	-
7th Ave – 3rd Ave	251	2	40	99%	1%	0%	49	-	-	-	-
Lemon St											
E Ave – I Ave	1,693	2	45	98%	1%	1%	59	-	-	-	50
I Ave – Peach Ave	1,696	2	45	99%	1%	0%	59	-	-	-	-
East of Peach Ave	1,289	2	45	99%	1%	0%	58	-	-	-	-
Eucalyptus St											
Mariposa Rd – Maple Avenue	1,071	2	40	99%	1%	0%	56	-	-	-	-
7th Ave – 3rd Ave	2,564	2	40	99%	1%	0%	59	-	-	-	-
I Ave – Peach Ave	1,210	2	40	99%	1%	0%	56	-	-	-	-
Bear Valley Rd											
Amargosa Rd – SB I-15 ramp	46,564	6	45	85%	10%	5%	75	75	185	440	1045
NB I-15 ramp – Mariposa Rd	93,558	6	45	85%	10%	5%	78	130	310	740	1765
Mariposa Rd – 11th Ave	59,796	6	45	85%	10%	5%	76	95	225	530	1270
7th Ave – 3rd Ave	41,715	6	45	84%	11%	5%	74	70	170	410	975
West of 2nd Ave	49,067	6	45	85%	10%	5%	75	80	190	455	1085
West of Ridgecrest Rd	61,379	6	45	85%	10%	5%	76	95	225	540	1290
I Ave – Peach Ave	56,377	6	45	85%	10%	5%	76	90	210	505	1205

Segment	Existing ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
At Mojave River	29,191	6	45	78%	15%	7%	74	65	150	355	850
Baldy Mesa Rd											
South of Phelan Rd	2,683	2	45	99%	1%	0%	61	-	-	-	65
North of Phelan Rd	6,834	2	45	99%	1%	0%	65	-	-	55	130
Caliente Rd											
North of Oak Hill Rd	1,855	2	45	98%	1%	1%	60	-	-	-	55
South of Ranchero Rd	1,865	2	45	98%	1%	1%	60	-	-	-	55
South of Joshua St	1,956	2	45	98%	1%	1%	60	-	-	-	55
Highway 395											
South of Phelan Rd	19,446	4	55	80%	10%	10%	75	65	155	365	875
North of Phelan Rd	17,676	4	55	78%	10%	12%	75	65	150	360	860
South of Bear Valley Rd	22,680	4	55	80%	10%	10%	75	75	175	415	990
Mesa Linda St											
South of Main St	2,065	2	45	99%	1%	0%	60	-	-	-	55
Cataba Rd											
North of Main St	3,540	4	35	99%	1%	0%	58	-	-	-	-
Mariposa Rd											
I-15 NB ramp – Oak Hill Rd	6,859	2	55	95%	4%	1%	68	-	-	100	240
Oak Hill Rd – Ranchero Rd	8,308	2	55	95%	4%	1%	69	-	-	115	275
Ranchero Rd – Joshua St	2,864	2	50	95%	4%	1%	63	-	-	-	100
South of Main St	3,417	2	50	95%	4%	1%	64	-	-	-	115
North of Main St	4,112	2	45	95%	4%	1%	64	-	-	-	105
South of Eucalyptus St	3,432	2	45	95%	4%	1%	63	-	-	-	95
South of Bear Valley Rd	10,263	2	45	95%	4%	1%	68	-	-	90	210
Escondido Ave											
South of Ranchero Rd	1,098	2	45	95%	4%	1%	58	-	-	-	-
South of Main St	10,832	4	45	90%	8%	2%	68	-	-	115	275
Fuente Ave											
South of Main St	596	2	35	99%	1%	0%	53	-	-	-	-

Segment	Existing ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Maple Ave											
South of Ranchero Rd	2,205	2	45	99%	1%	0%	60	-	-	-	55
North of Ranchero Rd	3,876	2	45	95%	4%	1%	63	-	-	-	100
Muscatel St – Sultana St	6,776	4	45	90%	9%	1%	66	-	-	80	190
Main St – Willow St	6,508	2	45	95%	4%	1%	66	-	-	60	150
South of Eucalyptus St	4,067	2	45	95%	4%	1%	64	-	-	-	105
Eucalyptus St – Mariposa Rd	5,302	2	45	95%	4%	1%	65	-	-	55	130
Cottonwood Ave											
North of Ranchero Rd	1,840	2	45	98%	1%	1%	60	-	-	-	55
South of Main St	4,872	2	45	98%	1%	1%	64	-	-	-	110
South of Eucalyptus St	5,487	2	45	99%	1%	0%	64	-	-	-	110
7th Ave											
Ranchero Rd – Mesquite St	7,342	2	45	95%	4%	1%	66	-	-	70	165
South of Main St	5,284	2	45	95%	4%	1%	65	-	-	55	130
South of Eucalyptus St	7,878	2	55	95%	4%	1%	69	-	-	110	270
3rd Ave											
South of Eucalyptus St	2,191	2	45	99%	1%	0%	60	-	-	-	55
Santa Fe Ave East											
Ranchero Rd – Summit Valley Rd*	4,723	2	55	95%	4%	1%	67	-	-	75	180
South of Main St	3,158	2	40	89%	10%	1%	62	-	-	-	80
Hesperia Rd											
Main St – Lemon St	23,276	2	45	89%	9%	2%	72	-	80	190	460
Lemon St – Eucalyptus St	24,453	2	45	90%	8%	2%	72	-	80	195	465
E Ave											
South of Main St	5,518	2	40	95%	4%	1%	64	-	-	-	105
Main St – Lemon St	8,917	2	40	95%	4%	1%	66	-	-	60	145
Lemon St – I Ave	5,622	2	40	95%	4%	1%	64	-	-	-	105
I Ave											
North of Ranchero Rd	2,395	2	40	90%	9%	1%	61	-	-	-	60
South of Main St	14,144	2	40	90%	9%	1%	68	-	-	100	240
Main St – Lemon St	13,021	2	45	82%	16%	2%	70	-	60	145	340
Lemon St – Eucalyptus St	11,856	2	45	86%	12%	2%	70	-	50	125	295
Eucalyptus St – Bear Valley Ave	24,483	2	45	86%	12%	2%	73	-	90	215	510

Segment	Existing ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Peach Ave											
North of Ranchero Rd	425	2	40	95%	4%	1%	52	-	-	-	-
South of Main St	3,974	2	40	95%	4%	1%	62	-	-	-	80
North of Main St	4,846	2	40	95%	4%	1%	63	-	-	-	95
South of Eucalyptus St	4,164	2	40	95%	4%	1%	62	-	-	-	80
Arrowhead Lake Rd											
South of Ranchero Rd	1,693	2	35	99%	1%	0%	56	-	-	-	-
North of Ranchero Rd	2,617	2	50	99%	1%	0%	62	-	-	-	80

* Equivalent to Summit Valley Rd south of Ranchero Rd
Note: CNEL at 50' is from center of closest lane.

2.2 RAILROAD

The Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) railroads enter the City Sphere of Influence from the southwest and travel northeast to run parallel to Summit Valley Road. The BNSF line enters the City near Fuente Avenue, turns north near Hesperia Airport to run between Santa Fe Avenue East and Santa Fe Avenue West, and exits the City to the north. A BNSF spur exits the main northbound line between Live Oak Street and Hercules Street, and exits the City to the east. The UP line turns northwest near Mesa Linda Street, enters the City at Ranchero Road, crosses I-15, returns to the City Sphere of Influence at Mesquite Street, and exits the City Sphere of Influence to the northwest. A small UP spur exits the main southbound line near Prairie Trail and terminates between Escondido Avenue and Fuente Avenue. Peak-day counts of approximately 95 trains per day on the BNSF line and approximately 7 trains per day on the UP line in the year 2000 are assumed (Southern California Association of Governments 2005).

2.2.1 Railroad Ambient Noise and Vibration Survey

A survey was conducted on November 15 and 16, 2006 to quantify the existing noise and vibration levels generated by train passbys. Measurements were conducted in the BNSF right-of-way between the train tracks and Santa Fe Avenue East, and within the roadway right-of-way east of Santa Fe Avenue East. Eleven sound level measurements and eight vibration level measurements were conducted at two measurement locations between the hours of 10:30 a.m. and 1:30 p.m.

The data collection devices included a Larson Davis Model 820 ANSI Type 1 Integrating Sound Level Meter and a Larson Davis Model HVM100 Vibration Meter with an ICP accelerometer. The sound level meter was set for "slow" time response and A-weighting, and the microphone was equipped with a windscreen and mounted on a tripod five feet above the ground. The vibration meter was set for single integration (in/sec output) and a range of 0.4-100 Hz.

Weather conditions during the measurements were calm, with clear skies and low humidity. The results of the railroad sound level and vibration level measurements are summarized in Tables 7 and 8, respectively, and correspond to the locations depicted on Figure 4.

Sound levels caused by rail traffic decrease at a rate of 3 to 4.5 dB when the distance from the railroad is doubled, depending on the surface hardness between the source and the receiving property.

Table 7. Freight Train Passby Sound Level Measurements (dBA)

Locomotives	Cars	Estimated Speed	Horn	Distance from Track Centerline	Sound Exposure Level (SEL)	1-Hour Leq at 50 feet**
4	55	55 mph	Y	50 feet	114.9	79.3
4	96	45 mph	Y	50 feet	107.5	71.9
2	106*	35 mph	N	50 feet	99.7	64.1
4	101	55 mph	N	65 feet	98.2	64.6
4	115	55 mph	Y	65 feet	97.4	64.0
4	99	45 mph	N	50 feet	89.4	53.8
4	125	45 mph	N	165 feet	90.8	65.6
4	97	35 mph	N	150 feet	97.8	71.7
5	118	35 mph	N	150 feet	85.3	59.6
2	117*	35 mph	Y	165 feet	99.3	74.1
3	103	35 mph	N	150 feet	99.6	73.5

Notes:

* Cars were empty.
** Assumes one passby in one-hour period.

Table 8. Freight Train Passby Vibration Level Measurements (in/sec)

Peak Particle Velocity (PPV)	Distance from Track Centerline	Peak Particle Velocity (PPV)	Distance from Track Centerline
1.13	Ambient	0.63	Ambient
1.55	78 feet	0.57	165 feet
1.03	Ambient	1.18	150 feet
1.07	93 feet	0.98	150 feet
1.44	Ambient	0.67	165 feet
0.82	93 feet	0.50	Ambient
0.80	Ambient	1.20	150 feet

Ambient: PPV measured prior to the arrival of a train.

2.3 AVIATION

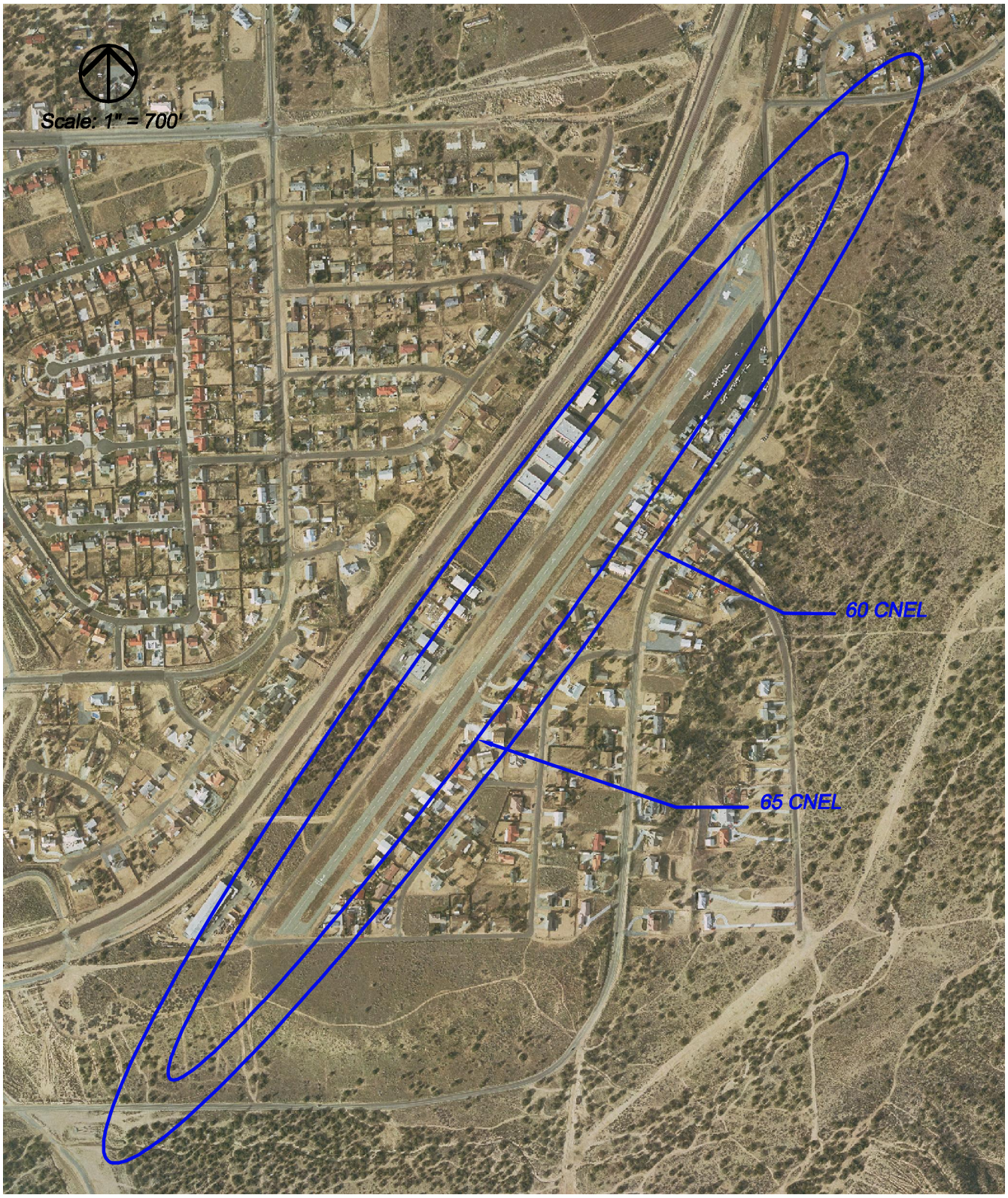
The Hesperia Airport is within the City boundary, and is bounded by Summit Valley Road to the east, Santa Fe Avenue to the west, and Jenny Street to the south. The future (2010) Hesperia Airport noise contours are shown on Figure 5; the 60 CNEL contour extends approximately 350 feet east and west from the center of the runway, and approximately 1,000 feet north and south from the ends of the runway. There are 18 residences located to the southeast that are within the 60 dBA CNEL airport noise contour.

2.4 STATIONARY SOURCES

Stationary noise sources include industrial and commercial land uses such as manufacturing plants, processing plants, motorcycle parks, automobile repair and power generators. Ancillary equipment that generates noise includes heating, ventilation and air-conditioning equipment and emergency generators. In residential areas, stationary noise sources include air conditioners and swimming pool /spa mechanical equipment. The noise level associated with these sources varies with the type of noise source and the distance from the noise source.

There are many stationary noise sources throughout the City. However, the majority of the industrial noise sources are located in the area north of Main Street, south of Bear Valley Road, east of Santa Fe Avenue, and west of I Avenue. Other commercial areas are located along Main Street, Phelan Road, Bear Valley Road, Hesperia Road, I-15, and near the I-15/Main Street interchange.

Construction activity is currently occurring throughout the City and generates noise that is audible at nearby land uses. Construction noise levels vary depending on the distance between the activity and receptors, and the type of equipment used, how it is operated, and how well the equipment is maintained. Figure 6 illustrates relative intensities of construction vibrations. Figure 7 illustrates sound levels from typical construction equipment. Sound levels from typical construction activity typically range from 60 to 90 dBA at 50 feet from the source (EPA 1971).

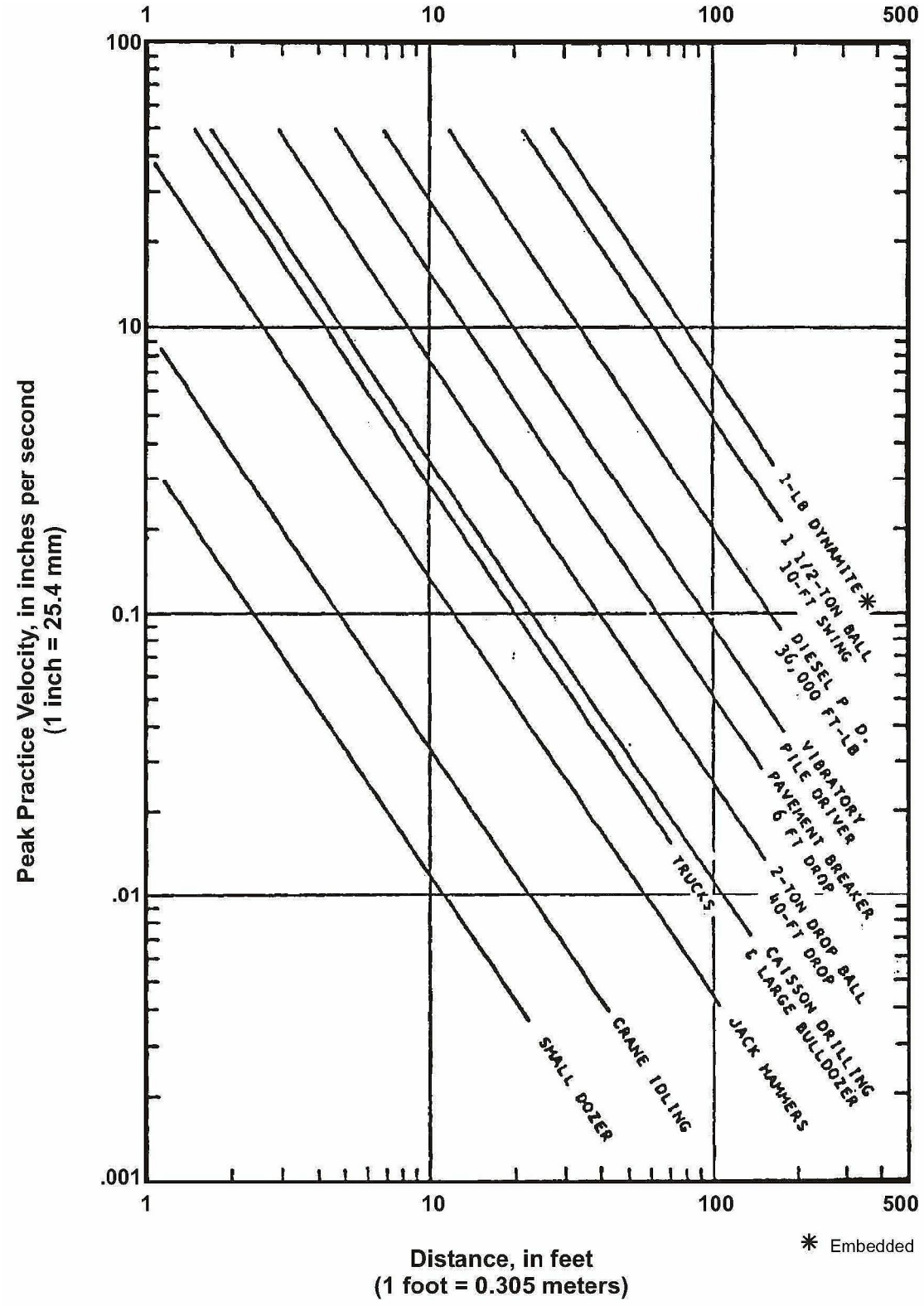


Source: Hesperia Airport Comprehensive Land Use Plan 5/16/1991

Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 5
Hesperia Airport
Future (2010) Noise Contours

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Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 6
Relative Intensities Of Construction Vibrations

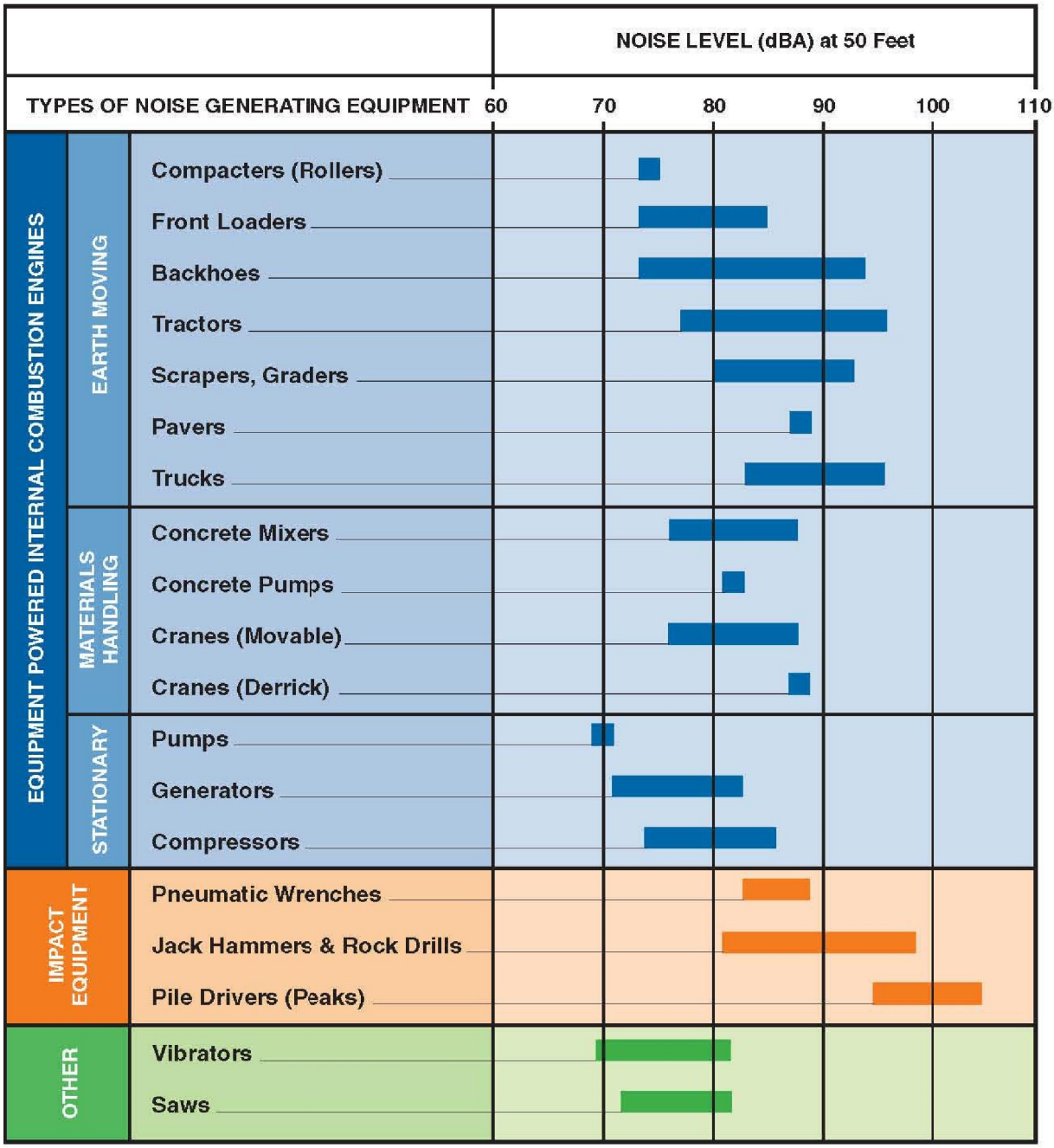


Figure 7

Typical Construction Equipment Noise Generation

Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

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3.0 EVALUATION OF PREFERRED PLAN

3.1 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the CEQA Guidelines. For the purposes of this report, the project (Preferred Plan) would have a significant impact with regard to noise if it would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of levels set forth in Figure 3, Table 4 and Municipal Code Section 16.20.125,B.

- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels as set forth in Table 2 and Municipal Code Section 16.20.130.

3.2 VEHICULAR TRAFFIC

Implementation of the Preferred Plan would result in increased vehicular traffic on the regional road network, which would incrementally increase ambient noise levels.

Acoustical calculations were performed for the traffic volumes with implementation of the Preferred Plan using TNM, as described above. All roadway segments presented in the Transportation Technical Report were analyzed. As in the existing conditions analysis, the calculations show the sound level at 50 feet from the center of the nearest lane of each roadway segment and the line-of-sight distance from the roadway centerline to the 75, 70, 65, and 60, dBA CNEL noise contours. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography. Table 9 shows the traffic noise levels in the City and City Sphere of Influence with implementation of the Preferred Plan.

Table 9. Calculated Preferred Plan Roadway Noise Levels (dBA)

Segment	Preferred ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
SR 138											
West of Summit Valley Rd	62,800	6	55	95%	4%	1%	77	105	255	610	1455
East of Summit Valley Rd	37,200	6	55	95%	4%	1%	75	75	175	415	995
Highway 173											
East of Rancho Las Flores Rd	23,000	4	50	95%	4%	1%	72	-	90	220	520
Summit Valley Rd											
North of SR 138	27,800	4	55	95%	4%	1%	74	55	130	315	750
Maple Ave – Santa Fe Ave East	30,700	4	55	95%	4%	1%	74	60	140	335	800
East of Arrowhead Lake Rd	30,900	4	55	95%	4%	1%	74	60	145	340	815
Oak Hill Rd											
I-15 SB ramp – I-15 NB ramp	21,700	4	35	95%	4%	1%	67	-	-	100	240
Ranchero Rd											
Baldy Mesa Rd – Verbena Rd	30,600	6	45	93%	5%	2%	72	-	105	250	600
Verbena Rd – Caliente Rd	61,300	6	45	93%	5%	2%	75	75	180	425	1010
Mariposa Rd – Escondido Ave	41,900	6	40	90%	7%	3%	72	-	115	280	665
Escondido Ave – Maple Ave	47,800	6	40	90%	7%	3%	73	55	130	310	740
Maple Ave – Cottonwood Ave	42,000	6	40	90%	7%	3%	72	-	115	280	665
Cottonwood Ave – 7th Ave	41,700	6	40	90%	7%	3%	72	-	115	280	665
7th Ave – Santa Fe Ave East	72,700	6	40	90%	7%	3%	75	75	180	425	1010
Santa Fe Ave – East I Ave	40,900	6	40	90%	7%	3%	72	-	115	275	655
I Ave – Peach Ave	9,600	2	40	90%	7%	3%	67	-	-	80	190
Mesquite St											
East of Maple Ave	18,500	4	35	99%	1%	0%	65	-	-	70	170
East of 7th St	11,500	4	35	99%	1%	0%	63	-	-	50	120
Snowline Rd											
Baldy Mesa Rd – Verbena Rd	19,300	4	40	95%	4%	1%	68	-	50	120	290
Joshua St											
Caliente Rd – Hwy 395	43,700	4	35	97%	2%	1%	70	-	65	160	380
US 395 – I-15 SB ramp	41,000	4	35	97%	2%	1%	70	-	65	150	360
NB I-15 ramp – Mariposa Rd	40,400	4	35	97%	2%	1%	70	-	60	150	355
Poplar St											
East of Hwy 395	12,700	4	25	95%	4%	1%	62	-	-	-	95

Segment	Preferred ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Muscatel St											
Escondido Ave – Fuente Ave	26,100	4	35	97%	2%	1%	68	-	-	110	260
Sultana St											
7th Ave – Hesperia Rd	23,200	4	35	97%	2%	1%	67	-	-	100	240
E Ave – I Ave	14,900	4	35	97%	2%	1%	65	-	-	70	170
Phelan Rd											
Baldy Mesa Rd – Hwy 395	47,400	6	45	92%	6%	2%	74	65	150	355	850
Main St											
Cataba Rd – SB I-15 ramp	92,600	6	40	93%	5%	2%	70	-	85	205	490
NB I-15 ramp – Mariposa Rd	77,400	6	40	93%	5%	2%	74	70	170	405	960
Mariposa Rd – Maple Ave	64,300	6	40	93%	5%	2%	74	60	145	350	835
Maple Ave – Cottonwood Ave	55,200	6	40	93%	5%	2%	73	55	130	310	740
Cottonwood Ave – 7th Ave	57,100	6	40	93%	5%	2%	73	55	135	320	765
7th Ave – Hesperia Rd	52,800	4	40	93%	5%	2%	73	-	120	285	675
C Ave – E Ave	49,700	4	40	93%	5%	2%	73	-	115	270	640
E Ave – I Ave	39,700	4	40	93%	5%	2%	72	-	95	225	540
I Ave – Peach Ave	31,800	4	40	93%	5%	2%	71	-	80	195	460
Peach Ave – Rock Springs Rd	32,100	4	40	93%	5%	2%	71	-	80	195	460
Rock Springs Rd											
At Mojave River	30,900	4	45	95%	4%	1%	72	-	90	220	520
Smoketree Rd											
West of Hwy 395	24,900	4	40	95%	4%	1%	69	-	60	145	340
Mojave St											
Hwy 395 – Amargosa Rd	42,500	4	40	92%	6%	2%	72	-	105	245	585
Mariposa Rd – Maple Ave	45,900	6	40	88%	8%	4%	73	55	135	320	765
Mauna Loa St											
Maple Ave – Cottonwood Ave	39,700	6	40	88%	8%	4%	72	50	120	290	690
Cottonwood Ave – 7th Ave	32,800	6	40	88%	8%	4%	72	-	105	250	600
7th Ave – 3rd Ave	37,600	6	40	88%	8%	4%	72	-	115	280	665

Segment	Preferred ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Lemon St											
E Ave – I Ave	34,700	6	40	88%	8%	4%	72	-	110	260	620
I Ave – Peach Ave	36,900	6	40	88%	8%	4%	72	-	115	275	655
East of Peach Ave	39,700	6	40	88%	8%	4%	72	50	120	290	690
At Mojave River	44,800	6	40	88%	8%	4%	73	55	130	315	755
Eucalyptus St											
Mariposa Rd – Maple Avenue	34,500	6	40	90%	7%	3%	71	-	100	245	580
7th Ave – 3rd Ave	22,800	4	40	90%	7%	3%	70	-	70	165	395
I Ave – Peach Ave	20,500	4	40	90%	7%	3%	70	-	65	150	360
Bear Valley Rd											
Amargosa Rd – SB I-15 ramp	91,300	6	40	90%	7%	3%	76	90	210	505	1205
NB I-15 ramp – Mariposa Rd	133,000	6	40	90%	7%	3%	77	115	280	665	1590
Mariposa Rd – 11th Ave	71,500	6	40	90%	7%	3%	75	75	175	415	995
7th Ave – 3rd Ave	63,500	6	40	90%	7%	3%	74	65	160	380	910
West of 2nd Ave	67,600	6	40	90%	7%	3%	74	70	170	405	960
West of Ridgecrest Rd	74,600	6	40	90%	7%	3%	75	75	180	430	1030
I Ave – Peach Ave	79,900	6	40	90%	7%	3%	75	80	190	455	1085
At Mojave River	53,600	6	40	90%	7%	3%	73	60	140	340	805
Baldy Mesa Rd											
South of Phelan Rd	63,500	6	45	95%	4%	1%	74	70	170	405	960
North of Phelan Rd	48,000	6	45	95%	4%	1%	73	60	135	325	780
Verbena Rd											
North of Ranchero Rd	23,500	4	35	99%	1%	0%	66	-	-	85	205
Caliente Rd											
North of Oak Hill Rd	11,200	2	40	97%	2%	1%	66	-	-	70	165
South of Ranchero Rd	32,900	4	40	97%	2%	1%	70	-	70	170	400
South of Joshua St	19,700	2	40	97%	2%	1%	69	-	-	105	255
Highway 395											
South of Phelan Rd	81,700	6	45	88%	8%	4%	77	110	260	620	1485
North of Phelan Rd	98,600	6	45	88%	8%	4%	78	125	300	715	1705
South of Bear Valley Rd	77,700	6	45	88%	8%	4%	74	70	165	390	925
Mesa Linda St											
South of Main St	27,500	4	40	97%	2%	1%	69	-	60	145	350

Segment	Preferred ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Cataba Rd											
North of Main St	3,500	4	35	99%	1%	0%	58	-	-	-	-
Mariposa Rd											
I-15 NB ramp – Oak Hill Rd	36,500	6	40	95%	4%	1%	71	-	85	210	495
Oak Hill Rd – Ranchero Rd	42,600	6	40	95%	4%	1%	71	-	95	230	550
Ranchero Rd – Joshua St	36,400	6	40	95%	4%	1%	70	-	85	205	490
South of Main St	56,200	6	40	95%	4%	1%	72	50	120	285	680
North of Main St	57,300	6	40	95%	4%	1%	72	50	120	290	690
South of Eucalyptus St	47,300	6	40	95%	4%	1%	72	-	105	250	600
South of Bear Valley Rd	44,000	6	40	95%	4%	1%	71	-	100	240	570
Escondido Ave											
South of Ranchero Rd	8,600	4	40	99%	1%	0%	64	-	-	55	130
South of Main St	62,700	6	40	95%	4%	1%	73	55	130	310	740
Fuente Ave											
South of Main St	4,900	4	35	99%	1%	0%	60	-	-	-	60
Maple Ave											
Rancho Las Flores Rd – Summit Valley Rd	33,700	4	40	90%	7%	3%	72	-	95	220	530
South of Ranchero Rd	18,500	4	40	90%	7%	3%	69	-	60	140	335
North of Ranchero Rd	16,700	4	40	90%	7%	3%	69	-	55	130	315
Muscatel St – Sultana St	25,900	4	40	90%	7%	3%	71	-	75	185	435
Main St – Willow St	26,600	4	40	90%	7%	3%	71	-	80	185	445
South of Eucalyptus St	26,500	4	40	90%	7%	3%	71	-	80	185	445
Eucalyptus St – Mariposa Rd	24,400	4	40	90%	7%	3%	70	-	75	175	415
Cottonwood Ave											
North of Ranchero Rd	5,500	2	40	99%	1%	0%	63	-	-	-	85
South of Main St	24,400	4	40	99%	1%	0%	68	-	-	120	285
South of Eucalyptus St	25,100	4	40	99%	1%	0%	68	-	50	120	290
7th Ave											
Ranchero Rd – Mesquite St	22,900	4	40	95%	4%	1%	69	-	55	135	325
South of Main St	20,200	4	40	95%	4%	1%	68	-	50	125	295
South of Eucalyptus St	22,800	4	40	95%	4%	1%	69	-	55	135	325
3rd Ave											
South of Eucalyptus St	16,500	4	40	99%	1%	0%	67	-	-	90	210

Segment	Preferred ADT	Lanes	Speed (mph)	Traffic Mix: Cars / Medium Trucks / Heavy Trucks			CNEL at 50'	Approximate Distance to CNEL Contour (ft)			
								75	70	65	60
Santa Fe Ave East											
Ranchero Rd – Summit Valley Rd*	66,100	6	40	90%	8%	2%	74	65	160	380	910
South of Lime St	26,200	4	40	90%	8%	2%	71	-	75	175	420
South of Main St	9,700	4	40	90%	8%	2%	66	-	-	85	200
Hesperia Rd											
Main St – Lemon St	41,000	4	40	90%	8%	2%	73	-	105	250	595
Lemon St – Eucalyptus St	40,700	4	40	90%	8%	2%	73	-	105	250	595
Rancho Las Flores Rd											
North of Hwy 138	53,100	6	40	93%	5%	2%	73	55	125	300	715
Maple Ave – Santa Fe Ave East	41,400	6	40	93%	5%	2%	72	-	105	250	600
South of Summit Valley Rd	21,000	6	40	93%	5%	2%	69	-	65	150	355
E Ave											
South of Main St	17,300	4	40	95%	4%	1%	68	-	-	110	260
Main St – Lemon St	22,300	4	40	95%	4%	1%	69	-	55	135	320
Lemon St – I Ave	13,900	4	40	95%	4%	1%	67	-	-	95	220
I Ave											
North of Ranchero Rd	17,200	4	35	93%	5%	2%	67	-	-	95	230
South of Main St	27,600	4	35	93%	5%	2%	69	-	55	135	325
Main St – Lemon St	22,600	4	40	85%	12%	3%	71	-	75	185	435
Lemon St – Eucalyptus St	20,300	4	40	85%	12%	3%	70	-	70	170	400
Eucalyptus St – Bear Valley Ave	28,400	4	40	85%	12%	3%	72	-	90	220	520
Peach Ave											
North of Ranchero Rd	4,400	4	35	95%	4%	1%	60	-	-	-	70
South of Main St	20,000	4	35	95%	4%	1%	67	-	-	95	225
North of Main St	16,300	4	35	95%	4%	1%	66	-	-	80	195
South of Eucalyptus St	25,700	4	35	95%	4%	1%	68	-	-	115	275
Arrowhead Lake Rd											
Mesa Drive – Summit Valley Rd	30,200	6	40	97%	2%	1%	69	-	70	170	405
South of Ranchero Rd	18,700	6	40	97%	2%	1%	67	-	-	115	280
North of Ranchero Rd	20,900	6	40	97%	2%	1%	68	-	55	125	300

* Equivalent to Summit Valley Rd south of Ranchero Rd
Note: CNEL at 50' is from center of closest lane.

A comparison of existing traffic noise levels and traffic noise levels with implementation of the Preferred Plan shows that traffic resulting from implementation of the Preferred Plan would cause noise level changes ranging from a reduction by 4 dBA CNEL to an increase of 23 dBA CNEL (Table 9). An increase of less than 3 dBA is not perceptible by the average human ear. Areas of frequent outdoor use, such as rear yards, patios, child play areas, at existing and new noise sensitive land uses in areas where the sound level exceeds 65 dBA CNEL along these roadways may be significantly impacted.

Table 10. Existing vs. Preferred Plan Roadway Noise Levels at 50 Feet from Closest Lane (dBA CNEL)

Segment	Existing	Preferred Plan	Delta	Homes
SR 138				
West of Summit Valley Rd	67	77	10	Y
East of Summit Valley Rd	63	75	12	Y
Highway 173				
East of Rancho Las Flores Rd	-	72	-	Y
Summit Valley Rd				
North of SR 138	66	74	8	Y
Maple Ave – Santa Fe Ave East	-	74	-	Y
East of Arrowhead Lake Rd	-	74	-	Y
Oak Hill Rd				
I-15 SB ramp – I-15 NB ramp	62	67	5	N
Ranchero Rd				
Baldy Mesa Rd – Verbena Rd	-	72	-	Y
Verbena Rd – Caliente Rd	-	75	-	N
Mariposa Rd – Escondido Ave	67	72	5	Y
Escondido Ave – Maple Ave	67	73	6	Y
Maple Ave – Cottonwood Ave	66	72	6	Y
Cottonwood Ave – 7th Ave	66	72	6	Y
7th Ave – Santa Fe Ave East	-	75	-	Y
Santa Fe Ave East – I Ave	63	72	9	Y
I Ave – Peach Ave	59	67	8	Y
Mesquite St				
East of Maple Ave	56	65	9	Y
East of 7th St	57	63	6	Y
Snowline Rd				
Baldy Mesa Rd – Verbena Rd	-	68	-	Y
Joshua St				
Caliente Rd – Hwy 395	59	70	11	N
US 395 – I-15 SB Ramp	67	70	3	N
NB I-15 ramp – Mariposa Rd	60	70	10	N
Poplar St				
East of Hwy 395	54	62	8	N

Segment	Existing	Preferred Plan	Delta	Homes
Muscatel St				
Escondido Ave – Fuente Ave	51	68	17	Y
Sultana St				
7th Ave – Hesperia Rd	57	67	10	Y
E Ave – I Ave	59	65	6	Y
Phelan Rd				
Baldy Mesa Rd – Hwy 395	71	74	3	Y
Main St				
Cataba Rd SB – I-15 ramp	74	70	-4	N
NB I-15 ramp – Mariposa Rd	74	74	0	N
Mariposa Rd – Maple Ave	72	74	2	Y
Maple Ave – Cottonwood Ave	73	73	0	Y
Cottonwood Ave – 7th Ave	73	73	0	Y
7th Ave – Hesperia Rd	74	73	-1	N
C Ave – E Ave	74	73	-1	N
E Ave – I Ave	74	72	-2	N
I Ave – Peach Ave	71	71	0	Y
Peach Ave – Rock Springs Rd	70	71	1	Y
Rock Springs Rd				
At Mojave River	68	72	4	Y
Smoketree Rd				
West of Hwy 395	-	69	-	Y
Mojave St				
Hwy 395 – Amargosa Rd	-	72	-	Y
Mariposa Rd – Maple Ave	-	73	-	Y
Mauna Loa St				
Maple Ave – Cottonwood Ave	59	72	13	Y
Cottonwood Ave – 7th Ave	58	72	14	Y
7th Ave – 3rd Ave	49	72	23	Y
Lemon St				
E Ave – I Ave	59	72	13	N
I Ave Peach Ave	59	72	13	Y
East of Peach Ave	58	72	14	Y
At Mojave River	-	73	-	Y

Segment	Existing	Preferred Plan	Delta	Homes
Eucalyptus St				
Mariposa Rd – Maple Avenue	56	71	15	Y
3rd Ave – 7th Ave	59	70	11	Y
I Ave – Peach Ave	56	70	14	Y
Bear Valley Rd				
Amargosa Rd – SB I-15 ramp	75	76	1	N
NB I-15 ramp – Mariposa Rd	78	77	-1	N
Mariposa Rd – 11th Ave	76	75	-1	Y
7th Ave – 3rd Ave	74	74	0	Y
West of 2nd Ave	75	74	-1	N
West of Ridgecrest Rd	76	75	-1	N
I Ave – Peach Ave	76	75	-1	N
At Mojave River	74	73	-1	N
Baldy Mesa Rd				
South of Phelan Rd	61	74	13	Y
North of Phelan Rd	65	73	8	Y
Verbena Rd				
North of Ranchero Rd	-	66	-	Y
Caliente Rd				
North of Oak Hill Rd	60	66	6	N
South of Ranchero Rd	60	70	10	N
South of Joshua St	60	69	9	N
Highway 395				
South of Phelan Rd	75	77	2	N
North of Phelan Rd	75	78	3	Y
South of Bear Valley Rd	75	74	-1	Y
Mesa Linda St				
South of Main St	60	69	9	N
Cataba Rd				
North of Main St	58	58	0	Y

Segment	Existing	Preferred Plan	Delta	Homes
Mariposa Rd				
I-15 NB ramp – Oak Hill Rd	68	71	3	N
Oak Hill Rd – Ranchero Rd	69	71	2	Y
Ranchero Rd – Joshua St	63	70	7	N
South of Main St	64	72	8	N
North of Main St	64	72	8	N
South of Eucalyptus St	63	72	9	Y
South of Bear Valley Rd	68	71	3	Y
Escondido Ave				
South of Ranchero Rd	58	64	6	Y
South of Main St	68	73	5	Y
Fuente Ave				
South of Main St	53	60	7	Y
Maple Ave				
Rancho Las Flores Rd – Summit Valley Rd	-	72	-	N
South of Ranchero Rd	60	69	9	Y
North of Ranchero Rd	63	69	6	Y
Muscatel St – Sultana St	66	71	5	Y
Main St – Willow St	66	71	5	Y
South of Eucalyptus St	64	71	7	Y
Eucalyptus St – Mariposa Rd	65	70	5	Y
Cottonwood Ave				
North of Ranchero Rd	60	63	3	Y
South of Main St	64	68	4	Y
South of Eucalyptus St	64	68	4	Y
7th Ave				
Ranchero Rd – Mesquite St	66	69	3	Y
South of Main St	65	68	3	Y
South of Eucalyptus St	69	69	0	Y
3rd Ave				
South of Eucalyptus St	60	67	7	Y

Segment	Existing	Preferred Plan	Delta	Homes
Santa Fe Ave East				
Ranchero Rd – Summit Valley Rd*	67	74	7	Y
South of Lime St	-	71	-	Y
South of Main St	62	66	4	Y
Hesperia Rd				
Main St – Lemon St	72	73	1	N
Lemon St – Eucalyptus St	72	73	1	Y
Rancho Las Flores Rd				
North of Hwy 138	-	73	-	N
Maple Ave – Santa Fe Ave East	-	72	-	N
South of Summit Valley Rd	-	69	-	N
E Ave				
South of Main St	64	68	4	Y
Main St – Lemon St	66	69	3	N
Lemon St – I Ave	64	67	3	N
I Ave				
North of Ranchero Rd	61	67	6	Y
South of Main St	68	69	1	Y
Main St – Lemon St	70	71	1	Y
Lemon St – Eucalyptus St	70	70	0	Y
Eucalyptus St Bear Valley Ave	73	72	-1	Y
Peach Ave				
North of Ranchero Rd	52	60	8	Y
South of Main St	62	67	5	Y
North of Main St	63	66	3	Y
South of Eucalyptus St	62	68	6	Y
Arrowhead Lake Rd				
Mesa Drive - Summit Valley Rd	-	69	-	Y
South of Ranchero Rd	56	67	11	Y
North of Ranchero Rd	62	68	6	Y

* Equivalent to Summit Valley Rd south of Ranchero Rd

3.3 RAILROAD

Noise

The BNSF and UP railroads will continue to operate on existing tracks in the future. Future daily operations on both BNSF and UP lines are projected to increase. In the year 2025, daily operations are estimated to be approximately 187 freight trains on the BNSF line and 9 freight trains on the UP line (Southern California Association of Governments 2005). The increased daily operations would increase the sound level in the vicinity of the BNSF line by approximately 3 dBA and would increase the sound level in the vicinity of the UP line by approximately 1 dBA. Sound levels variations of less than 3 dBA are not detectable by the typical human ear. New noise sensitive receptors constructed within 1,850 feet of the BNSF line (in direct line-of-sight) or within 90 feet of the UP line may be exposed to sound levels exceeding 65 dBA CNEL and thus be significantly impacted.

Vibration

The location of future railroad operations would remain unchanged from the current condition. No vibration impacts would occur as a result of the preferred alternative.

3.4 AVIATION

The City is currently subject to periodic overflights associated with Hesperia Airport. There are 18 residences located to the southeast that are within the 60 dBA CNEL airport noise contour. This condition is expected to continue in the future; however, there are no forecast contours available for the airport.

3.5 STATIONARY SOURCES

Noise associated with stationary noise sources as a result of the Preferred Plan is expected to be similar to the existing condition. Sufficient spatial separation should be maintained between commercial and industrial uses and residential and other noise-sensitive uses. A site-specific noise study is recommended whenever a noise-sensitive development is proposed to be located in close proximity to an industrial or commercial noise source.

4.0 NOISE MITIGATION

Effective noise abatement measures are unique for each situation. The physical techniques to mitigate noise vary in their noise reduction capabilities. Factors to consider when evaluating potential noise mitigation include: the amount of noise reduction desired, situations where physical techniques would be most effective, and aesthetics. The following measures can be used to mitigate noise impacts:

Site Planning

Proper site planning to reduce noise impacts should be considered for all noise sensitive developments. Buildings can be oriented on a site in such a way as to exploit the site's noise attenuating features. By consideration of a site's natural topography, size and shape, it is often possible to reduce and possibly eliminate noise impacts from vehicular traffic and railroads. Site planning techniques includes the following:

- Increasing the distance from the noise source to sensitive receptors by creation of setbacks;
- Placing non-noise sensitive uses such as parking lots and utility areas between the noise source and receiver; and
- Orienting usable outdoor living space such as balconies, patios, and child play areas away from roadways.

Barriers

Noise barriers such as walls and earthen berms are commonly used to mitigate noise from ground transportation, commercial and industrial sources. Noise barriers can be used to reduce the noise level both outdoors and indoors. The effectiveness of a barrier depends upon factors such as the relative height of the barrier relative to the line-of-sight from the source to the receiver, the distance from the barrier to the source and to the receiver and the reflections of sound. To be effective, a barrier must block the line-of-sight from the source to the receiver. A barrier must also be of solid construction (i.e., masonry) without holes or gaps and be long enough to prevent sound from passing around the ends. Under the best of circumstances, a properly designed noise barrier can reduce noise as much as 15 decibels. A site-specific acoustical analysis is required to determine the proper height and placement of a barrier.

A row of houses or other buildings may act as a barrier. A row of one- or two-story houses (with about 30 percent open gaps) provides a barrier attenuation of approximately 3 to 5 decibels; two rows of houses, 6 to 10 decibels; and three or more rows of houses, 10 to 12 decibels.

Building Design

The location of a building on its site, the arrangement of rooms, and the location of doors and windows all have a bearing on interior noise control. The sides of a building which face a roadway or other noise source should house those activities that can tolerate the greatest amount of noise. Noise sensitive areas include bedrooms, living rooms and dens. Less noise sensitive areas may include kitchens and bathrooms. Hallways, closets and storage rooms are generally not noise sensitive.

Indoor noise levels are controlled by the noise reduction characteristics of the building shell. In general, doors and windows are the acoustical weak link in a building. Therefore, careful consideration should be given to their placement. By limiting the number and size of these openings on the sides of the building exposed to noise, interior noise levels will be reduced.

Often it is necessary to allow for a closed window condition to control interior noise. When this occurs, an alternative means of ventilation such as heat pumps or forced air units is required to meet the California Building Code requirements. Heavy-pane or double-pane windows are frequently required to increase the sound insulation within a room. Doors facing a noise source should be solid-core and should be equipped with an appropriate gasket.

An interior noise analysis will be required for new residential development located in areas where future noise levels would exceed 60 dBA CNEL. The interior noise analysis should evaluate the proposed building shell (exterior wall, windows, and doors) to ensure that interior noise levels will not exceed 45 dBA CNEL. The analysis should be performed prior to obtaining a building permit.

5.0 LIST OF PREPARERS

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_____
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7.0 GLOSSARY

The terms and definitions in this glossary are commonly found in environmental noise literature.

Ambient Noise: All-encompassing noise at a given place and time. This is usually a composite of sounds from all sources near and far, including any specific sources of interest.

A-Weighted Level: The sound level in decibels as measured on a sound level meter using the Aweighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of 10 decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.

Day-Night Sound Level (Ldn): The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of 10 decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m. (Note: CNEL and Ldn represent daily levels of noise exposure averaged on an annual or daily basis, while Leq represents the equivalent energy noise exposure for a shorter time period, typically one hour.)

Decibel, dB: A unit of measurement describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

Equivalent Sound Level (Leq): The energy-averaged A-weighted sound level during a measured time interval. It is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound.

Frequency: The number of oscillations per second of a periodic wave sound and of a vibrating solid, expressed in units of hertz, formerly cycles per second (cps). 1 Hz = 1 cps = 1 oscillation per second.

Heavy Truck: A vehicle type for the purpose of noise prediction modeling defined as all vehicles with three or more axles designed for transportation of cargo. Generally, the gross weight is more than 26,500 pounds.

Hertz: Unit of frequency, formerly called cycles per second. 1 Hz = 1 cps.

Maximum Sound Level (Lmax): Represents the root-mean-square (RMS) maximum noise level obtained during the measurement interval.

Medium Truck: A vehicle classification for the purpose of noise prediction modeling, defined as all vehicles with two axles and six wheels designed for transportation of cargo. Generally, the gross weight is more than 10,000 pounds and less than 26,500 pounds.

Minimum Sound level (Lmin): Represents the root-mean-square minimum noise level obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

Noise Barrier: A generic term for any feature that blocks or diminishes sound in its path from the source to receiver. Although the term can technically refer to any feature, manmade or natural, the two most common features included in noise barriers are sound walls and earth berms.

Noise Contours: Lines drawn about a noise source indicating equal levels of noise exposure.

Noise Sensitive Land Use: Land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise, such as residential dwellings, transient lodging, dormitories, hospitals, educational facilities, public assembly facilities, amphitheatres, congregate care facilities, childcare facilities, and libraries.

Peak Particle Velocity (PPV): The peak signal value of an oscillating vibration velocity waveform. Usually expressed in inches/second in the United States.

Percentile Noise Limit (Ln): Characterizes the time-varying character of environmental noise by identifying the noise level exceeded n% of the time. For example, the statistical noise descriptors L10, L50, and L90 are the noise levels exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

Receiver/Receptor: A stationary far-field position at which noise or vibration levels are specified.

Root Mean Square (RMS): The square root of the mean-square value of an oscillating waveform, where the mean-square value is obtained by squaring the value of amplitudes at each instant of time and then averaging these values over the sample time.

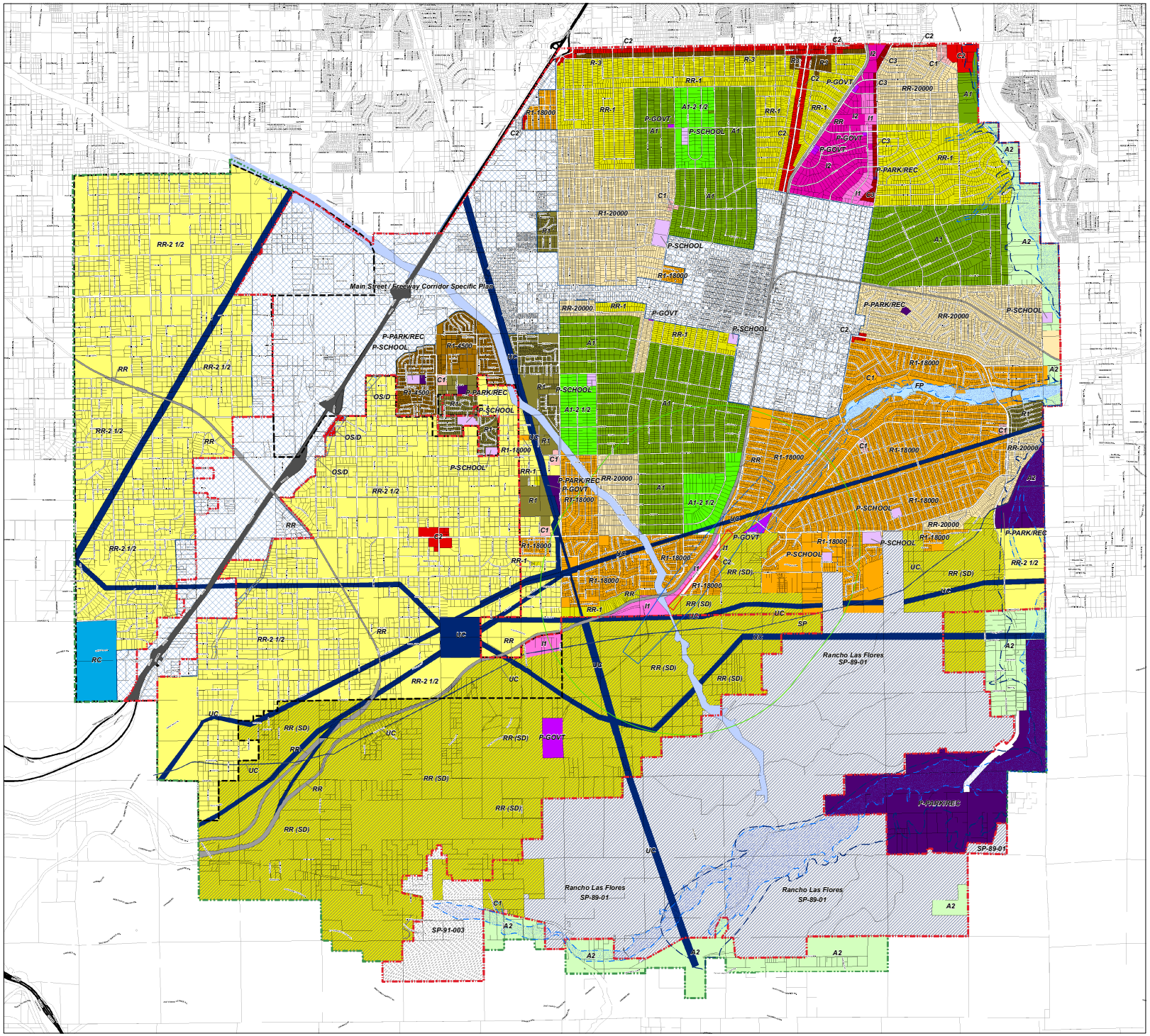
Single Event Level (SEL): The summation of the A-weighted sound energy at a particular location over the true duration of a noise event normalized to a duration of one second. The true duration is defined as the amount of time the noise event exceeds background levels. For events lasting more than one second, SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. SEL combines an event's overall sound level along with its duration. SEL provides a comprehensive way to describe noise events for use in modeling and comparing noise environments.

Sound: A physical disturbance in a medium that is capable of being detected by the human ear.

Vibration: An oscillation wherein the quantity is a parameter that defines the motion of a mechanical system.

Vibration Velocity Level (VdB): Ten times the common logarithm of the ratio of the square of the amplitude of the RMS vibration velocity to the square of the amplitude of the reference RMS vibration velocity.

APPENDIX A. CITY OF HESPERIA GENERAL PLAN LAND USE MAP



Legend

Agricultural
- A2 (0.0 - 0.2 du/ac)
- A1-2 1/2 (0.21 - 0.4 du/ac)
- A1 (0.41 - 1.0 du/ac)

Rural Residential
- RR-2 1/2 (0.0 - 0.4 du/ac)
- RR (SD) (0.0 - 0.4 du/ac)
- RR-1 (0.41 - 1.0 du/ac)
- RR-20000 (1.1 - 2.0 du/ac)

Residential
- R1-18000 (2.1 - 2.4 du/ac)
- R1 (2.5 - 4.5 du/ac)
- R1-4500 (4.6 - 8.0 du/ac)
- R3 (8.1 - 15.0 du/ac)

Commercial
- C1 - Neighborhood Commercial (0.0 - 0.5 FAR)
- C2 - General Commericial (0.0 - 1.0 FAR)
- C3 - Service Commercial (0.0 - 0.5 FAR)

Industrial
- I1 - Limited Manufacturing (0.0 - 1.0 FAR)
- I2 - General Manufacturing (0.0 - 1.0 FAR)

Public
- P-SCHOOL - Public School (0.0 - 1.0 FAR)
- P-GOVT - Government Facility (0.0 - 1.0 FAR)
- P-PARK/REC - Park & Recreation (0.0 - 1.0 FAR)

Specific Plan
- Summit Valley Ranch Specific Plan SP-91-003
- Rancho Las Flores Specific Plan SP-89-01
- Main Street / Freeway Corridor Specific Plan

Other
- Rec-Com - Recreational Commercial
- RC - Resource Conservation
- RRC - Railroad Corridor
- UC - Utility Corridor
- TC - Transportation Corridor
- AQ - Aqueduct

Overlay
- AS - Airport Safety Zone
- AAT - Airport Approach and Transistional Zone
- AN - Airport Notice Area
- Dam Innundation
- FP - 100-Year Flood Plain Overlay
- OS / D - Open Space Drainage

- City Boundary
- Sphere of Influence
- Oak Hills Community Plan

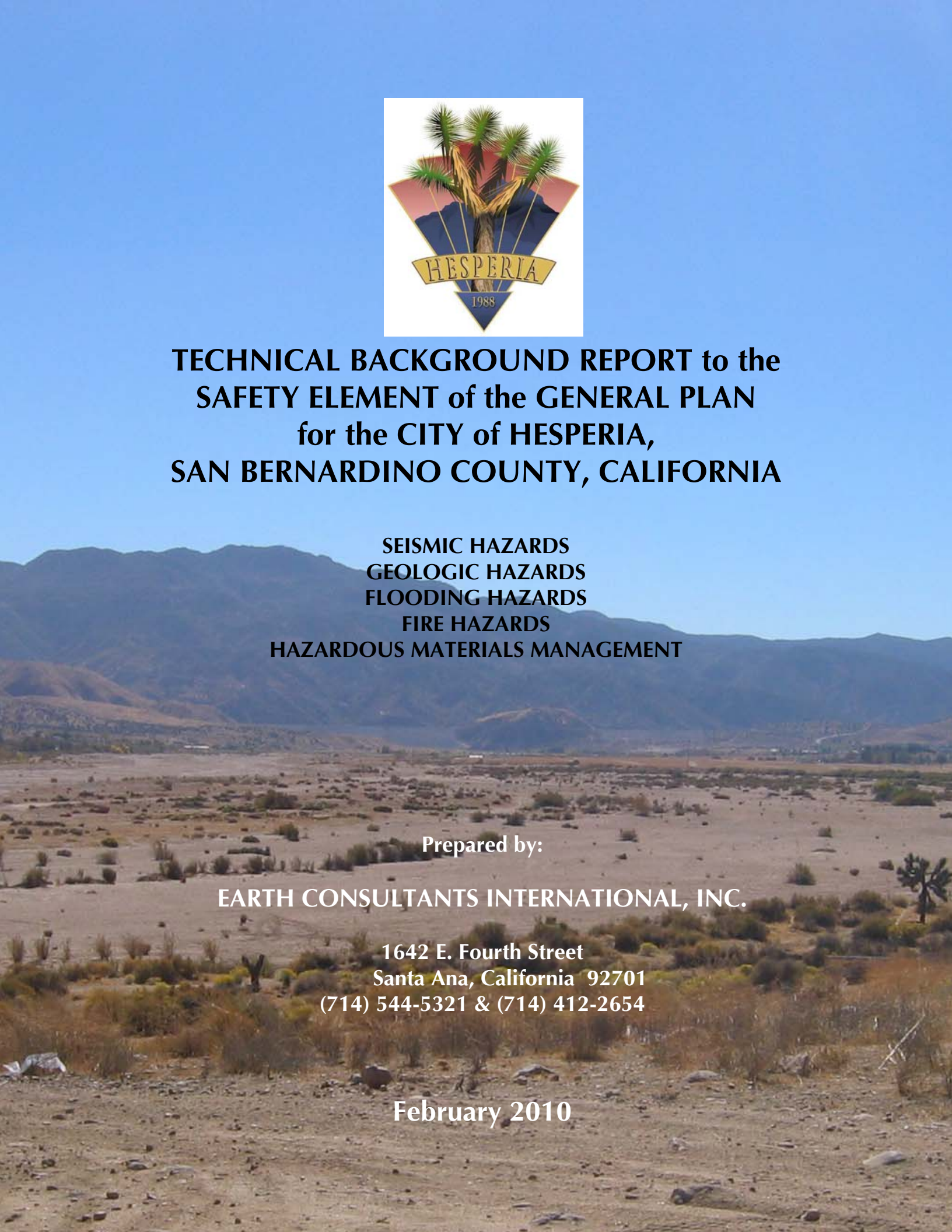
DISCLAIMER:
This map is a public resource of general information. The feature data provided on this map represents the most accurate mapping and parcel information available at the most recent date of revision. In the event of a conflict between information on this map and adopted City Resolutions or Ordinances, the City's Resolutions or Ordinances shall govern.

General Plan Land Use *(Proposed)*

0 0.25 0.5 1 1.5 Miles

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TECHNICAL BACKGROUND REPORT to the SAFETY ELEMENT of the GENERAL PLAN for the CITY of HESPERIA, SAN BERNARDINO COUNTY, CALIFORNIA

SEISMIC HAZARDS
GEOLOGIC HAZARDS
FLOODING HAZARDS
FIRE HAZARDS
HAZARDOUS MATERIALS MANAGEMENT

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EXECUTIVE SUMMARY

The Background Report to the Safety Element of the General Plan for the City of Hesperia describes and discusses the natural and some man-made hazards that have the potential to impact the city.

Hesperia lies across the boundary of two very distinct geomorphic provinces. The very southern edge of the city encroaches into the Transverse Ranges Province, a region whose characteristic features are a series of east-west trending ranges that include the San Gabriel and San Bernardino Mountains. The greater part of Hesperia, north of the mountains, lies within the Mojave Desert Province, an arid region of alluvial fans, desert plains, dry lakebeds, and scattered mountain ranges. These physical features are a direct consequence of the geologic and climatic processes that have affected this region in the last few million years. The most striking feature is the dramatic contrast between the Mojave Desert and the adjacent mountains – a direct result of movement along faults that have both elevated and down-dropped great blocks of the Earth's crust. As a result, the mountain ranges that form the backdrop to Hesperia are composed of rocks that have been sheared and intensely fractured under the strain of tectonic movement. Along the base of the mountains, multiple generations of overlapping alluvial fans have a range of ages coincident with the rise of the mountains.

The physiographic and geologic history of the Hesperia area control to a great extent the geologic hazards, as well as the natural resources, within the city. For example, Hesperia receives great quantities of runoff from the nearby mountains during storms, leading to flooding problems in some areas. Regional tectonic subsidence along the valley floor, concurrent with uplift of the adjacent mountains, is responsible to a great extent for the rapid deposition of poorly consolidated alluvium that is susceptible to consolidation and/or collapse. This same deep alluvium, however, provides a natural underground reservoir (aquifer) for ground water, the city's source of all its domestic water.

Most of the hazards covered herein are "natural" hazards, such as earthquakes (Chapter 1); slope instability, subsidence, and erosion (Chapter 2); floods and inundation due to dam failure (Chapter 3), and wildland fire (Chapter 4). These natural conditions do not pose a hazard in undeveloped areas, but when they interact with the built environment, they have the potential to become catastrophic. For example, flooding in an undeveloped area has no impact on buildings or infrastructure, and no one is likely to get hurt or killed. But when flooding occurs in a developed residential area, it has the potential to cause extensive damage and monetary losses. This does not need to happen, though. From past experience, we have learned how to measure, contain, and where necessary, avoid floodwaters. Similarly, we have learned how to design earthquake-resistant structures. The primary purpose of this document is to educate and inform the residents and officials of Hesperia of the potential natural hazards in the community. By doing so, you can take action to reduce the hazards specific to your area to a level that you, your family and your community are comfortable with. Through appropriate action, the hazard does not need to become a disaster. These are some of the topics that are covered in more detail in the following report. The man-made hazards covered in this document include structure and chemical fires (Chapter 4), and hazardous materials (Chapter 5).

Not all potential natural hazards are covered in this document. For example, although drought is a potentially significant hazard in the region, its regional impact requires a regional approach to the development of mitigation or contingency plans. Also, methods for drought prediction and forecasting are in their infancy, and thus not very reliable. Future generations of this document

should consider a section on drought, including the development of mitigation measures to manage water supply. Similarly, there are no known volcanic sources near the city of Hesperia, but a major eruption of the volcanic field in Yellowstone, or Mammoth, could blanket the entire region in ash, with severe environmental, social and financial consequences. However, given the difficulties of predicting and planning for such a catastrophe, volcanic hazards are also not discussed herein. Other climatological hazards, such as extreme cold, hail, and snow avalanches do not occur often in southern California, and are therefore not discussed.

So, what is the best way to use this report? As the saying goes, "a picture is worth a thousand words." Thus, we recommend that you first refer to the maps that accompany this report. If you are like almost everyone else, you will want to look for the area where you live or work, or where you are thinking of moving. These maps will show you at a glance whether your area of interest is, for example, on or near an area susceptible to liquefaction, flooding, or in a fire hazard area. Keep in mind, however, maps are by necessity generalized, and therefore, the boundaries shown on the maps are only approximate – you do not want to be lulled into a false sense of security because your house lot is across the street from a contact between a hazardous and a non-hazardous zone. Or, alternatively, decide to move because you are currently living in an area zoned as hazardous. This is where reading the text becomes important. Read on the specific hazards that you are concerned about, then apply that knowledge to your lot and house. How old is your house? Is it tied down to its foundation? Does it have a fire-resistant roof? Are there protective berms upgradient that will divert runoff away from your structure? There are specific actions that you can take to make your house specifically, or Hesperia in general, a safer place.

Hesperia is located within the high desert portion of the Inland Empire, an area that is growing very rapidly: Hesperia's current population of more than 84,000 residents is expected to double by the year 2025. As the city grows in the next few decades, new development will be needed to meet the demand for homes. When meeting this demand, it is imperative to manage land use in a responsible way, as development disrupts natural processes, often leading to negative impacts on the environment as well as on the development and adjacent properties. The impacts of land development can be minimized, however, if both site-specific and regional planning elements are recognized and considered, the project incorporates knowledge gained from scientific research in developing and implementing a design appropriate to the area, and protective measures are constructed and maintained for the lifetime of the project.

Given that Hesperia is still a growing city, there is the opportunity to effect mitigation via avoidance and engineering design in currently undeveloped areas. In already developed areas of the city, mitigation may have to be implemented through the redevelopment process, and as a result, may require decades to complete. It is certainly also possible that, as new technological solutions or scientific knowledge is gained, some of the mitigation can be achieved through engineering manipulation of the existing structures.

This technical report is the foundation upon which the programs and policies in the Safety Element are based. In the end though, all mitigation is local. Without the support of the citizens of Hesperia, no governmental programs will be successful. It is hoped that this document will assist you in understanding the issues and the risks you and Hesperia face. Through such an understanding you will be ready to support and implement the programs necessary to reduce your community's risk to acceptable levels.

CHAPTER 1: SEISMIC HAZARDS

1.1 Introduction

In seismically active southern California, an earthquake has the potential to cause far-reaching loss of life or property, and economic damage. This is so because damaging earthquakes are relatively frequent, affect widespread areas, trigger many secondary effects, and can overwhelm the ability of local jurisdictions to respond. Earthquake-triggered geologic effects include ground shaking, surface fault rupture, landslides, liquefaction, subsidence, tsunamis and seiches. Some of these hazards can occur in the city of Hesperia, as discussed in detail below. Earthquakes can also lead to urban fires, reservoir failures, and toxic chemical releases. These man-related hazards are also discussed in this document.

Having said the above, recent earthquakes in or near urban environments in California have caused relatively few casualties. This is due both to luck and design. Earthquake researchers agree that recent earthquakes in California have not truly tested the performance of our built environment, and although newer buildings are generally safe, older structures have the potential to collapse or incur substantial structural damage. Shaking as a result of the M_W 7.1 Loma Prieta earthquake was surprisingly short for the size of the quake because the fault ruptured bilaterally, propagating both to the north and south at the same time. (M_W stands for moment magnitude, a measure of earthquake energy release, discussed below.) This, combined with the fact that traffic was uncommonly light because so many were watching the World Series limited the number of fatalities resulting from the collapse of a portion of the Nimitz Freeway in Oakland. The 1994, M_W 6.7 Northridge earthquake occurred before dawn, when most people were home safely in bed, and most of the energy released occurred away from the densely populated metropolitan area. Had this earthquake occurred later in the day, the collapse of the seven highway bridges alone would have resulted in a much higher death toll. Still, this moderate-sized event caused 54 deaths and nearly $30 billion in damage. These statistics give us pause when we realize that the southern California region is at risk from earthquakes that could release more than ten times the seismic energy of the Northridge earthquake.

It is therefore important to note that although it is not possible to prevent earthquakes, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning, public education, emergency exercises, enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake's effects and avoid disaster. The record shows that local government, emergency relief organizations, and residents can and must take action to develop and implement policies and programs to reduce the effects of earthquakes. Thus, this document not only discusses the potential hazards that can impact Hesperia, but also addresses effective action items and programs to help the City become more self-sufficient in the event of an earthquake.

1.2 Earthquake and Mitigation Basics

1.2.1 Definitions

The outer 10 to 70 kilometers of the Earth consist of enormous blocks of moving rock called tectonic plates. There are about a dozen major plates, which slowly collide, separate, and grind past each other. In the uppermost brittle portion of the plates, friction locks the plate edges together, while plastic movement continues at depth. Consequently,

the near-surface rocks bend and deform near plate boundaries, storing strain energy. Eventually, the frictional forces are overcome and the locked portions of the plates move. The stored strain energy is then released in seismic waves.

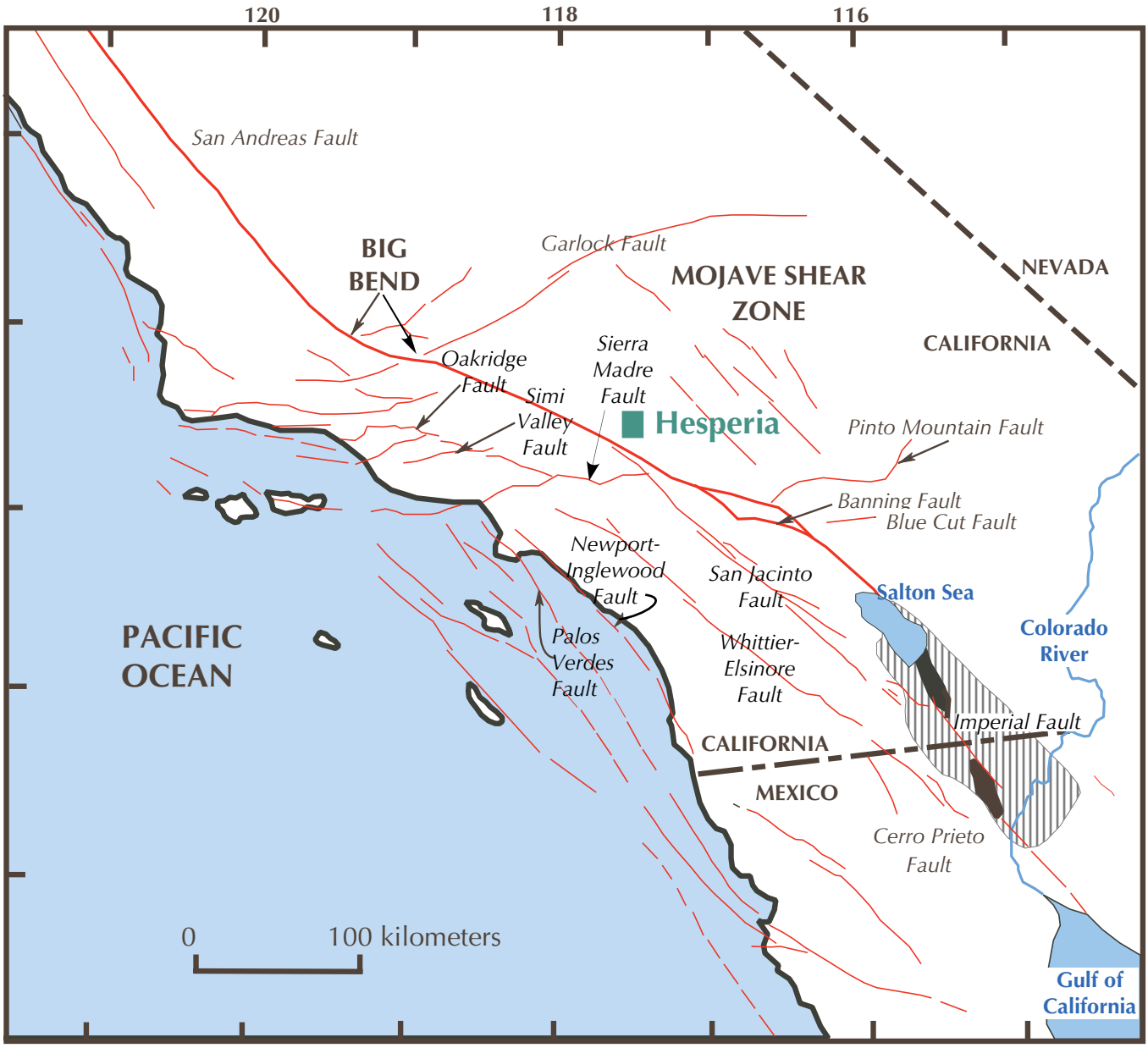
By definition, the break or fracture between moving blocks of rock is called a fault, and such differential movement produces a fault rupture. The point where the fault rupture originates is called the focus (or hypocenter). The released energy radiates out in all directions from the rupture surface causing the Earth to vibrate and shake as the waves travel through. This shaking is what we feel in an earthquake.

Although faults exist everywhere, most earthquakes occur on or near plate boundaries. Thus, southern California has many earthquakes, because it straddles the boundary between the North American and Pacific plates, and fault rupture accommodates their motion. Hesperia and most of eastern southern California are riding on the North American Plate, which is moving southeasterly (relative to the Pacific Plate), at about 50 mm/yr. This is about the rate at which fingernails grow, and seems unimpressive. However, it is enough to accumulate enormous amounts of strain energy over tens to thousands of years. Despite being locked in place most of the time, in another 15 million years (a short time in the context of the Earth's history), due to plate movements, downtown Los Angeles (which is on the Pacific Plate) will be hundreds of kilometers north of San Francisco (which like Hesperia, is mostly on the North American Plate).

Although the San Andreas fault marks the actual separation between the Pacific and North American plates, only about 70% of the plate motion actually occurs on this fault. The rest is distributed along other faults of the San Andreas system, including the San Jacinto, Whittier-Elsinore, Newport-Inglewood, Palos Verdes, and several offshore faults. To the east of the San Andreas fault, slip is distributed among faults of the Eastern Mojave Shear Zone, including those responsible for the 1992, M_W 7.3 Landers and 1999 M_W 7.1 Hector Mine earthquakes. Thus, the zone of plate-boundary earthquakes and ground deformation covers an area that stretches from Nevada to the Pacific Ocean (see Figure 1-1).

Because the Pacific and North American plates are sliding past each other, with relative motions to the northwest and southeast, respectively, all of the faults mentioned above trend northwest-southeast, and are strike-slip faults. On average, strike-slip faults are nearly vertical breaks in the rock, and when a strike-slip fault ruptures, the rocks on either side of the fault slide horizontally past each other.

However, there is a kink in the San Andreas fault commonly referred to as the "Big Bend," located about 140 miles northwest of Hesperia (Figure 1-1). Near the Big Bend, the two plates do not slide past each other. Instead, they collide, causing localized compression, which results in folding and thrust faulting. Thrust faults meet the surface of the Earth at a low angle, dipping 25 to 35 degrees from horizontal. Thrusts are a type of dip-slip fault where rocks on opposite sides of the fault move up or down relative to each other. When a thrust fault ruptures, the top block of rock moves up and over the rock on the opposite side of the fault.



Source: Modified from Fuis and Mooney, 1990

MAP EXPLANATION

- Fault
- Onshore Spreading Center
- New Crust (late Cenozoic)

Earth Consultants International

Project Number: 2617
Date: February 2010

Regional Fault Map

Figure 1-1

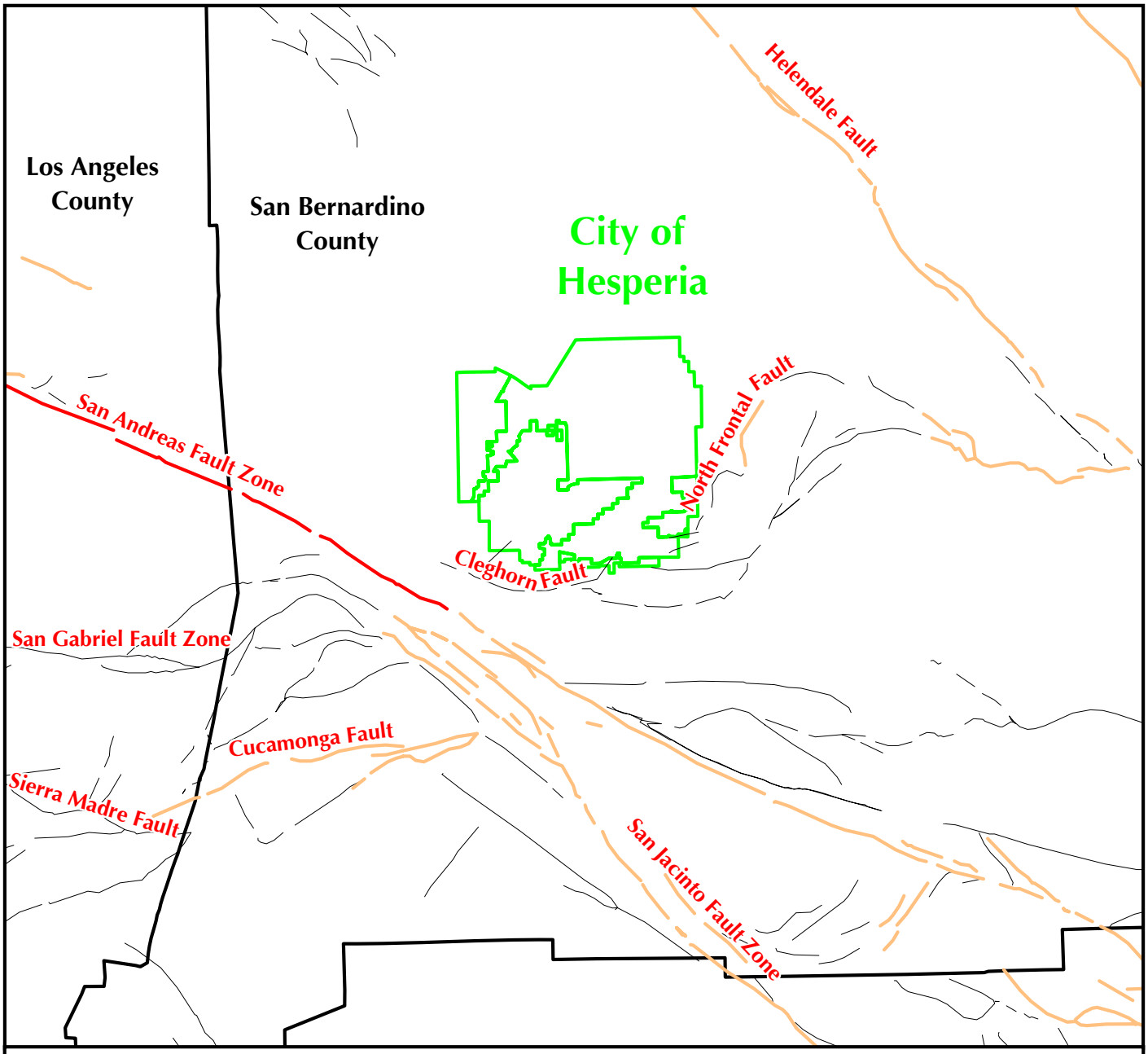
In southern California, ruptures along thrust faults have built the Transverse Ranges geologic province, a region with an east-west trend to its landforms and underlying geologic structures. This orientation is anomalous, virtually unique in the western United States, and is a direct consequence of the plates colliding at the Big Bend. Many of southern California's most recent damaging earthquakes have occurred on thrust faults that are uplifting the Transverse Ranges, including the 1971 San Fernando, the 1987 Whittier Narrows, the 1991 Sierra Madre, and the 1994 Northridge earthquakes.

Thrust faults can be particularly hazardous because many are "blind" thrust faults; that is, they do not extend to the surface of the Earth, and are therefore extremely difficult to detect before they rupture. Some of the latest earthquakes in southern California, including the 1987 Whittier Narrows earthquake and the 1994 Northridge earthquake, occurred on previously unknown blind thrust faults.

The city of Hesperia is located near the boundary between the North American and Pacific plates (on the North American side) and as a result, near the boundary of two very distinct geomorphic provinces. Specifically, the southern edge of the study area encroaches onto the Transverse Ranges Province, a region characterized by an east-west trend of its major ranges and faults. These ranges, which include the San Bernardino and San Gabriel Mountains, are "transverse" to the more common northwest-southeast trend characteristic of a large part of the southern California landscape, as defined by the San Andreas fault. North of the mountains, the greater part of Hesperia lies within the Mojave Desert Province, an arid region of alluvial fans, desert plains, dry lakebeds, and scattered mountain ranges. The east-west Garlock fault defines the northern boundary of this province, whereas the San Andreas fault defines its western boundary. Hesperia is near several seismically active earthquakes sources, including the San Andreas, North Frontal Fault, Cleghorn, Cucamonga, Helendale, and San Jacinto faults (see Figure 1-2). Of these, the San Andreas, Helendale and San Jacinto faults are predominantly right-lateral strike-slip, the North Frontal and Cucamonga faults are oblique-slip faults (thrust faults with some strike-slip component of movement), and the Cleghorn fault is a left-lateral strike-slip fault with a slightly normal component. Each of these faults, plus other regional seismic sources, will be discussed in more detail in Section 1.5.

1.2.2 Evaluating Earthquake Hazard Potential

When comparing the sizes of earthquakes, the most meaningful feature is the amount of energy released. Thus scientists most often consider seismic moment, a measure of the energy released when a fault ruptures. We are more familiar, however, with scales of magnitude, which measure amplitude of ground motion. Magnitude scales are logarithmic. Each one-point increase in magnitude represents a ten-fold increase in amplitude of the waves as measured at a specific location, and a 32-fold increase in energy. That is, a magnitude 7 earthquake produces 100 times (10 x 10) the ground motion amplitude of a magnitude 5 earthquake. Similarly, a magnitude 7 earthquake releases approximately 1,000 times more energy (32 x 32) than a magnitude 5 earthquake. Recently, scientists have developed the moment magnitude (M_w) scale to relate energy release to magnitude.



Modified from: Jennings, 1994.

Explanation

Fault Showing Evidence of Historic Rupture (Active).

Fault Showing Evidence of Holocene Rupture (Active).

Fault Showing Evidence of Quaternary and Late Quaternary Rupture (Potentially Active).

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Project Number: 2617
Date: February 2010

Local Active and Potentially Active Faults

Figure 1-2

An early measure of earthquake size still used today is the seismic intensity scale, which is a qualitative assessment of an earthquake's effects at a given location. Although it has limited scientific application, intensity is still widely used because it is intuitively clear and quick to determine. The most commonly used measure of seismic intensity is called the Modified Mercalli Intensity (MMI) scale, which has 12 damage levels (Table 1-1).

A given earthquake will have one moment and, in principle, one magnitude, although there are several methods of calculating magnitude, which give slightly different results. However, one earthquake will produce many levels of intensity because intensity effects vary with the location and the perceptions of the observer.

Few faults are simple, planar breaks in the Earth. They more often consist of smaller strands, with a similar orientation and sense of movement. A strand is mappable as a single, fairly continuous feature at a scale of about 1:24,000 (1 inch on paper represents 2,000 feet on the ground). Sometimes geologists group strands into segments, which are believed capable of rupturing together during a single earthquake. The more extensive the fault, the bigger the earthquake it can produce. Therefore, multi-strand fault ruptures produce larger earthquakes.

The bigger and closer the earthquake, the greater the damage it may generate. Thus fault dimensions and proximity are key parameters in any hazard assessment. In addition, it is important to know a fault's style of movement (i.e., is it dip-slip or strike-slip, discussed above), the age of its most recent activity, its total displacement, and its slip rate (all discussed below). These values allow an estimation of how often a fault produces damaging earthquakes, and how big an earthquake should be expected the next time the fault ruptures.

Total displacement is the length, measured in kilometers (km), of the total movement that has occurred along the fault over as long a time as the geologic record reveals. It is usually estimated by measuring distances between geologic features that have been split apart and separated (offset) by the cumulative movement of the fault over many earthquakes. Slip rate is a speed, expressed in millimeters per year (mm/yr). Slip rate is estimated by measuring an amount of offset accrued during a known amount of time, obtained by dating the ages of geologic features. Slip rate data also are used to estimate a fault's earthquake recurrence interval. Sometimes referred to as "repeat time" or "return interval", the recurrence interval represents the average amount of time that elapses between major earthquakes on a fault. The most specific way to derive the recurrence interval for a given fault is to excavate a trench across the fault to obtain paleoseismic evidence of earthquakes that have occurred during prehistoric time.

Paleoseismic studies show that faults with higher slip rates often have shorter recurrence intervals between major earthquakes. This makes sense because a high slip rate indicates rocks that, at depth, are moving relatively quickly. Thus the locked, surficial rocks are storing more strain energy, so the forces of friction will be exceeded more often, releasing the strain energy in more frequent, large earthquakes.

Table 1-1: Abridged Modified Mercalli Intensity Scale

Intensity Value and Description		Average Peak Velocity (cm/sec)	Average Peak Acceleration (g = gravity)
I.	Not felt except by a very few under especially favorable circumstances (I Rossi-Forel scale). Damage potential: None.	<0.1	<0.0017
II.	Felt only by a few persons at rest, especially on upper floors of high-rise buildings. Delicately suspended objects may swing. (I to II Rossi-Forel scale). Damage potential: None.	0.1 – 1.1	0.0017 – 0.014
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel scale). Damage potential: None.		
IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like a heavy truck striking building. Standing automobiles rocked noticeably. (IV to V Rossi-Forel scale). Damage potential: None. Perceived shaking: Light.	1.1 – 3.4	0.014 - 0.039
V.	Felt by nearly everyone; many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel scale). Damage potential: Very light. Perceived shaking: Moderate.	3.4 – 8.1	0.039-0.092
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved, few instances of fallen plaster and damaged chimneys. Damage slight. (VI to VII Rossi-Forel scale). Damage potential: Light. Perceived shaking: Strong.	8.1 - 16	0.092 -0.18
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (VIII Rossi-Forel scale). Damage potential: Moderate. Perceived shaking: Very strong.	16 - 31	0.18 - 0.34
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (VIII+ to IX Rossi-Forel scale). Damage potential: Moderate to heavy. Perceived shaking: Severe.	31 - 60	0.34 - 0.65
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel scale). Damage potential: Heavy. Perceived shaking: Violent.	60 - 116	0.65 – 1.24
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. (X Rossi-Forel scale). Damage potential: Very heavy. Perceived shaking: Extreme.	> 116	> 1.24
XI.	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		
XII.	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into air.		

Modified from Bolt (1999); Wald et al. (1999)

Faults have formed over millions of years, usually in response to regional stresses. Shifts in these stress regimes do occur over millennia. As a result, some faults change in character. For example, a thrust fault in a compressional environment may become a strike-slip fault in a transpressive (oblique compressional) environment. Other faults may be abandoned altogether. Consequently, the State of California, under the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Hart and Bryant, 1999), classifies faults according to the following criteria:

- ***Active***: faults showing proven displacement of the ground surface within about the past 11,000 years (within the Holocene Epoch), that are thought capable of producing earthquakes;

- ***Potentially Active***: faults showing evidence of movement within the past 1.6 million years, but that have not been shown conclusively whether or not they have moved in the past 11,000 years; and

- ***Not active***: faults that have conclusively NOT moved in the past 11,000 years.

The Alquist-Priolo classification is used primarily for residential subdivisions. Different definitions of activity are used by other agencies or organizations depending on the type of facility being planned or developed. For example, longer periods of inactivity may be required for dams or nuclear power plants. An important subset of active faults are those with historical earthquakes. In California, that means faults that have ruptured since 1769, when the Spanish first arrived and settled in the area.

The underlying assumption in this classification system is that if a fault has not ruptured in the past 11,000 years, it is not likely to be the source of a damaging earthquake in the future. In reality, however, most potentially active faults have been insufficiently studied to determine their hazard level. Also, although simple in theory, the evidence necessary to determine whether a fault has or has not moved during the past 11,000 years can be difficult to obtain. For example, some faults leave no discernable evidence of their earthquakes, while other faults stop rupturing for millennia, and then are "reactivated" as the tectonic environment changes.

1.2.3 Causes of Earthquake Damage

Causes of earthquake damage can be categorized into three general areas: strong shaking, various types of ground failure that are a result of shaking, and ground displacement along the rupturing fault. The State definition of an active fault is designed to gauge the surface rupture potential of a fault, and is used to prevent development from being sited directly on an active fault. This helps to reduce damage from the third category. Below, the three categories are discussed in order of their likelihood to occur extensively:

1) Strong ground shaking causes the vast majority of earthquake damage. Horizontal ground acceleration is frequently responsible for widespread damage to structures, so it is commonly estimated as a percentage of g, the acceleration of gravity. Full characterization of shaking potential, though, requires estimates of peak (maximum) ground displacement and velocity, the duration of strong shaking, and the periods (lengths) of waves that will control each of these factors at a given location. We look

to the recorded effects of damaging earthquakes worldwide to understand what might happen in similar environments here in the future. In general, the degree of shaking can depend upon:

- Source effects. These include earthquake size, location, and distance, as discussed above. In addition, the exact way that rocks move along the fault can influence shaking. For example, the 1995, M_W 6.9 Kobe, Japan earthquake was not much bigger than the 1994, M_W 6.7 Northridge, California earthquake, but the city of Kobe suffered much worse damage. During the Kobe earthquake, the fault's orientation and movement directed seismic waves into the city. During the Northridge earthquake, the fault's motion directed waves away from populous areas.

- Path effects. Seismic waves change direction as they travel through the Earth's contrasting layers, just as light bounces (reflects) and bends (refracts) as it moves from air to water. Sometimes seismic energy gets focused into one location and causes damage in unexpected areas. Focusing of 1989's M_W 7.1 Loma Prieta earthquake waves caused damage in San Francisco's Marina district, some 62 miles (100 km) distant from the rupturing fault.

- Site effects. Seismic waves slow down in the loose sediments and weathered rock at the Earth's surface. As they slow, their energy converts from speed to amplitude, which heightens shaking. This is like the behavior of ocean waves – as the waves slow down near shore, their crests grow higher. The Marina District of San Francisco also serves as an example of site effects. Earthquake motions were greatly amplified in the deep, sediment-filled basin underlying the District compared to the surrounding bedrock areas. Seismic waves can get trapped at the surface and reverberate (resonate). Whether resonance will occur depends on the period (the length) of the incoming waves. Waves, soils and buildings all have resonant periods. When these coincide, tremendous damage can occur.

We keep talking about periods. What do we mean? Waves repeat their motions with varying frequencies. Slow-to-repeat waves are called long-period waves. Quick-to-repeat waves are called short-period waves. Long-period seismic waves, which are created by large earthquakes, are most likely to reverberate and cause damage in long-period structures, like bridges and high-rises. ("Long-period structures" are those that respond to long-period waves.) Shorter-period seismic waves, which tend to die out quickly, will most often cause damage fairly near the fault, and they will cause most damage to shorter-period structures such as one- to three-story buildings. Very short-period waves are most likely to cause near-fault, interior damage, such as to equipment.

2) Liquefaction and slope failure are very destructive secondary effects of strong seismic shaking.

- Liquefaction typically occurs within the upper 50 feet of the surface, when saturated, loose, fine- to medium-grained soils (sand and silt) are present. Earthquake shaking suddenly increases pressure in the water that fills the pores

between soil grains, causing the soil to lose strength and behave as a liquid. This process can be observed at the beach by standing on the wet sand near the surf zone. Standing still, the sand will support your weight. However, when you tap the sand with your feet, water comes to the surface, the sand liquefies, and your feet sink.

When soils liquefy, the structures built on them can sink, tilt, and suffer significant structural damage. Liquefaction-related effects include loss of bearing strength, ground oscillations, lateral spreading and flow failures or slumping. The excess water pressure is relieved by the ejection of material upward through fissures and cracks. A water-soil slurry bubbles onto the ground surface, resulting in features called "sand boils", "sand blows" or "sand volcanoes." Site-specific geotechnical studies are the only practical, reliable way to determine the liquefaction potential of a site.

- Landslides and Rockfall (Mass Wasting). Gravity inexorably pulls hillsides down and earthquake shaking enhances this on-going process. Slope stability depends on many factors and their interrelationships. Rock type and pore water pressure are arguably the most important factors, as well as slope steepness due to natural or human-made undercutting. Where slopes have failed before, they may fail again. Thus, it is essential to map existing landslides and soil slumps. Furthermore, because there are predictable relationships between local geology and the likelihood that mass wasting will occur, field investigations can be used to identify failure-prone slopes before an earthquake occurs. Combined with analyses of slope gradient, land use, and bedrock or soil materials, this information can be used to identify high-risk areas where mitigation measures would be most effective.

3) Primary ground rupture due to fault movement typically results in a relatively small percentage of the total damage in an earthquake, yet being too close to a rupturing fault can result in extensive damage. It is difficult to safely reduce the effects of this hazard through building and foundation design. Therefore, the primary mitigation measure is to avoid active faults by setting structures back from the fault zone. Application of this measure is subject to requirements of the Alquist-Priolo Earthquake Fault Zoning Act and guidelines prepared by the California Geological Survey – previously known as the California Division of Mines and Geology (CDMG Note 49). The final approval of a fault setback lies with the local reviewing agency.

Earthquake damage also depends on the characteristics of human-made structures. The interaction of ground motion with the built environment is complex. Governing factors include a structure's height, construction, and stiffness, which determine the structure's resonant period; the underlying soil's strength and resonant period; and the periods of the incoming seismic waves. Other factors include architectural design, condition, and age of the structure.

1.2.4 Choosing Earthquakes for Planning and Design

It is often useful to create a deterministic or design earthquake scenario to study the effects of a particular earthquake on a building or a community. Often, such scenarios consider the largest earthquake that is believed possible to occur on a fault or fault segment, referred

to as the maximum magnitude earthquake (M_{max}). Other scenarios that have been used considered the Maximum Probable Earthquake (M_{PE}) or Design Basis Earthquake (DBE) (1997 Uniform Building Code – UBC; 2001 California Building Code - CBC). The DBE is defined as the earthquake with a statistical return period of 475 years (with ground motion that has a 10% probability of being exceeded in 50 years). The 2001 edition of the California Building Code (California Building Standards Commission - CBSC, 2001) used for public schools, hospitals, and other critical facilities the Upper Bound Earthquake (UBE), which has a statistical return period of 949 years and a ground motion with a 10% probability of being exceeded in 100 years. Seismic design parameters in the most recent version of the California Building Code (2007 edition) are based on the Maximum Considered Earthquake (MCE), with a ground motion that has a 2% probability of being exceeded in 50 years and a recurrence interval of about 2,500 years. [Seismic design parameters define what kinds of earthquake effects a structure must be able to withstand. These include peak ground acceleration, duration of strong shaking, and the periods of incoming strong motion waves.] As the descriptions above suggest, building codes have selected different earthquake scenario depending on the application, such as the planned use, lifetime or importance of a facility. Traditionally, the more critical the structure, the longer the time period used between earthquakes and the larger the design earthquake that has been used.

Geologists, seismologists, engineers, emergency response personnel and urban planners typically use maximum magnitude and maximum probable earthquakes to evaluate seismic hazard. The assumption is that if we plan for the worst-case scenario, we establish safety margins. Then smaller earthquakes that are more likely to occur can be dealt with effectively.

As is true for most earthquake-prone regions, many potential earthquake sources pose a threat to Hesperia. Thus, it is also important to consider the overall likelihood of damage from a plausible suite of earthquakes. This approach is called probabilistic seismic hazard analysis (PSHA), and typically considers the likelihood of exceeding a certain level of damaging ground motion that could be produced by any or all faults within a 62-mile (100-km) radius of the project site, or in this case, the city. PSHA has been utilized by the U.S. Geological Survey to produce national seismic hazard maps such as those used by the Uniform Building Code (ICBO, 1997), the International Building Code (ICC, 2006) and the California Building Code (CBSC, 2007).

Regardless of which fault causes a damaging earthquake, there will always be aftershocks. By definition, these are smaller earthquakes that happen close to the mainshock (the biggest earthquake of the sequence) in time and space. These smaller earthquakes occur as the Earth adjusts to the regional stress changes created by the mainshock. As the size of the mainshock increases, there typically is a corresponding increase in the number of aftershocks, the size of the aftershocks, and the size of the area in which they might occur.

On average, the largest aftershock will be 1.2 magnitude units less than the mainshock. Thus, a M_W 6.9 earthquake will tend to produce aftershocks up to M_W 5.7 in size. This is an average, and there are many cases where the biggest aftershock is larger than the average predicts. The key point is this: any major earthquake will produce aftershocks large enough to cause additional damage, especially to already-weakened structures.

Consequently, post-disaster response planning must take damaging aftershocks into account.

1.3 Laws To Mitigate Earthquake Hazard

1.3.1 Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Special Studies Zones Act was signed into law in 1972 (in 1994 it was renamed the Alquist-Priolo Earthquake Fault Zoning Act). The primary purpose of the Act is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault (Hart and Bryant, 1999). This State law was passed in direct response to the 1971 San Fernando earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings and other structures. Surface rupture is the most easily avoided seismic hazard.

The Act requires the State Geologist (Chief of the California Geological Survey) to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." These faults show evidence of Holocene surface displacement along one or more or their segments (sufficiently active) and are clearly detectable by a trained geologist as a physical feature at or just below the ground surface (well defined). The boundary of an "Earthquake Fault Zone" is generally about 500 feet from major active faults, and 200 to 300 feet from well-defined minor faults. The Act dictates that cities and counties withhold development permits for sites within an Earthquake Fault Zone until geologic investigations demonstrate that the sites are not threatened by surface displacements from future faulting (Hart and Bryant, 1999).

Alquist-Priolo maps are distributed to all affected cities and counties for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. State law exempts single-family wood-frame and steel-frame dwellings that are less than three stories and are not part of a development of four units or more. However, local agencies can be more restrictive than State law requires. There are currently no Alquist-Priolo Earthquake Fault Zones mapped within Hesperia's city limits. The closest Alquist-Priolo Earthquake Fault Zones to Hesperia include that on the North Frontal fault less than 2 miles to the east, and the San Andreas fault to the south (see Plate 1-2). Other faults closer to the city that have not been zoned are associated with the Cleghorn fault zone. Of these, a few fault traces have been mapped just inside the city's southern and eastern boundaries. Another fault trace has been mapped near the city's western boundary, and within its Sphere of Influence (see Plate 1-2). The recency of activity of these faults, and their future surface fault rupture hazard potential are discussed further in Section 1.6.1 below.

1.3.2 Seismic Hazards Mapping Act

The Alquist-Priolo Earthquake Fault Zoning Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. Recognizing this, in 1990, the State passed the Seismic Hazards Mapping Act (SHMA), which addresses non-surface fault rupture earthquake hazards, including strong ground shaking, liquefaction and seismically induced landslides. The California Geological Survey (CGS) is the principal State agency charged with implementing the Act. Pursuant to the SHMA, the CGS is

directed to provide local governments with seismic hazard zone maps that identify areas susceptible to liquefaction, and earthquake-induced landslides and other ground failures. The goal is to minimize loss of life and property by identifying and mitigating seismic hazards. The seismic hazard zones delineated by the CGS are referred to as "zones of required investigation." Site-specific geological hazard investigations are required by the SHMA when construction projects fall within these areas.

The CGS, pursuant to the 1990 SHMA, has been releasing seismic hazards maps since 1997, with emphasis on the large metropolitan areas of Los Angeles, Orange and Ventura counties (funding for this program limits the geographic scope of this studies to these three counties in southern California). As a result, at this time, there are no State-issued (and therefore official) seismic hazard zone maps for the city of Hesperia. Nevertheless, the methodology that the CGS uses to prepare these maps is well documented, and can be duplicated in areas that the CGS has yet to map. To that end, and for the purposes of this study, we have followed a simplified version of the CGS methodology to identify areas in the city of Hesperia that are susceptible to liquefaction. The methodology used and the resulting analysis of liquefaction susceptibility in the city of Hesperia are described in more detail in Section 1.7.1.

1.3.3 Real Estate Disclosure Requirements

Since June 1, 1998, the Natural Hazards Disclosure Act has required that sellers of real property and their agents provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property being sold lies within one or more State-mapped hazard areas. If a property is located in a Seismic Hazard Zone as shown on a map issued by the State Geologist, the seller or the seller's agent must disclose this fact to potential buyers. The law specifies two ways in which this disclosure can be made. One is to use the Natural Hazards Disclosure Statement as provided in Section 1102.6c of the California Civil Code. The other way is to use the Local Option Real Estate Disclosure Statement as provided in Section 1102.6a of the California Civil Code. The Local Option Real Estate Disclosure Statement can be substituted for the Natural Hazards Disclosure Statement only if the Local Option Statement contains substantially the same information and substantially the same warning as the Natural Hazards Disclosure Statement.

California State law also requires that when houses built before 1960 are sold, the seller must give the buyer a completed earthquake hazards disclosure report, and a copy of the booklet entitled "The Homeowner's Guide to Earthquake Safety." This publication was written and adopted by the California Seismic Safety Commission. The most recent edition of this booklet is available from the web at www.seismic.ca.gov/. The booklet contains a sample of a residential earthquake hazards report that buyers are required to fill in, and it provides specific information on common structural weaknesses that can fail, damaging homes during earthquakes. The booklet further describes specific actions that can be taken by homeowners to strengthen their homes.

The Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act also require that real estate agents, or sellers of real estate acting without an agent, disclose to prospective buyers that the property is located in an Earthquake Fault or Seismic Hazard Zone. There are currently no official Alquist-Priolo or Seismic Hazard maps for Hesperia, but areas of the city impacted by natural hazards, as described in this document, should be

disclosed to prospective buyers, following the provisions of the Natural Hazards Disclosure Act.

1.3.4 California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970 to insure that local governmental agencies consider and review the environmental impacts of development projects within their jurisdictions. CEQA requires that an Environmental Impact Report (EIR) be prepared for projects that may have significant effects on the environment. EIRs are required to identify geologic and seismic hazards, and to recommend potential mitigation measures, thus giving the local agency the authority to regulate private development projects in the early stages of planning. These documents are by law issued in draft form and made available at local libraries and City Hall for individuals and organizations to review and comment on. The comments are addressed in the final report submitted for approval or refusal by the Planning Commission and/or City Council.

1.3.5 Uniform Building Code and California Building Code

The International Conference of Building Officials (ICBO) was formed in 1922 to develop a uniform set of building regulations; this led to the publication of the first Uniform Building Code (UBC) in 1927. In keeping with the intent of providing a safe building environment, building codes were updated on a fairly regular basis, but adoption of these updates at the county- and city-level was not mandatory. As a result, the building codes used from one community to the next were often not the same. Then in 1980, recognizing that many building code provisions are not affected by local conditions, like exiting from a building, and to facilitate the concept that industries working in California should have some uniformity in building code provisions throughout the State, the legislature amended the State's Health and Safety Code to require local jurisdictions to adopt, as a minimum, the latest edition of the Uniform Building Code (UBC). The law states that every local agency, such as individual cities and counties, enforcing building regulations must adopt the provisions of the California Building Code (CBC) within 180 days of its publication; although each jurisdiction can require more stringent regulations, issued as amendments to the CBC. The publication date of the CBC is established by the California Building Standards Commission and the code is known as Title 24 of the California Code of Regulations. Based upon the publication cycle of the UBC, the CBC used to be updated and republished every three years since the initial action by the legislature.

Then, in 1994, to further the concept of uniformity in building design, the ICBO joined with the two other national building code publishers, the Building Officials and Code Administrators International, Inc. (BOCA) and the Southern Building Code Congress International, Inc. (SBCCI), to form a single organization, the International Code Council, (ICC). In the year 2000, the group published the first International Building Code (IBC) as well as an entire family of codes, (i.e. building, mechanical, plumbing and fire) that were coordinated with each other. As a result, the last (and final) version of the UBC was issued in 1997. After the formation of the ICC and the publication of the IBC, the California legislature did not address the matter of updating the CBC with a building code other than the UBC. In fact, the California Building Standards Commission, after careful review of the 2000 IBC, chose not to use the IBC, but instead continued to adopt the old 1997 UBC for the CBC. The 2001 CBC (based on the 1997 UBC) was used throughout the State from

2001 to 2007, often with local, more restrictive amendments based upon local geographic, topographic or climatic conditions.

In 2003, California considered adopting the National Fire Protection Association (NFPA) 5000 building code as the State's next building code. Specifically, on July 29, 2003, the California Building Standards Commission recommended adoption of the NFPA 5000 code as the basis for California's next building code. However, state agencies that reviewed the proposed building code found it to be incomplete, requiring the adoption of substantial amendments, many transcribed directly from the 1997 CBC, to bring it to the level provided by the 2001 CBC. For this and other reasons, including the cost of developing the amendments and training state, county and city officials responsible for the enforcement of the code, on March 8, 2005, the Coordinating Council of the California Building Standards Commission recommended rescission of the 2003 decision to adopt the NFPA 5000, and instead recommended adoption of the latest International Building Code (IBC) as the basis for the next CBC. Thus, the California Building Standards Commission (BSC) reviewed the 2006 IBC, and using the IBC as a basis, prepared the 2007 edition of the CBC. This latest building code became available to the public on July 1, 2007, and became effective on January 1, 2008. [The 2010 California Building Code will become available later this year, and should become effective on January 2011. For more recent information regarding the latest building code, refer to the California Building Standards Commission website at www.bsc.ca.gov/].

It should be emphasized that the building codes provide minimum requirements. In some cases these requirements may not be adequate, particularly in the areas of faulting and seismology, where the pool of knowledge is rapidly growing and evolving. Consequently, it is important that geotechnical consultants working in the city, as well as reviewers of their work, keep up to date on current research.

1.3.6 Unreinforced Masonry Law

Enacted in 1986, the Unreinforced Masonry Law (Section 8875 et seq. of the California Government Code) required all cities and counties in Seismic Zone 4 (zones near historically active faults, per the building code at the time) to identify potentially hazardous unreinforced masonry (URM) buildings in their jurisdictions, establish a URM loss reduction program, and report their progress to the State by 1990. The owners of such buildings were to be notified of the potential earthquake hazard these buildings pose. Some jurisdictions did implement mandatory retrofit programs, while others established voluntary programs. A few cities only notified the building owners, but did not adopt any type of strengthening program. Since 1997, California has required all jurisdictions to enforce the 1997 Uniform Code for Building Conservation (UCBC) Appendix Chapter 1 as the model building code, although local governments may adopt amendments to that code under certain circumstances (ICBC, 2001; SSC, 2006). The UCBC standards are meant to significantly reduce but not necessarily eliminate the risk to life from collapse of the structure. Prior to 1997, local governments could adopt other building standards that preceded the UCBC, and in fact, in many jurisdictions, retrofits were conducted in accordance with local ordinances that may only partially comply with the latest UCBC. The 2007 California Building Code (CBC) includes building standards for historical buildings (2007 California Historical Building Code, Part 8 of Title 24), and building

standards for existing buildings (2007 California Existing Building Code, Part 10 of Title 24, based on the 2006 International Existing Building Code).

The Hesperia area is located near historically active faults. Therefore, and in compliance with the Unreinforced Masonry Law, the City inventoried the URMs in its jurisdiction. In the year 2003, Hesperia reported to the Seismic Safety Commission that only one URM building (the old school house) has been identified in the city, and that this building is of historical significance but has not been officially designated as such. The owner of this building has been notified of the hazards associated with this type of construction, and the need to mitigate the URM to be at least in compliance with the State Historical Building Code. According to the 2003 report by the Seismic Safety Commission, Hesperia was considering the implementation of a Historical Structure/Site Ordinance. Ordinance 77, Historic Structure/Site Ordinance has since been adopted (Dave Reno, Principal Planner, Cit of Hesperia, personal communication, November 12, 2009). This ordinance establishes the procedure by which a structure of historical significance would be retrofitted. Since the old school house, however, has not been officially designated a historical structure by City Council, Ordinance 77 at this time does not apply to this building.

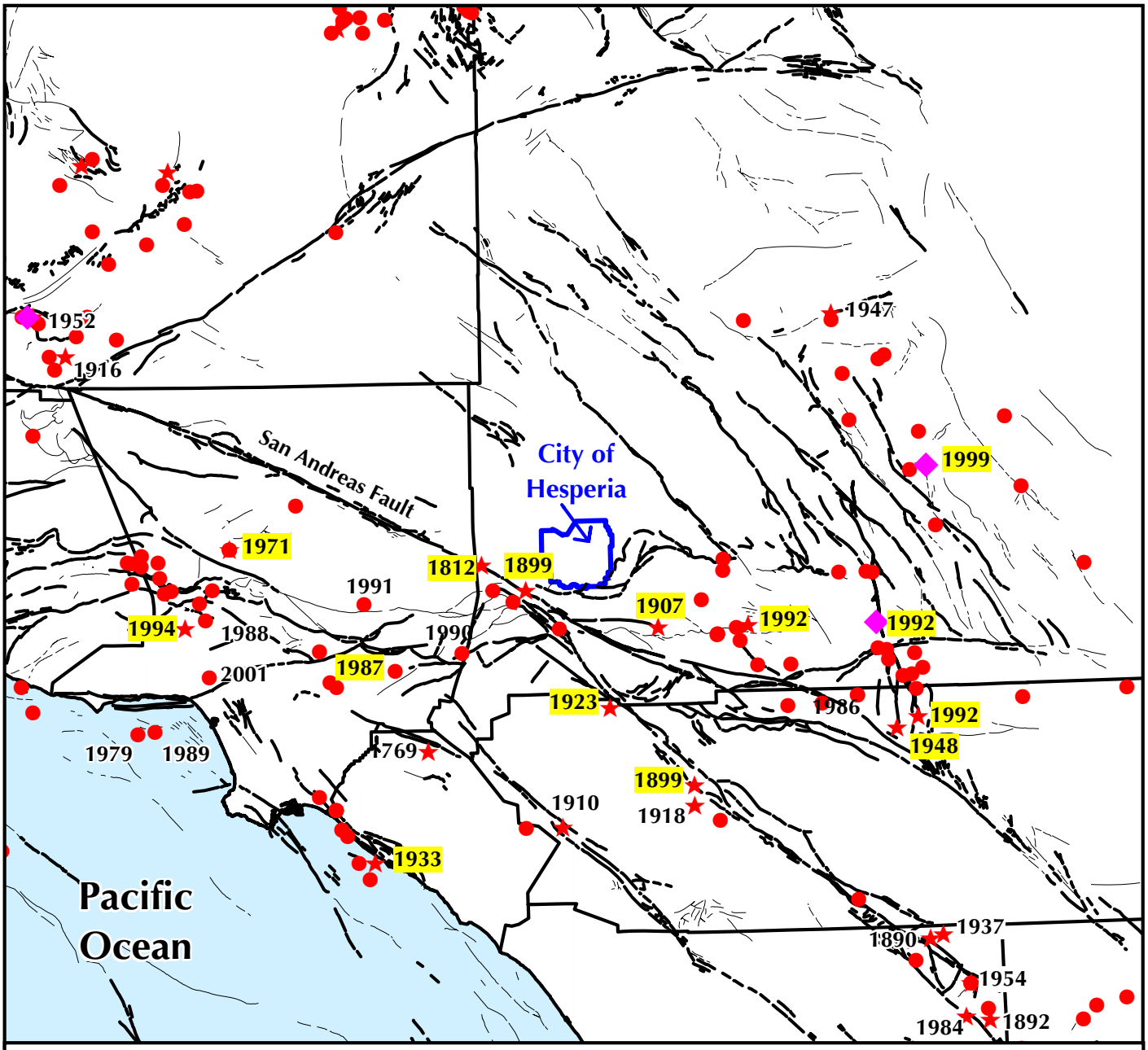
1.4 Notable Earthquakes in the Hesperia Area

Figure 1-3 shows the approximate epicenters of some of the earthquakes that have resulted in significant ground shaking in the southern California area, including Hesperia, since before the 1800s. The most significant of these events are described below. Plate 1-1 shows the approximate epicentral locations of earthquakes in and around the city instrumentally detected between 1932 and 2006. Earlier earthquakes are not shown since prior to 1932 there were no instruments available to measure the location and magnitude of an earthquake. The map shows that only a few small earthquakes have been reported in Hesperia with most seismic activity in the area occurring to the south, most likely associated with the Cleghorn fault and the San Andreas fault zones.

1.4.1 Wrightwood Earthquake of December 8, 1812

This large earthquake occurred on December 8, 1812 and was felt throughout southern California. Based on accounts of damage recorded at missions in the earthquake-affected area, an estimated magnitude of 7.5 has been calculated for the event (Toppozada et al., 1981). Subsurface investigations and tree ring studies show that the earthquake likely ruptured the Mojave section of the San Andreas fault near Wrightwood, and may have been accompanied by a significant surface rupture between Cajon Pass and Tejon Pass (Jacoby, Sheppard and Sieh, 1988). The worst reported damage caused by the earthquake occurred significantly west of the San Andreas fault at San Juan Capistrano Mission, where the roof of the church collapsed, killing 40 people. The earthquake also damaged walls and destroyed statues at San Gabriel Mission and damaged missions in the Santa Barbara area. Strong aftershocks caused earthquake-damaged buildings to collapse for several days after the mainshock.

This earthquake would have been felt strongly in the Hesperia area, with peak ground accelerations estimated at about 0.16g to 0.2g.



Source: Jennings, 1994; SCEC earthquake catalog; NEIC earthquake catalog

N
W E
S

0 20
Miles

Explanation

- Magnitude 7+
- Magnitude 6 - 7
- Magnitude 5 - 6
- Quaternary faults
- 1899 Earthquakes discussed further in the text

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Date: February 2010

Regional Seismicity Map

Figure 1-3

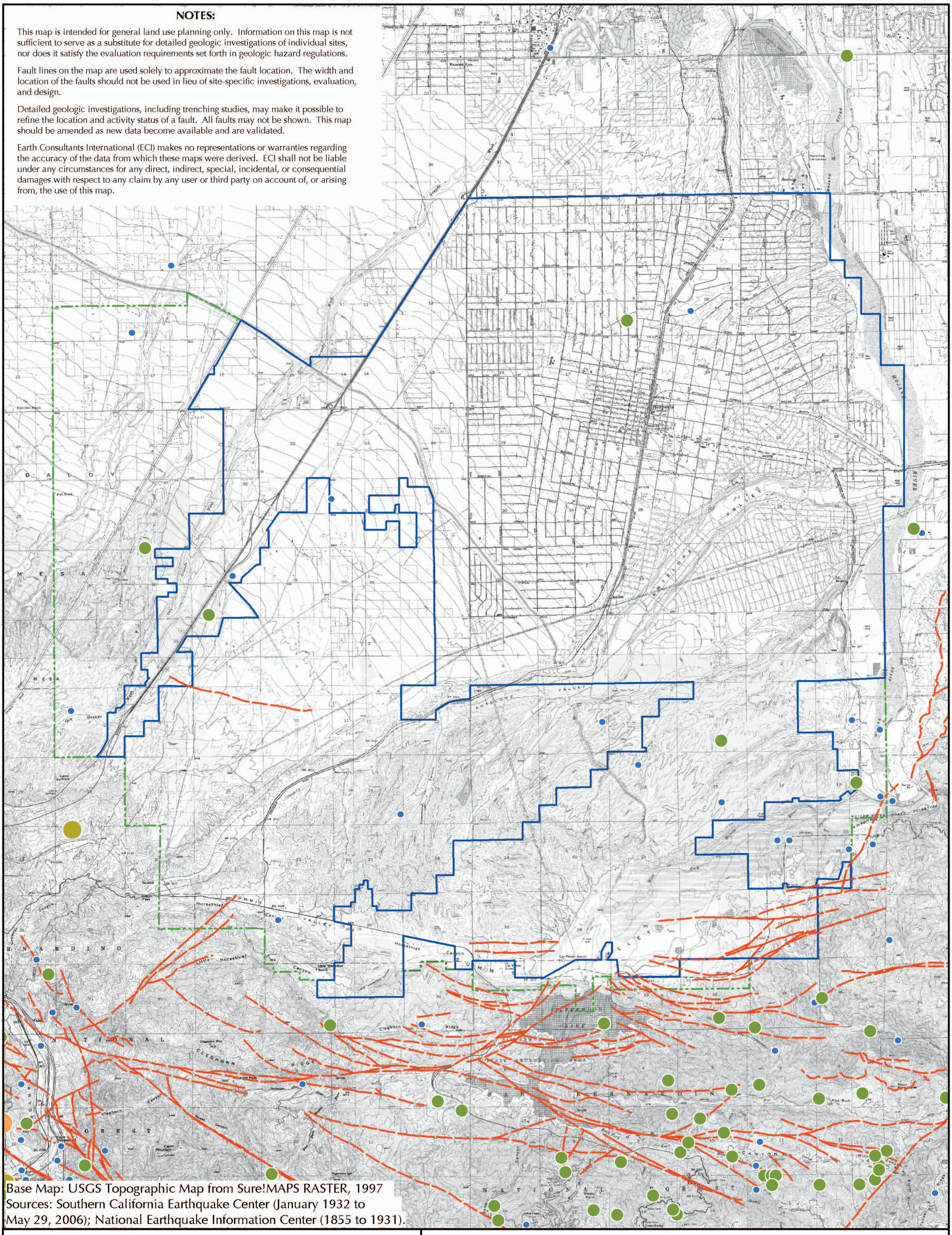
NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Fault lines on the map are used solely to approximate the fault location. The width and location of the faults should not be used in lieu of site-specific investigations, evaluation, and design.

Detailed geologic investigations, including trenching studies, may make it possible to refine the location and activity status of a fault. All faults may not be shown. This map should be amended as new data become available and are validated.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.



N

W E

S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

Earthquake Magnitude

- 5 to 6
- 4 to 5
- 3 to 4
- 2 to 3
- <2

Fault or lineament, solid where location known, dashed where approximate, dotted where inferred (for more information refer to Plate 1-2)

Hesperia City Limit

Hesperia Sphere of Influence

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Date: February 2010

Historical Seismicity Map (1932-2006)

Hesperia, California

Plate 1-1

1.4.2 Unnamed Earthquake of 1855

This earthquake occurred on July 11, 1855 and was felt across southern California from Santa Barbara to San Bernardino. Light to moderate damage was reported in the Los Angeles area, where 26 houses experienced cracked walls and the bell tower of the San Gabriel Mission was knocked down (www.sfmuseum.org/alm/quakeso.html). Because damage was limited primarily to the Los Angeles area, this earthquake is thought to have occurred on a local fault such as the Hollywood-Raymond, Whittier or Newport-Inglewood faults, or on one of the many blind thrust faults that underlie the area.

1.4.3 Cajon Pass Earthquake of 1899

This earthquake occurred on July 22, 1899 at 12:32 P.M., Pacific Standard Time (PST). The epicenter of this earthquake was roughly located 15 miles northwest of San Bernardino, and about 13 miles from Hesperia (see Figure 1-3). The earthquake is thought to have had a local magnitude (M_L) of between 5.7 and 6.5, although these are estimates only, as there were no instruments to measure the size of an earthquake at that time. The tremor was reportedly felt throughout southern California, with some areas in the Lytle Creek and Cajon Pass reporting intensities as high as VIII or IX in the Rossi Intensity Scale (Rossi-Forel equivalents to the Modified Mercalli intensity scale are shown on Table 1-1). Given its location, the earthquake may have been caused by either the San Andreas or San Jacinto faults. The strong ground shaking caused extensive landsliding in the epicentral region; landslides blocked both the Lytle Creek Canyon Road and the road through Cajon Pass (Townley, 1939). Buildings in San Bernardino, Highland and Patton reportedly suffered extensive damage; buildings in Redlands, Pomona, and Riverside suffered some damage; minor damage was reported as far away as in Los Angeles and Pasadena. The earthquake apparently did not cause any fatalities.

1.4.4 San Jacinto Earthquake of 1899

This earthquake occurred at 4:25 in the morning on Christmas Day, in 1899. The main shock is estimated to have had a magnitude of 6.5. Several smaller aftershocks followed the main shock, and in the town of San Jacinto, as many as thirty smaller tremors were felt throughout the day. The epicenter of this earthquake is not well located, but damage patterns suggest the location shown on Figure 1-2, near the town of San Jacinto, with the causative fault most likely being the San Jacinto fault. Both the towns of San Jacinto and Hemet reported extensive damage, with nearly all brick buildings either badly damaged or destroyed. Six people were killed in the Soboba Indian Reservation as a result of falling adobe walls. In Riverside, chimneys toppled and walls cracked (Claypole, 1900). The main earthquake was felt over a broad area that includes San Diego to the southwest, Needles to the northeast, and Arizona to the east. No surface rupture was reported, but several large "sinks" or subsidence areas were reported about 10 miles to the southeast of San Jacinto.

1.4.5 San Bernardino Earthquake of 1907

An earthquake of magnitude 5.4 (approximately) occurred on September 20, 1907 at 1:54 A.M. PST in the San Bernardino area, to the southeast of Hesperia. This tremor probably did not cause any significant damage in the area, as there is very little information on it.

1.4.6 North San Jacinto Fault Earthquake of 1923

This earthquake occurred about 7 miles south of San Bernardino on July 22, 1923, at 11:28

P.M. PST. The M_L 6.3 earthquake on the San Jacinto fault caused minor damage primarily in the cities of San Bernardino and Redlands, where chimneys collapsed and windows broke. Two public buildings in San Bernardino, the San Bernardino County Hospital and the Hall of Records, were badly damaged, and extensive damage was sustained by the State Hospital building in Patton. However, most of the buildings that sustained damage were deemed of poor construction. Slight damage was reported in Los Angeles. Two people were critically injured, but no deaths were reported. The shaking was felt as far away as Needles and Santa Barbara.

1.4.7 Long Beach Earthquake of 1933

The M_w 6.4 Long Beach earthquake occurred on March 10, at 5:54 P.M. PST, following a strong foreshock the day before. The earthquake ruptured the Newport-Inglewood fault, and was felt from the San Joaquin Valley to Northern Baja. The epicenter was located on the boundary between Huntington Beach and Newport Beach, although the earthquake was called "the Long Beach earthquake" because the worst damage was focused in the city of Long Beach. In the Hesperia area, the earthquake is estimated to have produced Modified Mercalli Intensities of about IV (http://pasadena.wr.usgs.gov/shake/ca/STORE/XLong_Beach/ciim_display.html).

The earthquake killed 115 people and caused $40-50 million in property damage (www.scecdc.scec.org/quakedex.html). Primary ground rupture of the Newport-Inglewood fault was not observed, although secondary cracking, minor slumping, and lateral movement of unconsolidated sediments occurred throughout the region. Road surfaces along the shore between Long Beach and Newport Beach were damaged by settlement of road fills that had been placed on marshy land. In urban areas, unreinforced masonry buildings were most severely damaged, especially in areas of artificial fill or water-soaked alluvium. In one part of Compton, most buildings built on unconsolidated sediments and artificial fill were destroyed. In Long Beach, many buildings collapsed, were pushed off their foundations, or had walls or chimneys knocked down. In Newport Beach, 800 chimneys were knocked down at the roofline and hundreds of houses were destroyed (www.anaheimcocom.com/quake.htm). Many strong aftershocks occurred through March 16th.

The regional significance of this earthquake is that damage to school buildings was especially severe, which led to the passage of the Field and Riley Acts by the State legislature. The Field Act regulates school construction and the Riley Act regulates the construction of buildings larger than two-family dwellings.

1.4.8 Desert Hot Springs Earthquake of 1948

This magnitude 6.0 earthquake struck on December 4, 1948 at 3:43 P.M. PST. The fault involved is believed to be the South Branch of the San Andreas (or Banning fault, depending on nomenclature used). The Desert Hot Springs earthquake of 1948 not only was felt over a large area (as far away as central Arizona, parts of Mexico, Santa Catalina Island, and Bakersfield), but also caused damage in regions far from the epicenter. In the Los Angeles area, a 5,800-gallon water tank split open, water pipes were broken at UCLA and in Pasadena, and plaster cracked and fell from many buildings. In San Diego, a water main broke. In Escondido and Corona, walls cracked. The administration building of Elsinore High School was permanently closed, due to the damage it sustained, as was a

building at the Emory School in Palm City. Closer to the epicenter, landslides and ground cracks were reported, and a road leading to the Morongo Indian Reservation was badly damaged (Louderback, 1949). In Palm Springs, the city hit hardest by the quake, merchandise was thrown from shelves and destroyed, with losses in the thousands of dollars. Part of a furniture store collapsed. Two people were injured when the shaking induced a crowd to flee a movie theater in panic. Numerous other instances of minor structural damage were reported. Fortunately, despite the damage brought on by this earthquake, no lives were lost.

1.4.9 San Fernando (Sylmar) Earthquake of 1971

This magnitude 6.6 earthquake occurred on the San Fernando fault zone, the westernmost segment of the Sierra Madre fault, on February 9, 1971, at 6:00 in the morning local time. The surface rupture caused by this earthquake was nearly 12 miles long, and occurred in the Sylmar-San Fernando area, approximately 60 miles (100 km) from Hesperia. The maximum slip measured at the surface was nearly six feet. The earthquake caused over $500 million in property damage and 65 deaths. Most of the deaths occurred when the Veteran's Administration Hospital collapsed. Several other hospitals, including the Olive View Community Hospital in Sylmar suffered severe damage. Newly constructed freeway overpasses also collapsed, in damage scenes similar to those that occurred 23 years later in the 1994 Northridge earthquake. Loss of life could have been much greater had the earthquake struck at a busier time of the day. As with the Long Beach earthquake, legislation was passed in response to the damage caused by the 1971 earthquake. In this case, the building codes were strengthened and the Alquist-Priolo Special Studies (now call the Earthquake Fault Zone) Act was passed in 1972.

1.4.10 Whittier Narrows Earthquake of 1987

The Whittier Narrows earthquake occurred on October 1, 1987, at 7:42 in the morning local time, with its epicenter located approximately 50 miles (80 km) from Hesperia (Hauksson and Jones, 1989). This magnitude 5.9 earthquake occurred on a previously unknown, north-dipping concealed thrust fault (blind thrust) now called the Puente Hills fault (Shaw and Shearer, 1999). The earthquake caused eight fatalities, over 900 injured, and $358 million in property damage. Severe damage was confined mainly to communities east of Los Angeles and near the epicenter. Areas with high concentrations of URMs, such as the "uptown" district of Whittier, the old downtown section of Alhambra, and the "Old Town" section of Pasadena, were severely impacted. Several tilt-up buildings partially collapsed, including tilt-up buildings built after 1971, that were constructed to meet improved building standards, but were of irregular configuration, revealing seismic vulnerabilities not previously recognized. Residences that sustained damage usually were constructed of masonry, were not fully anchored to their foundations, or were houses built over garages with large openings. Many chimneys collapsed and in some cases, fell through roofs. Wood-frame residences, in contrast, sustained relatively little damage, and no severe structural damage to high-rise structures in downtown Los Angeles was reported.

1.4.11 Joshua Tree Earthquake of 1992

This magnitude 6.1 earthquake struck on April 22, 1992 at 9:50 P.M. PDT, approximately 15 miles north of Palm Desert. This event resulted from right-lateral strike-slip faulting and was preceded by a magnitude 4.6 foreshock. The Joshua Tree earthquake raised some

alarms due to its proximity to the San Andreas fault. A San Andreas Hazard Level B was declared following this quake, meaning that the San Andreas fault was given a 5 to 25% chance of generating an even larger earthquake within 3 days. Roughly two months and 6,000 aftershocks later, the Landers earthquake broke the surface of the Mojave Desert in the largest quake to hit southern California in 40 years, showing that the concern caused by the Joshua Tree earthquake was at least partially warranted. The aftershocks of the Joshua Tree quake suggested that the fault that slipped in the shock is a north to northwest-trending, right-lateral strike-slip fault at least 15 km long (Jones and others, 1995). Based on these data, and the location of the shocks, researchers suggest that the Eureka Peak fault may have been the fault responsible for this earthquake.

Damage caused by the Joshua Tree earthquake was slight to moderate in the communities of Joshua Tree, Yucca Valley, Desert Hot Springs, Palm Springs, and Twentynine Palms. Thirty-two people had to be treated for minor injuries. Though somewhat forgotten in the wake of the Landers earthquake, the Joshua Tree quake was a significant event on its own, and was felt as far away as San Diego, Santa Barbara, Las Vegas, Nevada, and even Phoenix, Arizona (Person, 1992).

1.4.12 Landers Earthquake of 1992

On the morning of June 28, 1992, most people in southern California were awakened at 4:57 by the largest earthquake to strike California in 40 years. Named "Landers" after the small desert community near its epicenter, the earthquake had a magnitude of 7.3. More than 50 miles of surface rupture associated with five or more faults occurred as a result of this earthquake. The average right-lateral strike-slip displacement was about 10 to 15 feet; the maximum was up to 18 feet. Centered in the Mojave Desert, approximately 120 miles from Los Angeles, the earthquake caused relatively little damage for its size (Brewer, 1992). It released about four times as much energy as the very destructive Loma Prieta earthquake of 1989, but fortunately, it did not claim as many lives (one child died when a chimney collapsed). The power of the earthquake was illustrated by the length of the ground rupture it left behind. The earthquake ruptured five separate faults: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock faults (Sieh and others, 1993). Other nearby faults also experienced triggered slip and minor surface rupture. Seismic intensities of level VI were reported in the Hesperia area (http://pasadena.wr.usgs.gov/shake/ca/STORE/XLanders/ciim_display.html).

1.4.13 Big Bear Earthquake of 1992

This magnitude 6.4 earthquake struck little more than 3 hours after the Landers earthquake on June 28, 1992 at 8:05:30 A.M. PDT. This earthquake is technically considered an aftershock of the Landers earthquake (indeed, the largest aftershock), although the Big Bear earthquake occurred over 20 miles west of the Landers rupture, on a fault with a different orientation and sense of slip than those involved in the main shock. From its aftershocks, the causative fault was determined to be a northeast-trending left-lateral fault. This orientation and slip are considered "conjugate" to the faults that slipped in the Landers rupture. The Big Bear earthquake did not break the ground surface, and, in fact, no surface trace of a fault with the proper orientation has been found in the area. The Big Bear earthquake caused a substantial amount of damage in the Big Bear area, but fortunately, it claimed no lives. However, landslides triggered by the quake blocked roads in the mountainous areas, aggravating the clean-up and rebuilding process (SCEC-DC, 2001).

1.4.14 Northridge Earthquake of 1994

On the morning of January 17th, 1994, at 4:31 PST, a M_w 6.7 earthquake struck the San Fernando Valley. This moderate-sized tremor was the most expensive earthquake in United States history, due primarily to its proximity to the heavily populated northern Los Angeles area. The rupture occurred in the San Fernando Valley on the previously unidentified eastern continuation of the Oak Ridge fault, which is a blind thrust fault and thus does not break the surface. The earthquake produced widespread ground accelerations of 1.0 g, some of the highest ever recorded for an earthquake of its size. The earthquake caused 57 deaths, 1,500 injuries and damaged 12,500 structures, knocking out of commission several major freeways for days to months. Although most damage was focused in the northern Los Angeles area, intensities of level VI (Table 1-1) were recorded in the Hesperia area.

1.4.15 Hector Mine Earthquake of 1999

Southern California's most recent large earthquake was a widely felt magnitude 7.1. It occurred on October 18, 1999, in a remote region of the Mojave Desert, 47 miles east-southeast of Barstow. Modified Mercalli Intensities of VI (Table 1-1) were reported in the Hesperia area (http://pasadena.wr.usgs.gov/shake/ca/). The Hector Mine earthquake is not considered an aftershock of the M 7.3 Landers earthquake of 1992, although Hector Mine occurred on similar, north-northwest trending strike-slip faults within the Eastern Mojave Shear Zone. Geologists documented a 25-mile (40-km) long surface rupture and a maximum right-lateral strike-slip offset of about 16 feet on the Lavic Lake fault.

1.5 Potential Sources of Seismic Ground Shaking

Seismic shaking is the geologic hazard that has the greatest potential to severely impact the Hesperia area, given that the city is located near several significant seismic sources (faults) that have the potential to cause moderate to large earthquakes (see Table 1-2). As discussed in Section 1.4 above, some of these faults caused moderate-sized earthquakes in the last century; however, given their length, many are thought capable of generating even larger earthquakes in the future that would cause strong ground shaking in Hesperia and nearby communities. The proximity of Hesperia to many regionally significant seismic sources should encourage City officials to diligently attend to seismic hazard mitigation.

In order to provide a better understanding of the shaking hazard posed by these faults, we conducted a deterministic seismic hazard analysis for City Hall and several other randomly selected points in the city using the software program EQFAULT by Blake (2000). This analysis estimates the Peak Horizontal Ground Accelerations (PHGA) that could be expected at these locations due to earthquakes occurring on any of the known active or potentially active faults within about 62 miles (100 km). The fault database (including fault locations and earthquake magnitudes of the maximum magnitude earthquakes for each fault) used to conduct these seismic shaking analyses is that used by the California Geological Survey (CGS) and the U.S. Geological Survey (USGS) for the National Seismic Hazard Maps (Peterson and others, 1996; Cao et al., 2003). However, as described further in the text, recent paleoseismic studies suggest that some of these faults may actually generate even larger earthquakes than those used in the analysis. Where appropriate, this is discussed further below.

PGHA depends on the size of the earthquake, the proximity of the rupturing fault, and local soil conditions. Effects of soil conditions are estimated by use of an attenuation relationship derived empirically from an analysis of recordings of earthquake shaking in similar soils during earthquakes of various sizes and distances. Given that most of the developed portion of Hesperia is underlain by semi-consolidated and unconsolidated soft sediments, we used alluvium for the deterministic analyses conducted for this study, and the attenuation relationship of Campbell and Bozorgnia (2000).

Based on the ground shaking analyses described above, those faults that can cause peak horizontal ground accelerations of about 0.1g or greater (Modified Mercalli Intensities greater than VII) in the Hesperia area are listed in Table 1-2. For a map showing most of these faults, refer to Figures 1-1 and 1-3. Those faults included in Table 1-2 that have the greatest impact on the Hesperia area, or that are thought to have a higher probability of causing an earthquake, are described in more detail in the following pages. The locations of active faults near the city are shown on Figure 1-3 and on Plate 1-2 (for those faults through or immediately adjacent to the city). The deterministic analyses indicate that should the North Frontal, San Andreas, or Cleghorn fault rupture, PGHA values of as much as 0.5g could be experienced in Hesperia. Shaking at these levels can cause significant damage to older structures, and moderate damage to even newer buildings constructed in accordance with the latest building code provisions.

Table 1-2 shows:

- The approximate distance, in miles and kilometers, between the fault and various points in the city of Hesperia;
- The maximum magnitude earthquake (M_{max}) each fault is estimated capable of generating;
- The peak ground accelerations (PGA), or intensity of ground motion expressed as a fraction of the acceleration of gravity (g), that could be experienced in different areas of the city of Hesperia if the M_{max} occurs on the faults listed; and
- The Modified Mercalli seismic Intensity (MMI) values calculated for various parts in the city.

The peak ground accelerations and intensities summarized in Table 1-2 are shown from largest to lowest for each fault; these should be considered as average values, since different areas of the city are expected to feel and respond to each earthquake differently in response to site-specific conditions. In general, peak ground accelerations and seismic intensity values decrease with increasing distance away from the causative fault. However, local site conditions, such as deep basins or reflection off of hard rock forming the San Bernardino Mountains to the south can amplify the seismic waves generated by an earthquake, resulting in localized higher accelerations than those listed here. Please note that the PHGA analyses conducted for this study provide a general indication of relative earthquake risk throughout the city of Hesperia. For individual projects however, site-specific analyses that consider the precise distance from a given site to the various faults in the region, as well as the local near-surface soil types, should be conducted. These site-specific analyses should also consider the degree of amplification that could be provided by the soft sediments that underlie the study area.

Table 1-2: Estimated Horizontal Peak Ground Accelerations and Seismic Intensities in the Hesperia Area

Fault Name	Distance to Hesperia β (mi)	Distance to Hesperia β (km)	Magnitude of M_{max}*	PGA (g) from M_{max}	MMI from M_{max}
North Frontal Fault (West)	2 – 14.5	3.2 – 23	7.2	0.58 – 0.23	X - IX
San Andreas (Whole Southern)	4 – 16.5	6.5 – 26.5	8.0	0.49– 0.34	X - IX
San Andreas (San Bernardino – Coachella)	4 – 16.5	6.5 – 26.5	7.7	0.47 – 0.29	X - IX
San Andreas (1857 Rupture or Cholame – Mojave)	7 – 17.5	11 – 28	7.8	0.46 – 0.3	X - IX
San Andreas (San Bernardino)	5.5 – 16.5	9.5 – 26.5	7.5	0.45 – 0.26	IX
Cleghorn	3 – 12	5 – 19.5	6.5	0.42 – 0.18	X- VIII
San Andreas (Mojave)	7 – 17.5	11 – 28	7.4	0.42 – 0.23	X- IX
Cucamonga	9 – 19	14.5 - 30.5	6.9	0.35 – 0.16	IX - VIII
Helendale – South Lockhart	13 - 24	21 - 38	7.3	0.27 – 0.16	IX - VIII
San Jacinto (San Bernardino)	9 - 20	14.5 - 32	6.7	0.26 – 0.12	IX - VII
Sierra Madre	20 –29	32 – 47.5	7.2	0.18 – 0.12	VIII - VII
Lenwood – Lockhart – Old Woman Springs	28 – 39	45 – 62.5	7.5	0.15 – 0.10	VIII- VII
San Jacinto (San Jacinto Valley)	23 – 31.5	37.5 - 50	6.9	0.11 – 0.08	VII

Abbreviations used in Table 1-2:
mi – miles; **km** – kilometer; **M_{max}** – maximum magnitude earthquake; **PGA** – peak ground acceleration as a percentage of g, the acceleration of gravity; **MMI** – Modified Mercalli Intensity.

In addition to the ground shaking values calculated using a deterministic analysis, we also ran the interactive ground motion module from the California Geological Survey (http://www.consrv.ca.gov/CGS/rghm/pshamap/pshamap.asp) to estimate the ground motions at Hesperia's City Hall that have a 10% probability of being exceeded in 50 years. [Unlike deterministic analyses that consider the largest possible earthquake that each of the known faults in the area is thought capable of producing, probabilistic analyses consider the likelihood of exceeding a certain level of damaging ground motion that could be produced by any or all faults within 62 miles (100 km).] For Hesperia, the level of ground motion estimated to have a 10% probability of being exceeded in 50 years is 0.47g, using alluvium as the underlying material. This level of ground motion is consistent with the results of the deterministic analyses, and indicates that many of the faults near Hesperia have high earthquake recurrence rates. As discussed above, these levels of shaking are in the moderate to high range for southern California, and can be expected to cause damage, particularly to older and/or poorly constructed buildings.

Another way to communicate the seismic shaking hazard is by the use of ShakeMaps. A ShakeMap is a representation of the various levels of ground shaking throughout the region where an earthquake occurs. ShakeMaps are compiled from the California Integrated Seismic Network (CISN) – a network of seismic recording instruments placed throughout the state, and are automatically generated following moderate to large earthquakes. Preliminary real-time maps are posted within minutes on the Internet (http://earthquake.usgs.gov/eqcenter/shakemap/) giving disaster response personnel an immediate picture of where the most damage is likely to be.

Although several shaking parameters can be illustrated on ShakeMaps, such as peak acceleration and peak velocity, most people can relate more easily to maps illustrating the *intensity* of ground shaking. Intensity is a qualitative assessment of an earthquake's effect at a given location based on how it felt to those that experienced it and how much damage it caused (see Section 1.2.2). Using actual instrumental ground motion recordings and comparing them to observed Modified Mercalli Intensities from recent California earthquakes, scientists can now estimate shaking intensities within a few minutes after an earthquake.

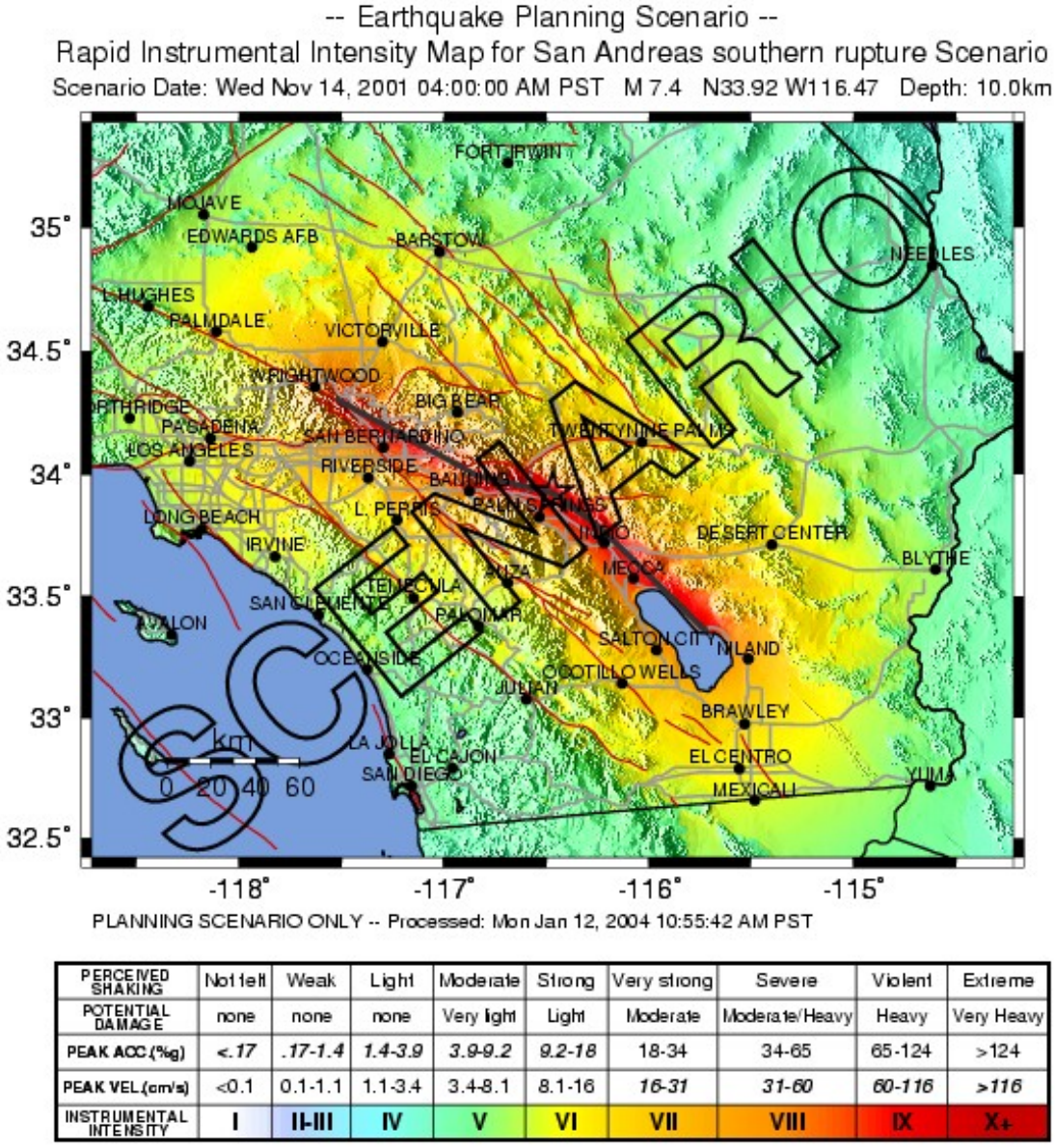
ShakeMaps can also be used for planning and emergency preparedness by creating hypothetical earthquake scenarios. These scenarios are not predictions – knowing when or how large an earthquake will be in advance is still not possible. However, using realistic assumptions about the size and location of a future earthquake, we can make predictions of its effects, and use this information for loss estimations and emergency response planning. Figure 1-4 is an Intensity ShakeMap for a hypothetical magnitude 7.4 earthquake that ruptures the southern San Andreas fault south and southwest of the city of Hesperia. The ShakeMap shows that the area in and around Hesperia would experience Modified Mercalli Intensities of about VIII, with much higher levels felt immediately to the south, closer to the San Andreas fault.

1.5.1 North Frontal Fault

Given its proximity to Hesperia, the North Frontal fault has the potential to generate the strongest seismic shaking at the city. This south-dipping, partially blind reverse fault zone along the eastern flank of the San Bernardino Mountains consists of several fault splays that have a combined total length of approximately 65 km (40 miles). Several of the fault splays interact with other nearby faults; the most significant of these is the Helendale fault, which seems to right-laterally offset the North Frontal fault zone, dividing it into two main segments (referred to as the East and West segments; Meisling, 1984). The West segment, which is about 22 miles (35 km) long, is at its closest approach less than 2 miles (3.2 km) from Hesperia.

The North Frontal fault is thought to have moved in the past 10,000 years, making it an active fault. However, the fault has not been studied in detail, and its recurrence interval, slip rate and other fault parameters are not well understood, although a slip rate of about 0.5 mm/yr is attributed to it. Furthermore, movement on this fault is thought to be responsible for an average uplift rate of about 1 mm/yr of the San Bernardino Mountains. Based on its length, the West segment of the North Frontal fault zone is thought capable of generating a maximum magnitude 7.2 earthquake. An earthquake of that size on this fault would be felt in Hesperia with peak ground accelerations of between about 0.58g and 0.23g, resolving in Modified Mercalli intensities as high as X.

Figure 1-4: ShakeMap for a Hypothetical Magnitude 7.4 Earthquake on the Southern San Andreas Fault



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: http://earthquake.usgs.gov/eqcenter/shakemap/sc/shake/SAF_south7.4_se/download/intensity.jpg

1.5.2 San Andreas Fault

The San Andreas fault is the principal boundary between the Pacific and North American plates. The fault extends over 750 miles (1,200 kilometers), from near Cape Mendocino in northern California to the Salton Sea region in southern California. This fault is considered the "Master Fault" in southern California because it has frequent, large earthquakes and controls the seismic hazards of the area. Many refer to an earthquake on the San Andreas fault as "The Big One," however, as shown above, at least one other fault closer to Hesperia has the potential to cause stronger ground shaking, and therefore more damage,

than the San Andreas fault. Nevertheless, the San Andreas fault should be considered in all seismic hazard assessment studies in southern California given its high probability of causing an earthquake in the near future. A group of scientists referred to as the 2007 Working Group on California Earthquake Probabilities (WGCEP, 2008) has calculated that the southern San Andreas fault has a 59% probability of causing an earthquake of at least magnitude 6.7 in the next 30 years.

Large faults, such as the San Andreas fault, are often divided into segments in order to evaluate their future earthquake potential. The segmentation is based on physical characteristics along the fault, particularly discontinuities that may affect the rupture length. In central and southern California the San Andreas fault is divided into five segments named, from north to south, Cholame, Carrizo, Mojave, San Bernardino Mountains, and Coachella Valley. At its closest approach, the southern portion of Hesperia is about 4 miles (6.5 kilometers) from the San Bernardino Mountains segment, and 7 miles (11 km) from the Mojave segment. Each segment is assumed to have a characteristic slip rate (rate of movement averaged over time), recurrence interval (time between moderate to large earthquakes), and displacement (amount of offset during an earthquake).

While this methodology has some value in predicting earthquakes, historical records and studies of prehistoric earthquakes show it is possible for more than one segment to rupture during a large quake or for ruptures to overlap into adjacent segments. For example, the last major earthquake on the southern portion of the San Andreas fault (and the largest earthquake reported in California) was the 1857 Fort Tejon (M 8) event. The 1857 earthquake ruptured the Cholame, Carrizo, and Mojave segments of the fault, resulting in displacements of as much as 27 feet (9 meters) along the rupture zone. These fault segments are thought to have a recurrence interval of between 104 and 296 years. Peak ground accelerations in Hesperia as a result of the 1857 earthquake are estimated to have been as high as 0.32g. However, another similar earthquake that ruptured the entire southern San Andreas fault, with its epicenter along the section of fault closest to Hesperia, could generate even higher peak ground accelerations in Hesperia, estimated at between 0.46g and 0.3g (see Table 1-2).

The **Mojave segment** of the San Andreas fault is 83 miles (133 km) long, extending from approximately Three Points southward to just northwest of Cajon Creek, at the southern limit of the 1857 rupture (WGCEP, 1995). Using a slip rate of 30±8 mm/yr and a characteristic displacement of 4.5±1.5 meters (m), the WGCEP (1995) derived a recurrence interval for this segment of 150 years. [[In 2002, the CGS assigned this segment a slip rate of about 34±5 mm/yr, whereas more recently, the 2007 WGCEP assigned it a slip rate of 28±3.5 mm/yr, which could resolve into a slightly longer recurrence interval]. The Mojave segment is estimated to be capable of producing a magnitude 7.4 earthquake, which could result in peak ground accelerations in Hesperia of 0.42g to 0.23g. The WGCEP (1995) calculated that this segment has a 26% probability of rupturing sometime between 1994 and 2024.

The **San Bernardino Mountains segment** is 49 miles (78 km) long and extends from approximately Cajon Creek southwestward to the San Gorgonio Pass. This segment is a structurally complex zone that is poorly understood, and for which there are scant data on fault behavior. Using a slip rate of 24±5 mm/yr and a characteristic displacement of 3.5 ±

1.0 m, the WGCEP (1995) derived a recurrence interval of 146 years. [The CGS (Cao, 2003) uses a slip rate of 24±6 mm/yr for this fault segment, whereas the 2007 WGCEP assigned a slip rate of 22±6 mm/yr to the northern section of the San Bernardino Mountains segment.] The San Bernardino Mountains segment of the San Andreas fault is estimated to be capable of producing a magnitude 7.5 earthquake, which could result in peak ground accelerations in Hesperia of between 0.45g and 0.26 g. If this fault segment ruptures in conjunction with the Mojave and/or Coachella Valley segments, higher ground motions would be expected. This segment was estimated to have a 28% probability of rupturing in the period between 1994 and 2024 (WGCEP, 1995).

The **Coachella Valley segment** extends 114 km from approximately San Gorgonio Pass to the Salton Sea. This segment has not produced any large, surface-rupturing earthquakes in historic times (Sieh and Williams, 1990). Paleoseismic studies suggest that the last surface-rupturing earthquake on this segment occurred around 1680 A.D. The data also suggest that the Coachella Valley and San Bernardino Mountain segments ruptured simultaneously in earthquakes that occurred around 1680 and 1450 A.D. Using a slip rate of 25 ± 5 mm/yr and a characteristic displacement of 4.0 +4,-2 m, the 1995 WGCEP derived a recurrence interval of 220 ±13 years for this segment. More recently, the 2007 WGCEP assigned a slip rate of 20±6 mm/yr to this segment. Rupture of both the Coachella Valley and San Bernardino Mountains segments together is thought would produce a magnitude 7.7 earthquake, which could result in peak ground accelerations in Hesperia of between 0.47g and 0.29g. The Coachella Valley segment has a 22% probability of rupturing sometime between 1994 and 2024.

1.5.3 Cleghorn Fault

The Cleghorn fault is an approximately 19-miles (30-km) long, steeply north-dipping, left-lateral strike-slip fault with a slight normal component of movement. The fault extends across Silverwood Lake, and therefore it is also referred to as the Silverwood Lake fault. Meisling and Weldon (1989) suggest that the fault zone has had about 200 meters of motion in the last 50,000 to 100,000 years, which resolves into a slip rate of between 2 and 4 mm/yr. However, some researchers have suggested that this rate is overstated, as the fault is not sufficiently well expressed in the landscape to support such a rate of slip. The fault is thought to have last moved in either the late Quaternary or Holocene, although Hart and others (1989) suggest that Holocene displacement and surface ruptures reported on this fault are actually a manifestation of landsliding and not faulting. A magnitude 6.5 earthquake on this fault is thought capable of generating horizontal peak ground accelerations in the Hesperia area of between about 0.42g and 0.18g, with Modified Mercalli Intensities in the X to VIII range.

1.5.4 Cucamonga Fault

The Cucamonga fault zone is a youthful, 25-km-long element of the Transverse Ranges family of thrust faults (Matti and others, 1982; Morton and Matti, 1987) that extends along the southern front of the San Gabriel Mountains from San Antonio Canyon eastward to the Lytle Creek area, where it appears to be truncated by the Lytle Creek fault, one of the many faults that form the San Jacinto fault zone (Burnett and Hart, 1994).

Paleoseismic (trenching) studies of the Cucamonga fault suggest that this fault has a slip rate of between 4.5 and 5.5 mm/yr (Matti and others, 1982; Matti and others, 1992).

Taking into account the uncertainties in carbon-14 dating, the 1988 WGCEP assigned a slip rate of 4.0±2.0 mm/yr to the fault, whereas more recently, the CGS assigned this fault a slip rate of 5.0±2.0 mm/yr. Morton and Matti (1987) and Matti and others (1992) estimate an average recurrence interval on this fault of 625 years, but additional studies are necessary to confirm this. Based on its length, the Cucamonga fault is thought capable of generating a maximum credible earthquake of magnitude 6.9. Such an event would generate peak horizontal ground acceleration in the Hesperia area of between about 0.35g and 0.16g, with Modified Mercalli intensities in the IX to VIII range.

1.5.5 Helendale – South Lockhart Fault

The Helendale fault is a right-lateral strike-slip fault that is 56 miles (90 km) long, and one of the northwest-trending faults that collectively appear to be accommodating between 9 and 23% of the motion between the North American and Pacific Plates. Combined, these faults are referred to as the Eastern California Shear Zone. The Helendale fault cuts through and offsets the North Frontal fault zone, as described above. The Helendale fault also seems to form a continuous fault with the South Lockhart fault to the north. The South Lockhart fault is a right-lateral strike-slip fault with a minor dip-slip component (Bryant, 1987c). The central and southern segments of the South Lockhart fault display evidence of Holocene rupture, including deformed Holocene sediments and well-defined scarps (Bryant, 1987). The northern segment of the South Lockhart fault is poorly defined and does not show evidence of Holocene rupture, indicating that the whole fault may not rupture at the same time. Rupture of multiple segments of both the Helendale and the South Lockhart faults may result in a large-magnitude earthquake that would be greater than if the South Lockhart, or the Helendale fault ruptured alone.

Petersen and Wesnousky (1994) calculated a slip rate for the Helendale fault of 0.8 mm/yr and a recurrence interval for large surface-rupturing events of 3,000 to 5,000 years. Paleoseismic studies of the Helendale fault indicate, however, a recurrence interval of 6,000 to 11,000 years (Bryan and Rockwell, 1995). Paleoseismic studies on the South Lockhart fault are required to resolve this discrepancy. It is possible that the actual slip rate on this fault is less than 0.8 mm/yr, or that the South Lockhart fault ruptures more often than the Helendale fault. Based on the data available at this time, the California Geological Survey uses a maximum earthquake of magnitude 7.3 to estimate the ground motion hazard resulting from the combined Helendale-South Lockhart faults. An earthquake of that size is anticipated to generate horizontal peak ground accelerations in Hesperia of about 0.27g to 0.16g, with Modified Mercalli Intensities of IX to VIII.

1.5.6 San Jacinto Fault Zone

The San Jacinto Fault Zone consists of a series of closely spaced faults that form the western margin of the San Jacinto Mountains. The zone extends from its junction with the San Andreas fault in San Bernardino, southeasterly toward the Brawley area, where it continues south of the international border as the Imperial fault. This fault zone has a high level of historical seismic activity, having generated at least ten moderate (M 6 - 7) earthquakes between 1890 and 1986. Offset across the fault traces is predominantly right-lateral, similar to the San Andreas fault, although Brown (1990) has suggested that vertical motion contributes up to 10% of the net slip. The San Jacinto fault zone has been divided into seven segments. Each segment, in turn, consists of a series of subparallel faults. The

segments of the San Jacinto fault closest to Hesperia are the San Bernardino and San Jacinto Valley segments.

Fault slip rates on the various segments of the San Jacinto are less well constrained than for the San Andreas fault, but the data available suggest slip rates of 12 ±6 mm/yr for the northern segments of the fault (including the San Bernardino and San Jacinto Valley segments) and slip rates of 4 ± 2 mm/yr for the southern segments (WGCEP, 1995). Various investigators have suggested a recurrence interval for large ground-rupturing earthquakes on the San Jacinto fault of between 150 and 300 years (Petersen and Wesnousky, 1994). It is unknown when the traces of the San Jacinto fault closest to Hesperia last ruptured. Radiocarbon dating of faulted and unfaulted deposits trenched at Sycamore Flat suggest that the San Jacinto fault trace last broke in this area between 280(±70) and 490(±70) years before present (Jeff Johnston, 1994 personal communication, as reported in Burnett and Hart, 1994). If these dates are correct, the San Bernardino segment of the San Jacinto fault is near or at the end of its strain cycle, and therefore capable of generating an earthquake in the not too distant future. The Working Group on California Earthquake Probabilities (1995) gave the San Bernardino and San Jacinto Valley segments a 37% and 43% probability, respectively, of rupturing sometime between 1994 and 2024.

A maximum credible earthquake of magnitude 6.7 on the San Bernardino segment of the San Jacinto fault has the potential to generate peak horizontal ground accelerations of between 0.26g and 0.12g in the Hesperia area. Similarly, a 6.9 earthquake on the more distant San Jacinto Valley segment would generate peak horizontal ground accelerations in Hesperia of between 0.11g and 0.08g (see Table 1-2).

1.5.7 Sierra Madre Fault

The Sierra Madre fault zone is a northeast-dipping reverse fault complex approximately 47 miles (75 km) long that extends along the base of the San Gabriel Mountains from the San Fernando Valley to San Antonio Canyon (Lamar et al., 1973; WGCEP, 1988), where it continues southeastward as the Cucamonga fault. Structurally, the Sierra Madre and Cucamonga faults are interpreted as related segments of a through-going frontal fault zone, with the Cucamonga fault zone transferring strain onto the Sierra Madre fault zone to the west (Morton and Matti, 1987).

Until recently there was very limited geomorphic evidence for quantifying either slip rate or earthquake recurrence along most of the Sierra Madre fault's length. The fault zone has been divided into five segments, and each segment seems to have a different rate of activity. The northwestern-most segment, the San Fernando segment, ruptured in 1971, causing the M_w 6.7 San Fernando (or Sylmar) earthquake. As a result of this earthquake, the Sierra Madre fault has been know to be active. Trenching studies of this fault after the 1971 earthquake led Bonilla (1973) to infer a 200-year recurrence interval for the San Fernando segment. In the 1980s, Crook et al., (1987) studied the Transverse Ranges using general geologic and geomorphic mapping, combined with a few trenching studies, to suggest that the segments of the Sierra Madre fault east of the San Fernando segment have not generated major earthquakes for several thousand years, and possibly for as long as 11,000 years. Then, in the mid 1990s, Rubin and others (1998) trenched a section of the Sierra Madre fault in Altadena, and determined that this segment has ruptured at least twice in the last 15,000 years, causing magnitude 7.2 to 7.6 earthquakes. Farther east, at

Horsethief Canyon, Tucker and Dolan (2001) trenched the east Sierra Madre fault and obtained data consistent with Rubin et al.'s (1998) findings, with the last rupture on this segment dated to about 8,000 years ago.

In 1988, a group of scientists called the Working Group on California Earthquake Probabilities (WGCEP) extrapolated the Cucamonga fault rate of 4.0 ± 2.0 mm/yr to the Sierra Madre fault, but in 2003, the California Geological Survey (CGS), assigned a lower slip rate to this fault of 2.0 ± 1.0 mm/yr (Cao et al., 2003). This revised rate recognizes that the Sierra Madre fault appears to rupture in infrequent, but large magnitude earthquakes, consistent with the paleoseismic record. In fact, using Rubin et al.'s (1998) and Tucker and Dolan's (2001) data, the Sierra Madre fault may slip at a rate of as little as 0.6 mm/yr. Using a slip rate of 0.6 mm/yr and a slip per event of 5 meters resolves into a recurrence interval of about 8,000 years. If, as the recent studies suggest, the last rupturing event on the eastern segments of the fault occurred about 8,000 years ago, it is possible that the section of the Sierra Madre fault closest to the Hesperia area is near the end of its cycle, and therefore likely to generate an earthquake in the not too distant future. The CGS (2003) estimates that the Sierra Madre fault is capable of producing a magnitude 7.2 earthquake. An earthquake of that size could generate peak horizontal ground accelerations in Hesperia of between about 0.18g and 0.12g.

1.5.8 Lenwood – Lockhart – Old Woman Springs Faults

The Lenwood fault is a right-lateral strike slip fault approximately 47 miles (75 km) long with a slip rate of about 0.8 mm/year. Trenching of the fault indicates that the fault has ruptured at least three times in the Holocene, 200-400, 5,000-6,000, and 8,300 years ago, for a recurrence between major surface ruptures of 4,000 to 5,000 years. Prior to the 1992 Landers earthquake, when the fault experienced triggered slip near its southeast end, aseismic creep on this fault had been recorded but not verified.

The Lockhart fault is a right-lateral strike-slip fault approximately 44 miles (70 km) long to the north of the Lenwood fault. The North Lockhart fault – a segment that shows no evidence of Holocene activity adds 6 miles (10 km) to the length above). The interval between major surface-rupturing earthquakes on the Lockhart fault is estimated at between 3,000 and 5,000 years (Jennings, 1994), with the central portion of the fault having ruptured during the Holocene, and segments both to the north and south having last ruptured in the Quaternary (http://www.data.scec.org/fault_index/lockhart.html).

The Old Woman Springs segment is the main trace in a complex system of faulting at the junction between the Eastern segment of the North Frontal Fault Zone and the Lenwood fault. The Old Woman Springs trace is about 6 miles (10 km) long and exhibits right-lateral strike-slip movement with some vertical slip. The fault is thought to have last moved in the Holocene, and is therefore defined as active.

Although the Lenwood and Lockhart faults form essentially a continuous, 90-miles (150-km) long system, there is no evidence that both of these faults have ruptured together in the past. Nevertheless, such an event might be possible, as evidenced by rupture of 5 separate fault segments during the Landers earthquake. For the purposes of this study, these faults, together with the Old Woman Springs fault, are assumed to rupture together in a magnitude 7.5 maximum earthquake. Such an event would generate peak ground

accelerations in Hesperia of about 0.15g to 0.10g, with Modified Mercalli Intensities in the VIII to VII range. If only one of these faults ruptures in an earthquake, the smaller magnitude event would cause lesser ground motions in the city than those reported above.

1.6 Potential Sources of Fault Rupture

1.6.1 Primary Fault Rupture

Primary fault rupture refers to fissuring and offset of the ground surface along a rupturing fault during an earthquake. Primary ground rupture typically results in a relatively small percentage of the total damage in an earthquake, but being too close to a rupturing fault can cause severe damage to structures. As discussed previously, development constraints within active fault zones were implemented in 1972 with passage of the California Alquist-Priolo Earthquake Fault Zoning Act. The Alquist-Priolo Act prohibits the construction of new habitable structures astride an active fault and requires special geologic studies to locate and evaluate whether a fault has ruptured the ground surface in the past about 11,000 years. If an active fault is encountered, structural setbacks from the fault are defined.

There are no faults zoned by the State of California within the Hesperia General Plan area. The closest Alquist-Priolo Earthquake Fault Zones to the Hesperia area include the North Frontal fault approximately 2 miles east, and the San Andreas fault approximately 4 miles southwest. Sections of both of these zones are shown on Plate 1-2. However, the State Geologist is still assessing many faults in California, and not all active faults have been zoned yet. In fact, some of the faults just recently zoned are faults that had not been studied previously, but were found to be active when they ruptured in an earthquake.

The Cleghorn fault zone south of Hesperia, as discussed in Section 1.5.3, is thought to be active, although it is unknown when it last ruptured during an earthquake. Estimates of total left-lateral displacement on this fault, of about 3.5 to 4 km (Meisling and Weldon, 1989; Morton and Miller, 2003) are in part based on the reconstruction of the offset older faults to the north and south of the Cleghorn fault shown on Plate 1-2. Although these older faults may no longer be major players in the tectonics of the area, they could slip a small amount during an earthquake on a nearby fault, such as the San Andreas fault (see the discussion on secondary fault rupture hazards below, in Section 1.6.2). In fact, several of the faults on the east side of Summit Valley, within and just south of the General Plan area are still evident in the landscape, as observed in recent aerial photographs, suggesting that they may still be active. Similarly, the north- to northeast-trending faults that extend across Hesperia's southeastern corner may also be transferring strain between the San Andreas fault and the North Frontal fault. Until studied further, critical facilities, such as water reservoirs, hospitals, schools, and fire stations should not be placed across the trace of these faults without first conducting site-specific studies to evaluate these faults' recency of activity and potential future surface fault rupture hazard.

The sole fault mapped by Morton and Miller (2003) through the western part of the General Plan area, between the California Aqueduct on the east, and the 15 Freeway on the west, appears not to impact the landscape, and is therefore considered less likely to pose a future surface fault rupture hazard.

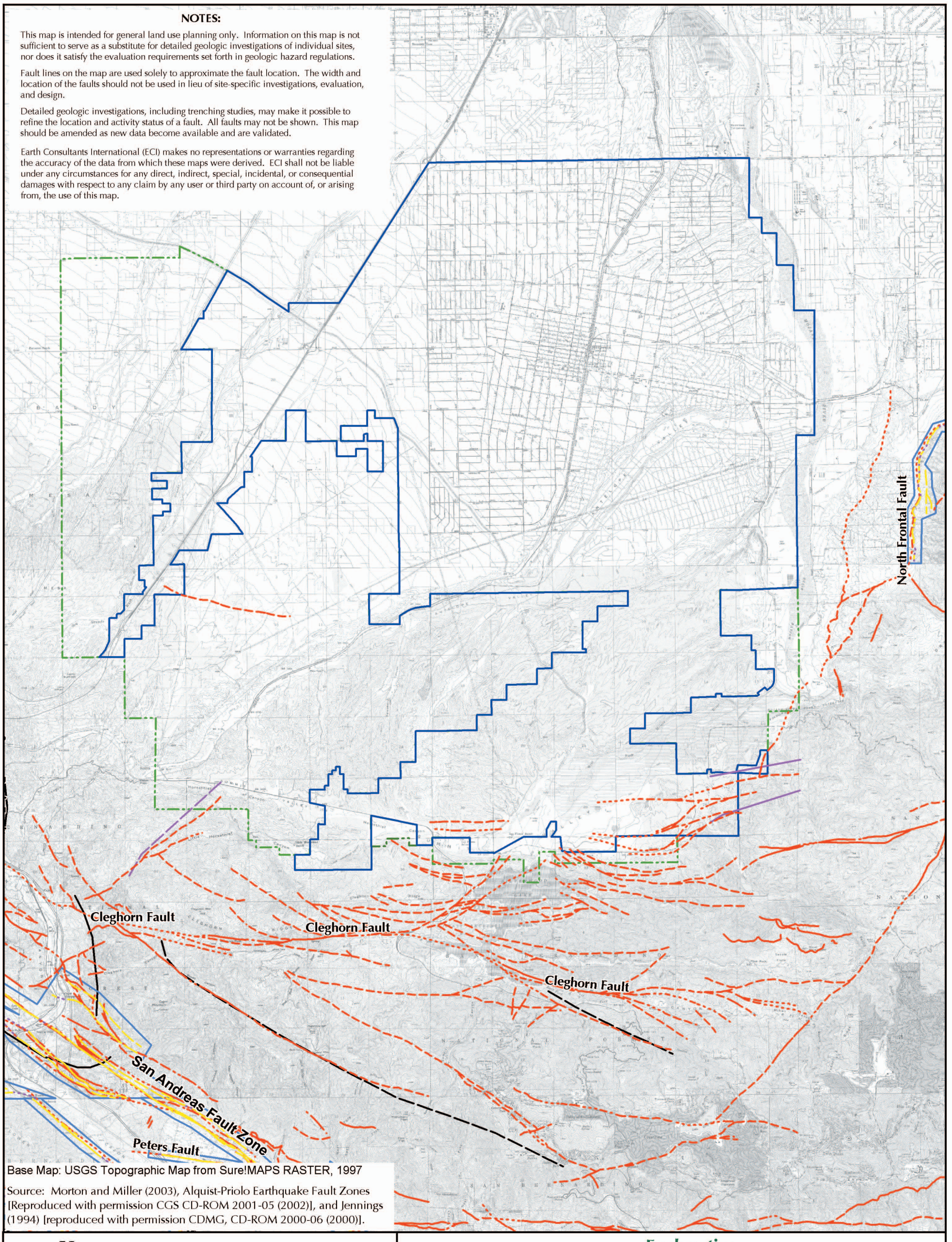
NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Fault lines on the map are used solely to approximate the fault location. The width and location of the faults should not be used in lieu of site-specific investigations, evaluation, and design.

Detailed geologic investigations, including trenching studies, may make it possible to refine the location and activity status of a fault. All faults may not be shown. This map should be amended as new data become available and are validated.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.



Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997

Source: Morton and Miller (2003), Alquist-Priolo Earthquake Fault Zones [Reproduced with permission CGS CD-ROM 2001-05 (2002)], and Jennings (1994) [reproduced with permission CDMG, CD-ROM 2000-06 (2000)].

N W E S

0 8000 16000 Feet

0 2000 4000 Meters

Scale: 1:96,000

Explanation

Faults; solid where location is known, dashed where approximate, dotted where inferred.

- Fault. From Morton and Miller (2003).
- Quaternary faults. From Jennings (1994).
- Alquist-Priolo Earthquake Fault. From CGS (2002).
- Pre-Quaternary faults. From Jennings (1994).
- Alquist-Priolo Earthquake Fault Zone. From CGS (2002).
- Hesperia City Limit
- Hesperia Sphere of Influence

HESPERIA 1988

Earth Consultants International

Project Number: 2617
Date: February 2010

Fault Map

Hesperia, California

Plate 1-2

1.6.1.1 Mitigation of Primary Fault Rupture

In most cases, it is impractical to reduce the damage potential of surface fault rupture by engineering design; therefore, the most often used and most appropriate mitigation measure is to simply avoid placing structures on or near active fault traces. The intent of the Alquist-Priolo Earthquake Fault zones is to require that geologic investigations, which may include fault trenching, be performed if conventional structures designed for human occupancy are proposed within the zone. These studies must evaluate whether or not an active segment of the fault extends across the area of proposed development, following the guidelines for evaluating the hazard of fault rupture presented in Note 49, published by the CGS, which is available on the world wide web at http://www.consrv.ca.gov/CGS/rghm/ap/index.htm.

Based on the results of these geologic studies, appropriate structural setbacks may be recommended to prevent the siting of the proposed structures directly on top or within a certain distance from the fault. A common misperception regarding setbacks is that they are always 50 feet from the active fault trace. In actuality, geologic investigations are required to characterize the ground deformation associated with an active fault. Based on these studies, specific setbacks are recommended. If a fault trace is narrow, with little or no associated ground deformation, a setback distance less than 50 feet may be recommended. Conversely, if the fault zone is wide, with multiple splays, or is poorly defined, a setback distance greater than 50 feet may be warranted. State law allows local jurisdictions to establish minimum setback distances from a hazardous fault, and some communities have taken a prescriptive approach to this issue, establishing specific setbacks from a fault, rather than allowing for different widths depending on the circumstances. For example, the City of West Hollywood requires a 50-foot setback from the Hollywood fault for conventional structures, and 100-foot setback for critical and high-occupancy facilities.

1.6.2 Secondary Fault Rupture and Related Ground Deformation

Primary fault rupture is rarely confined to a simple line along the fault trace. As the rupture reaches the brittle surface of the ground, it commonly spreads out into complex fault patterns of secondary faulting and ground deformation. In the 1992 Landers earthquake, the zone of deformation around the main trace was locally hundreds of feet wide (Lazarte et al., 1994). Surface displacement and distortion associated with secondary faulting and deformation can be relatively minor or can be large enough to cause significant damage to structures.

Secondary fault rupture refers to ground surface displacements along faults other than the main traces of active regional faults. Unlike the regional faults, these subsidiary faults are not deeply rooted in the Earth's crust and are not capable of producing damaging earthquakes on their own. Movement along these faults generally occurs in response to movement on a nearby regional fault. The zone of secondary faulting can be quite large, even in a moderate-sized earthquake. For instance, in the 1971 San Fernando quake, movement along subsidiary faults occurred as much as 2 km from the main trace (Ziony and Yerkes, 1985).

Secondary faulting in thrust fault terrain is very complex, and numerous types of faulting have been reported. These include splays, branches, tear faults, shallow thrust faults, and back-thrusts, as well as faults that form in the shallow subsurface as a result of folding in

sedimentary layers. Identified by Yeats (1982), fold-related types include flexural slip faults (slippage along bedding planes), and bending-moment faults (tensional or compressional tears in the axis of folding). A striking example of flexural slip along bedding planes occurred during the Northridge earthquake, when numerous bedding plane faults ruptured across the surface of newly graded roads and pads in a subdivision near Santa Clarita. The ruptures were accompanied by uplift and warping of the nearby ground (Treiman, 1995).

Secondary ground deformation includes fracturing, shattering, warping, tilting, uplift and/or subsidence. Such deformation may be relatively confined along the rupturing fault, or spread over a large region (such as the regional uplift of the Santa Susana Mountains after the Northridge earthquake). Deformation and secondary faulting can also occur without primary ground rupture, as in the case of ground deformation above a blind (buried) thrust fault.

As discussed in the previous section, several of the faults near and along the southern boundary of the Hesperia General Plan study area could move sympathetically with movement on a regional fault such as the San Andreas. Although offsets due to secondary faulting are typically measured in inches or fractions of inches, if structures placed across these features are not designed property, structural damage can be expected.

1.6.2.1 Mitigation of Secondary Fault Rupture and Ground Deformation

Geotechnical investigations for future development and redevelopment should consider this hazard. The methodology for evaluating these features is similar to that used for evaluating primary fault rupture (CGS Note 49, as discussed in Section 1.6.1.1).

Lazarte et al. (1994) outlined three approaches to mitigation of fault rupture hazard, which could be applied to secondary deformation as well. The first is avoidance using structural setback zones. The second is referred to as "geotechnical engineering." This method consists of placing a compacted fill blanket, or a compacted fill blanket reinforced with horizontal layers of geogrid, over the top of the fault trace. This is based on observations that the displacement across a distinct bedrock fault is spread out and dissipated in the overlying fill, thus reducing the severity of the displacement at the surface. The third method is "structural engineering." This refers to strengthening foundation elements to withstand a limited amount of ground deformation. This is based on studies of foundation performance in the Landers earthquake showing that structures overlying major fault ruptures suffered considerable damage but did not collapse. Application of the second and third methods requires a thorough understanding of the geologic environment and thoughtful engineering judgment. This is because quantifying the extent of future displacement is difficult, and there are no proven engineering standards in place to quantify the amount of mitigation needed (for instance how thick a fill blanket is needed). However, extensive research in this area is being conducted by Bray (2001). This will hopefully lead to an increase in the use of these techniques to mitigate the hazard of secondary ground deformation, provided that the CGS and local regulatory agencies are willing to consider and approve the use of alternatives to structural setbacks.

1.7 Geologic Hazards Resulting from Seismic Shaking

1.7.1 Liquefaction and Related Ground Failure

Liquefaction is a geologic process that causes various types of ground failure. It typically occurs in loose, saturated sediments primarily of sandy composition, in the presence of ground accelerations over 0.2g (Borchardt and Kennedy, 1979; Tinsley and Fumal, 1985). When liquefaction occurs, the sediments involved have a total or substantial loss of shear strength, and behave like a liquid or semi-viscous substance. Liquefaction can cause structural distress or failure due to ground settlement, a loss of bearing capacity in the foundation soils, and the buoyant rise of buried structures. The excess hydrostatic pressure generated by ground shaking can result in the formation of sand boils or mud spouts, and/or seepage of water through ground cracks.

The types of ground failure typically associated with liquefaction are explained below.

Lateral Spreading - Lateral displacement of surficial blocks of soil as the result of liquefaction in a subsurface layer is called lateral spreading. Even a very thin liquefied layer can act as a hazardous slip plane if it is continuous over a large enough area. Once liquefaction transforms the subsurface layer into a fluid-like mass, gravity plus inertial forces caused by the earthquake may move the mass down-slope towards a cut slope or free face (such as a river channel or a canal). Lateral spreading most commonly occurs on gentle slopes that range between 0.3 degrees and 3 degrees, and can displace the ground surface by several feet to tens of feet. Such movement damages pipelines, utilities, bridges, roads, and other structures. During the 1906 San Francisco earthquake, lateral spreads with displacements of only a few feet damaged every major pipeline. Thus, liquefaction compromised San Francisco's ability to fight the fires that caused about 85% of the damage (Tinsley et al., 1985). Lateral spreading was also reported in and around the Port of Los Angeles during both the 1933 and 1994 earthquakes (CDMG, 1998).

Flow Failure – The most catastrophic mode of ground failure caused by liquefaction is flow failure. Flow failure usually occurs on slopes greater than 3 degrees. Flows are principally liquefied soil or blocks of intact material riding on a liquefied subsurface. Displacements are often in the tens of meters, but under favorable circumstances, soils can be displaced for tens of miles, at velocities of tens of miles per hour. For example, the extensive damage to Seward and Valdez, Alaska, during the 1964 Great Alaskan earthquake was caused by submarine flow failures (Tinsley et al., 1985).

Ground Oscillation – When liquefaction occurs at depth but the slope is too gentle to permit lateral displacement, the soil blocks that are not liquefied may separate from one another and oscillate on the liquefied zone. The resulting ground oscillation may be accompanied by the opening and closing of fissures (cracks) and sand boils, potentially damaging structures and underground utilities (Tinsley et al., 1985).

Loss of Bearing Strength – When a soil liquefies, loss of bearing strength may occur beneath a structure, possibly causing the building to settle and tip. If the structure is buoyant, it may float upward. During the 1964 Niigata, Japan earthquake, buried septic tanks rose as much as 3 feet, and structures in the Kwangishicho apartment complex tilted as much as 60 degrees (Tinsley et al., 1985).

Ground Lurching – Soft, saturated soils have been observed to move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks on the ground surface. At present, the potential for ground lurching to occur at a given site can be predicted only generally. Areas underlain by thick accumulation of colluvium and alluvium appear to be the most susceptible to ground lurching. Under strong ground motion conditions, lurching can be expected in loose, cohesionless soils, or in clay-rich soils with high moisture content. In some cases, the deformation remains after the shaking stops (Barrows et al., 1994).

As indicated above, there are three general conditions that need to be met for liquefaction to occur. The first of these – strong ground shaking of relatively long duration – can be expected to occur in the Hesperia area as a result of an earthquake on any of the several active faults in the region (see Section 1.5 above). The second condition – geologically young, loose, unconsolidated sediments – occurs locally throughout the Hesperia area, typically along the active drainages and on the young alluvial fans (note the distribution of very young wash – Qw, very young fan – Qf, young fan – Qyf, and very young colluvial – Qc deposits on Plate 2.1). The third condition – water-saturated sediments within about 50 feet of the surface – has occurred and occurs locally within the Mojave River floodplain, where several wells show historical water levels shallower than 30 feet below the surface (some of these wells are identified on Plate 1-3). The areas of Hesperia where young unconsolidated sediments and historical shallow groundwater conditions co-exist are shown on Plate 1-3 as susceptible to liquefaction. Although between 1930 and 1990 groundwater levels in Hesperia, as in most of the Movaje groundwater basin, have generally dropped significantly due to increased pumping from wells, water levels in the Mojave River floodplain have remained either fairly steady, or have risen since 1994, when recharge of the basin with imported water from the State Water Project began (Stamos et al., 2004). The shallowing of the water table is more prevalent downriver from the Rock Springs Outlet, near the southeastern corner of the General Plan area, where recharge water is released. Rising water levels in the floodplain are also in part due to the reclaimed wastewater released into the Mojave River about 2 miles downstream of the Forks, and at the Las Flores Ranch (Schlumberger Water Services, 2004).

Most of the rest of Hesperia is underlain by what is referred to as the regional aquifer, with water stored within the unconsolidated to slightly consolidated alluvial fan deposits of Holocene to Tertiary age (Stamos et al., 2001; 2004). The youngest sediments overlying these areas, as shown on Plate 2-2, are unconsolidated and could be susceptible to liquefaction if shallow ground water were present. However, ground water in the regional aquifer typically occurs 300 to 500 feet below the ground surface, and with increased pumping of water wells, the water levels are expected to drop even further. Therefore, those portions of Hesperia elevated above the Mojave River floodplain are not considered susceptible to liquefaction.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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JR-1
(11.46'; 6-27-95)
004N004W01C002S

RS-1
(18.85'; 6-4-98)
004N003W19G002S

Deep Creek
(29.12'; 6-27-95)
004N003W31L006S

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Sources: Derived from Morton and Miller (2003), USGS (2002), and USGS 30m Digital Elevation Model

N
W E
S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

- Areas where local geological and groundwater conditions suggest a potential for liquefaction
- Areas where local topographic and geological conditions suggest the potential for earthquake-induced landslides
- RS-1 ● Groundwater Monitoring Well in the Mojave River floodplain basin with historical groundwater levels within 30 feet of the ground surface. (Water depth, date measurement was made). Number next to well is the State Well Number.
- Hesperia City Limit
- Hesperia Sphere of Influence

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Project Number: 2617
Date: February 2010

Seismic Hazard Zones
Hesperia, California

Plate 1-3

1.7.1.1 Mitigation of Liquefaction

Although an official Seismic Hazards map does not exist for this area, the liquefaction-susceptible areas delineated in Plate 1-3 were identified following the methodology that the California Geological Survey uses to prepare the official maps. Therefore, until the State issues an official map for Hesperia, Plate 1-3 should be used as if it were the official map, and site-specific liquefaction susceptibility studies should be conducted in the mapped areas prior to any proposed development. In accordance with the SHMA, all projects within a State-delineated Seismic Hazard Zone for liquefaction must be evaluated by a Certified Engineering Geologist and/or Registered Civil Engineer (this is typically a civil engineer with training and experience in soil engineering). Most often however, it is appropriate for both the engineer and geologist to be involved in the evaluation, and in the implementation of the mitigation measures. Likewise, project review by the local agency must be performed by geologists and engineers with the same credentials and experience.

In order to assist project consultants and reviewers in the implementation of the SHMA, the State has published specific guidelines for evaluating and mitigating liquefaction (CDMG, 1997; CGS, 2008). Furthermore, in 1999, a group sponsored by the Southern California Earthquake Center (SCEC, 1999) published recommended procedures for carrying out the California Geological Survey guidelines. In general, a liquefaction study is designed to identify the depth, thickness, and lateral extent of any liquefiable layers that would affect the project site. An analysis is then performed to estimate the type and amount of ground deformation that might occur, given the seismic potential of the area. Mitigation measures generally fall in one of two categories: ground improvement or foundation design. Ground improvement includes such measures as removal and recompaction of low-density soils, removal of excess ground water, in-situ ground densification, and other types of ground improvement (such as grouting or surcharging). Special foundations that may be recommended range from deep piles to reinforcement of shallow foundations (such as post-tensioned slabs). Mitigation for lateral spreading may also include modification of the site geometry or inclusion of retaining structures. The types (or combinations of types) of mitigation depend on the site conditions and on the nature of the proposed project (CDMG, 1997; CGS, 2008).

1.7.2 Seismically Induced Settlement

Under certain conditions, strong ground shaking can cause the densification of soils, resulting in local or regional settlement of the ground surface. During strong shaking, soil grains become more tightly packed due to the collapse of voids and pore spaces, resulting in a reduction of the thickness of the soil column. This type of ground failure typically occurs in loose granular, cohesionless soils, and can occur in either wet or dry conditions. Unconsolidated young alluvial deposits are especially susceptible to this hazard. Artificial fills may also experience seismically induced settlement. Damage to structures typically occurs as a result of local differential settlements. Regional settlement can damage pipelines by changing the flow gradient on water and sewer lines, for example.

As shown in Plate 2-2, certain areas of Hesperia are underlain by young, unconsolidated alluvial deposits and artificial fill (note the distribution of all Holocene-aged deposits and artificial fill). These sediments are susceptible to seismically induced settlement.

1.7.2.1 Mitigation of Seismically Induced Settlement

Mitigation measures for seismically induced settlement are similar to those used for liquefaction. Recommendations are provided by the project's geologist and soil engineer, following a detailed geotechnical investigation of the site. Overexcavation and recompaction is the most commonly used method to densify soft soils susceptible to settlement. Deeper overexcavation below final grades, especially at cut/fill, fill/natural or alluvium/bedrock contacts may be recommended to provide a more uniform subgrade. Overexcavation should also be performed so that large differences in fill thickness are not present across individual lots. In some cases, specially designed deep foundations, strengthened foundations, and/or fill compaction to a minimum standard that is higher than that required by the UBC may be recommended.

1.7.3 Seismically Induced Slope Failure

Strong ground motions can worsen existing unstable slope conditions, particularly if coupled with saturated ground conditions. Seismically induced landslides can overrun structures, people or property, sever utility lines, and block roads, thereby hindering rescue operations after an earthquake. Over 11,000 landslides were mapped shortly after the 1994 Northridge earthquake, all within a 45-mile radius of the epicenter (Harp and Jibson, 1996). Although numerous types of earthquake-induced landslides have been identified, the most widespread type generally consists of shallow failures involving surficial soils and the uppermost weathered bedrock in moderate to steep hillside terrain (these are also called disrupted soil slides). Rock falls and rock slides on very steep slopes are also common. The 1989 Loma Prieta and Northridge earthquakes showed that reactivation of existing deep-seated landslides can also occur (Spittler et al., 1990; Barrows et al., 1995).

A combination of geologic conditions leads to landslide vulnerability. These include high seismic potential; rapid uplift and erosion resulting in steep slopes and deeply incised canyons; highly fractured and folded rock; and rock with inherently weak components, such as silt or clay layers. The orientation of the slope with respect to the direction of the seismic waves (which can affect the shaking intensity) can also control the occurrence of landslides. Ground water conditions at the time of the earthquake also play an important role in the development of seismically induced slope failures. For instance, the 1906 San Francisco earthquake occurred in April, after a winter of exceptionally heavy rainfall, and produced many large landslides and mudflows, some of which were responsible for several deaths. The 1987 Loma Prieta earthquake however, occurred in October during the third year of a drought, and slope failures were limited primarily to rock falls and reactivation of older landslides that was manifested as ground cracking in the scarp areas but with very little movement (Griggs et al., 1991).

Hesperia has not been mapped as being located within a State-delineated Seismic Hazard Zone for seismically induced landsliding because this mapping program has not yet been funded for San Bernardino County. Although most of Hesperia is characterized by relatively level to gently sloping terrain, there are a few natural slopes in Hesperia that could be vulnerable to seismically induced slope failure. These areas are shown on Plate 1-3, and a more detailed description of slope instability issues is provided in Chapter 2. In addition to the slopes identified within the city, there are many areas in the San Bernardino Mountains in and to the south of Hesperia that could fail during an earthquake. This has the potential to significantly impede traffic through the area immediately and for several

days after an earthquake, which could indirectly impact Hesperia's residents and visitors, in addition to restricting access to and from the area by emergency response teams.

1.7.3.1 Mitigation of Seismically Induced Slope Failure

Existing slopes that are to remain adjacent to or within developments should be evaluated for the geologic conditions mentioned above. In general, slopes steeper than about 15 degrees are most susceptible, however failures can occur on flatter slopes if unsupported weak rock units are exposed in the slope face. For suspect slopes, appropriate geotechnical investigation and slope stability analyses should be performed for both static and dynamic (earthquake) conditions. For deeper slides, mitigation typically includes such measures as buttressing slopes or regrading the slope to a different configuration. Protection from rockfalls or surficial slides can often be achieved by protective devices such as barriers, retaining structures, catchment areas, or a combination of the above. The runout area of the slide at the base of the slope, and the potential bouncing of rocks must also be considered. If it is not feasible to mitigate the unstable slope conditions, building setbacks should be imposed.

In accordance with the SHMA, all development projects within a State-delineated Seismic Hazard Zone for seismically induced landsliding must be evaluated and reviewed by State-licensed engineering geologists and/or civil engineers (for landslide investigation and analysis, this typically requires both). In order to assist in the implementation of the SHMA, in 1997 the State published specific guidelines for evaluating and mitigating seismically induced landslides (CDMG, 1997), and the Southern California Earthquake Center (SCEC, 2002) sponsored the publication of a report entitled "Recommended Procedures for Implementation of DMG Special Publication 117." The State guidelines have recently been updated (CGS, 2008). The unstable slope areas identified in Plate 1-3 should be evaluated following the procedures outlined in these documents if development near these slopes is proposed.

1.7.4 Deformation of Sidehill Fills

Sidehill fills are artificial fill wedges typically constructed on natural slopes to create roadways or level building pads. Deformation of sidehill fills was noted in earlier earthquakes, but this phenomenon was particularly widespread during the 1994 Northridge earthquake. Older, poorly engineered road fills were most commonly affected, but in localized areas, building pads of all ages experienced deformation. The deformation was usually manifested as ground cracks at the cut/fill contacts, differential settlement in the fill wedge, and bulging of the slope face. The amount of displacement on the pads was generally about three inches or less, but this resulted in minor to severe property damage (Stewart et al., 1995). This phenomenon was most common in relatively thin fills (about 27 feet or less) placed near the tops or noses of narrow ridges (Barrows et al., 1995). This hazard is not expected to occur in Hesperia, except potentially along some of the approaches to the bridges that extend across the I-15 or the Mojave River, where minor settlement of the bridge embankment could result in a step up of a few inches to the actual bridge. Failure of sidehill fills could also occur locally in the foothills of the San Bernardino Mountains, on lots where grading involving the placement of fill was required to make a level pad.

1.7.4.1 Mitigation of Sidehill Deformation

Hillside grading designs are typically conducted during site-specific geotechnical investigations to determine if there is a potential for this hazard. There are currently no proven engineering standards for mitigating sidehill fill deformation, consequently current published research on this topic should be reviewed by project consultants at the time of their investigation. It is thought that the effects of this hazard on structures may be reduced by the use of post-tensioned foundations, deeper overexcavation below finish grades, deeper overexcavation on cut/fill transitions, and/or higher fill compaction criteria.

1.7.5 Ridgetop Fissuring and Shattering

Linear, fault-like fissures occurred on ridge crests in a relatively concentrated area of rugged terrain in the Santa Cruz Mountains during the 1989 Loma Prieta earthquake. Shattering of the surface soils on the crests of steep, narrow ridgelines occurred locally in the 1971 San Fernando earthquake, but was widespread in the 1994 Northridge earthquake. Ridgetop shattering (which leaves the surface looking as if it was plowed) by the Northridge earthquake was observed as far as 22 miles away from the epicenter. In the Sherman Oaks area, severe damage occurred locally to structures located at the tops of relatively high (greater than 100 feet), narrow (typically less than 300 feet wide) ridges flanked by slopes steeper than about 2.5:1 (horizontal:vertical). It is generally accepted that ridgetop fissuring and shattering is a result of intense amplification or focusing of seismic energy due to local topographic effects (Barrows et al., 1995).

Ridgetop shattering may occur locally in the southern part of Hesperia, in the San Bernardino Mountains and in the foothills at the base of the mountains, to the south and east of Summit Valley Road.

1.7.5.1 Mitigation of Ridgetop Fissuring and Shattering

Projects located or proposed in steep hillside areas should be evaluated for this hazard by a Certified Engineering Geologist. Although it is difficult to predict exactly where this hazard may occur, avoidance of development along the tops of steep, narrow ridgelines is probably the best mitigation measure. For large developments, recontouring of the topography to reduce the conditions conducive to ridgetop amplification, along with overexcavation below finish grades to remove and recompact weak, fractured bedrock might reduce this hazard to an acceptable level.

1.7.6 Seiches

A seiche is defined as a standing wave oscillation in an enclosed or semi-enclosed, shallow to moderately shallow water body or basin. Seiches continue (in a pendulum fashion) after the cessation of the originating force, which can be tidal action, wind action, or a seismic event. Reservoirs, lakes, ponds, swimming pools and other enclosed bodies of water are subject to these potentially damaging oscillations (sloshing). Whether or not seismically induced seiches develop in a water body is dependent upon specific earthquake parameters (e.g. frequency of the seismic waves, distance and direction from the epicenter), as well as site-specific design of the enclosed bodies of water, and is thus difficult to predict. Seiches are often described by the period of the waves (how quickly the waves repeat themselves), since the period will often determine whether or not adjoining structures will be damaged. The period of a seiche varies depending on the dimensions of the basin. Whether an earthquake will create seiches depends upon a number of

earthquake-specific parameters, including the earthquake location (a distant earthquake is more likely to generate a seiche than a local earthquake), the style of fault rupture (e.g., dip-slip or strike-slip), and on the configuration (length, width and depth) of the basin.

Amplitudes of seiche waves associated with earthquake ground motion are typically less than 0.5 m (1.6 feet high), although some have exceeded 2 m (6.6 ft). A seiche in Hebgen Reservoir, caused by an earthquake in 1959 near Yellowstone National Park, repeatedly overtopped the dam, causing considerable damage to the dam and its spillway (Stermitz, 1964). The 1964 Alaska earthquake produced seiche waves 0.3 m (1 ft) high in the Grand Coulee Dam reservoir, and seiches of similar magnitude were reported in fourteen bodies of water in the state of Washington (McGarr and Vorhis, 1968).

Seiches due to seismic shaking could occur in Silverwood Lake, and in any other lake and recharge basin present throughout the city, if they happen to have water at the time of the earthquake. Seiching could result in sloshing of water out of the lakes and basins and onto the immediately adjacent surrounding areas. In unlined basins, sloshing of water against the basin sides could cause the surrounding soil berms to experience erosion, and locally, some surficial slope failures. Similarly, water in swimming pools is known to slosh during earthquakes, but in most cases, the sloshing does not lead to significant damage. Sloshing of water inside water reservoirs is discussed further in Chapter 2.

1.7.6.1 Mitigation of Seiches

The degree of damage to small bodies of water, such as to shallow lakes, basins, and swimming pools, is likely to be minor. However, property owners down-gradient from bodies of water that could seiche during an earthquake should be aware of the potential hazard to their property should a lake or pool lose substantial amounts of water during an earthquake. Site-specific design elements, such as baffles, to reduce the potential for seiches are warranted in tanks and in open reservoirs or ponds where overflow or failure of the structure may cause damage to nearby properties. Damage to water tanks in recent earthquakes, such as the 1992 Landers-Big Bear sequence and the 1994 Northridge, resulted from seiching. As a result, the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks (D-100) provide new criteria for seismic design (Lund, 1994).

1.7.7 Tsunami

A tsunami is a sea wave caused by any large-scale disturbance of the ocean floor that occurs in a short period of time and causes a sudden displacement of water. Tsunamis can be caused by shallow underwater earthquakes, submarine landslides, underwater volcanic explosions, oceanic meteor impacts, and even underwater nuclear explosions. Tsunamis can travel across an entire ocean basin, or they can be local.

Given Hesperia's inland location, the tsunami hazard in the city is nil.

1.8 HazUS Earthquake Scenario Loss Estimations for the City of Hesperia

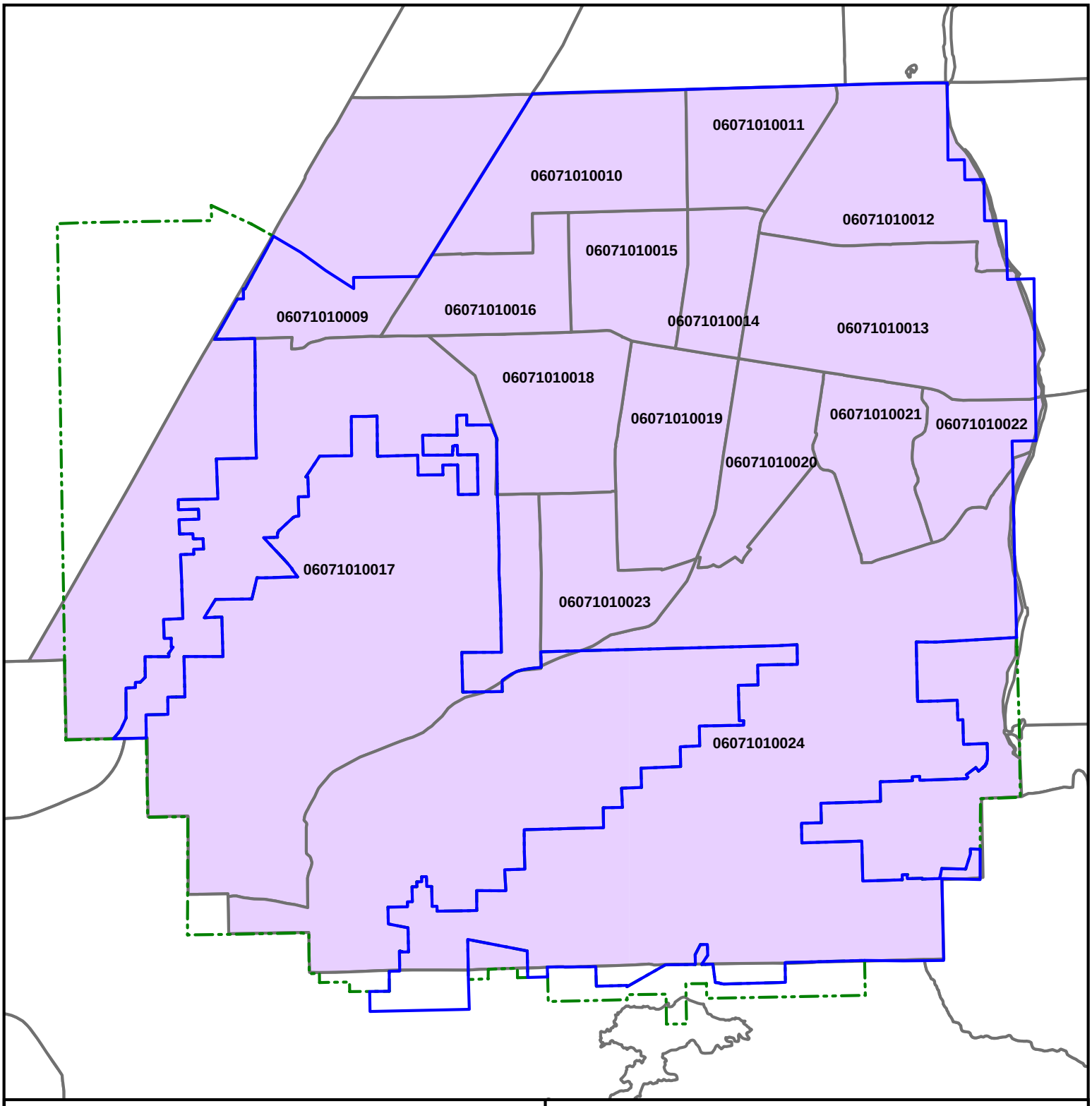
HazUS-MH™ is a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). [HazUS-MH stands for Hazards US – Multi-hazard.] A project of the National Institute of Building Sciences, funded by the Federal Emergency Management Agency

(FEMA), HazUS is a powerful advance in mitigation strategies. The HazUS project developed guidelines and procedures to make standardized earthquake loss estimates at a regional scale. With standardization, estimates can be compared from region to region. HazUS is designed for use by state, regional and local governments in planning for earthquake loss mitigation, emergency preparedness, response and recovery. HazUS addresses nearly all aspects of the built environment, and many different types of losses. The methodology has been tested against the experience of several past earthquakes, and against the judgment of experts. Subject to several limitations noted below, HazUS can produce results that are valid for the intended purposes.

Loss estimation is an invaluable tool, but it must be used with discretion. Loss estimation analyzes casualties, damage and economic loss in great detail. It produces seemingly precise numbers that can be easily misinterpreted. Loss estimation's results, for example, may cite 4,054 left homeless by a scenario earthquake. This is best interpreted by its magnitude. That is, an event that leaves 4,000 people homeless is clearly more manageable than an event causing 40,000 homeless people; and an event that leaves 400,000 homeless would overwhelm a community's resources. However, another loss estimation that predicts 5,000 people homeless should probably be considered equivalent to the 4,054 result. Because HazUS results make use of a great number of parameters and data of varying accuracy and completeness, it is not possible to assign quantitative error bars. Although the numbers should not be taken at face value, they are not rounded or edited because detailed evaluation of individual components of the disaster can help mitigation agencies ensure that they have considered all the important options.

The more community-specific the data that are input to HazUS, the more reliable the loss estimation. HazUS provides defaults for all required information. These are based on best-available scientific, engineering, census and economic knowledge. The loss estimations in this report have been tailored to Hesperia by using a map of soil types for the city.

HazUS-HM relies on 2000 Census data, which are reported by geographical areas or tracts. Sixteen (16) census tracts cover most of the Hesperia General Plan area (i.e., the City and its Sphere of Influence); these 16 census tracts were used in the HazUS-HM analysis, and their coverage, in relation to the study area, is shown on Figure 1-5. This figure shows that the largest area not included in the census tracts used in the analysis is that portion of the Sphere of Influence west of the Bureau of Light and Power Road and south of the California Aqueduct. A narrow band of the General Plan area along and south of Highway 173 was also not included. A review of recent aerial photographs suggests that the areas not included in the analysis are not extensively populated – the area west of the Bureau of Light and Power Road area is characterized by very low density housing in large parcels, whereas the area south of Highway 173 is predominantly vacant – and therefore that the population numbers used by HazUS are not off significantly. Other areas in the Sphere of Influence that were considered in the analysis do have an influence on the population numbers. Specifically, and according to HazUS, the 2000 census population for the 16 tracts considered was 69,074, while the City of Hesperia reports that its population in 2000, without including the Sphere of Influence, was 62,582. Therefore, the areas in the Sphere of Influence considered in the analysis added less about 7,000 to the year 2000 population count.



N
W E
S

0 9000 18000 Feet

0 2000 4000 Meters

Scale: 1:108,000

Explanation

- Census Tract
- Hesperia City Limit
- Hesperia Sphere of Influence

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Census Tract Boundaries

Used in the HazUS Analyses

Figure 1-5

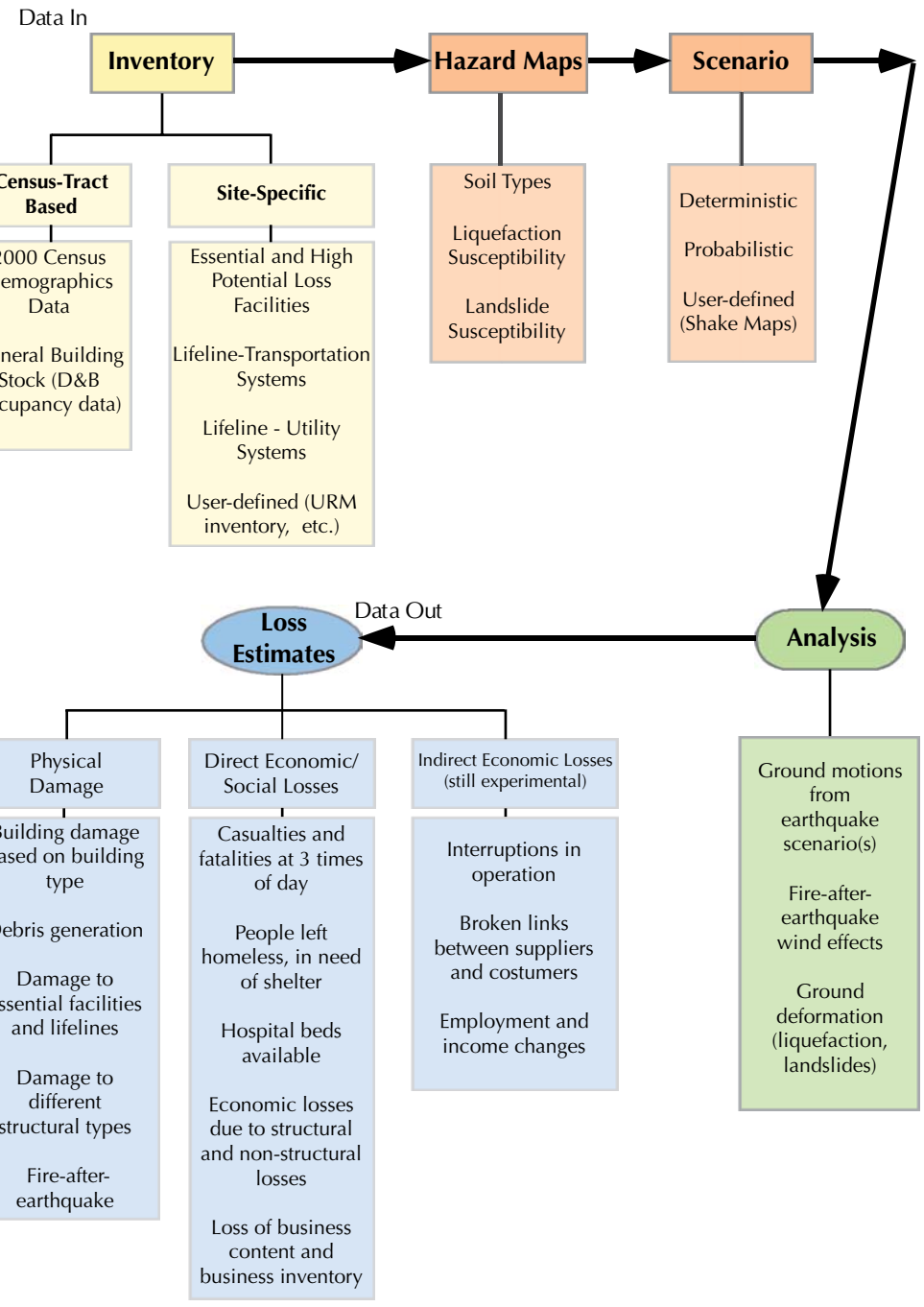
A different concern regarding the analysis is that the 2000 population numbers used are no longer applicable given that this is one of the fastest growing regions in southern California. Specifically, the City estimates that its 2006 population was 84,645, about a 26% increase since the year 2000. This increase in population is associated with a similar increase in housing in the area, consisting of several new large developments. Given this increase, it can reasonably be argued that the results presented here should be increased about 26% to account for the dramatic increase in population and housing. However, since HazUS considers a series of factors, including age and type of construction of the structures housing this population, and most of the casualties and damages are expected to be related preferentially to structures built to older building codes, a blanket 26% increase in the numbers would yield erroneously high loss estimates. For this reason, we chose to report the HazUS results without modification, recognizing that they are approximate and possibly about 10% short of the true numbers.

In addition, useful as HazUS seems to be, the loss estimation methodology has some inherent uncertainties. These arise in part from incomplete scientific knowledge concerning earthquakes and their effect upon buildings and facilities, and in part from the approximations and simplifications necessary for comprehensive analyses. Users should be aware of the following specific limitations:

- HazUS is driven by statistics, and thus is most accurate when applied to a region, or a class of buildings or facilities. It is least accurate when considering a particular site, building or facility.
- Losses estimated for lifelines may be less than losses estimated for the general building stock.
- Losses from smaller (less than M 6.0) damaging earthquakes may be overestimated.
- Pilot and calibration studies have not yet provided an adequate test concerning the possible extent and effects of landsliding (although this is not a concern in most of Hesperia).
- The indirect economic loss module is still experimental. While output from pilot studies has generally been credible, this module requires further testing.
- The databases that HazUS draws from to make its estimates are often incomplete or as mentioned above, either do not perfectly match the boundaries of the desired study area, or are no longer representative of current conditions. In the case of Hesperia, the city has grown substantially since the 2000 Census.

1.8.1 Methodology, Terminology and Input Data Used in the Earthquake Loss Estimations for the City of Hesperia

The flow chart in Figure 1-6 illustrates the modules (or components) of a HazUS analysis. The HazUS software uses population data by census tract and general building stock data from Dunn & Bradstreet (DNB). Essential facilities and lifeline inventory are located by latitude and longitude. However, the HazUS inventory data for lifelines and utilities were developed at a national level and where specific data are lacking, statistical estimations are utilized. Specifics about the site-specific inventory data used in the models are discussed further in the paragraphs below. Other site-specific data used include soil types. The user then defines the earthquake scenario to be modeled, including the magnitude of the



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Generalized Flow Chart Summarizing the HazUS Methodology

Figure 1-6

earthquake, and the location of the epicenter. Once all these data are input, the software calculates the loss estimates for each scenario.

The loss estimates include physical damage to buildings of different construction and occupancy types, damage to essential facilities and lifelines, number of after-earthquake fires and damage due to fire. The model also estimates the direct economic and social losses, including casualties and fatalities for three different times of the day, the number of people left homeless and number of people that will require shelter, number of hospital beds available, and the economic losses due to damage to the places of businesses, loss of inventory, and (to some degree) loss of jobs. The indirect economic losses component is still experimental; the calculations in the software are checked against actual past earthquakes, such as the 1989 Loma Prieta and 1994 Northridge earthquakes, but indirect losses are hard to measure, and it typically takes years before these monetary losses can be quantified with any degree of accuracy.

Critical Facilities: HazUS breaks critical facilities into two groups: essential facilities and high potential loss (HPL) facilities. Essential facilities provide important services to the community and should be functional after an earthquake. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. For Hesperia, the HazUS database shows one hospital with a total bed capacity of 83 beds (the Desert Valley Hospital located in Victorville, across the street from Hesperia), 23 schools, four fire stations, one police station and no dedicated emergency operations center (the Council Chambers is used as the EOC in the event of a disaster). Economic losses associated with these facilities are computed as part of the analysis of the general building stock. Data required for the analysis include occupancy classes (current building use) and building structural type, or a combination of essential facilities building type, design level and construction quality factor.

With respect to HPL facilities, the HazUS database shows zero dams in the region, no significant hazardous materials sites, no military installations, and no nuclear power plants. Although there are indeed no dams within the General Plan area, as Plate 3-2 shows, there are three dams near the Hesperia region, and at least two of them have the potential to inundate the low-lying areas along the Mojave River floodplain and Summit Valley if they fail. Similarly, as described in Chapter 5 of this document, there are at least four sites in the Hesperia area that use or produce significant quantities of hazardous materials (this list does not include the Hesperia Fire Lab site, a CERCLIS site that is not actively using or generating hazardous materials). Strong ground shaking during an earthquake could result in the accidental release of some of these compounds, with the potential to impact adjacent areas. For additional information regarding potential earthquake-induced damage to these facilities, refer to Sections 5.1.1 and 5.9 in Chapter 5.

Transportation and Utility Lifelines: HazUS divides the lifeline inventory into two systems: transportation and utility lifelines. The transportation system includes seven components: highways, railways, light rail, bus, ferry, ports, and airports. The utility lifelines include potable water, wastewater, natural gas, crude and refined oil, electric power, and communications. If site-specific lifeline utility data are not provided for these analyses, HazUS performs a statistical calculation based on the population served.

General Building Stock Type and Classification: HazUS provides damage data for buildings based on these structural types:

- Concrete
- Manufactured Housing (Trailers and Mobile Homes)
- Precast Concrete
- Reinforced Masonry Bearing Walls
- Steel
- Unreinforced Masonry Bearing Walls
- Wood Frame

and based on these occupancy (usage) classifications:

- Agricultural
- Commercial
- Education
- Government
- Industrial
- Other Residential
- Religion
- Single Family

Building Damage Classification: Loss estimation for the general building stock is averaged for each census tract. Building damage classifications range from slight to complete. As an example, the building damage classification for wood frame buildings is provided below. Wood-frame structures comprise the city's most numerous building type.

Wood, Light Frame:

Slight Structural Damage: Small cracks in the plaster or gypsum-board at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.

Moderate Structural Damage: Large cracks in the plaster or gypsum-board at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.

Extensive Structural Damage: Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of "room-over-garage" or other "soft-story" configurations; small foundations cracks.

Complete Structural Damage: Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Incorporation of Historic Building Code Design Functions: Estimates of building damage are provided for "High", "Moderate" and "Low" seismic design criteria. Buildings of newer construction (e.g., post-1973) are best designated by "high," indicating a higher resistance to earthquake damage than buildings classified as "moderate" or "low." Buildings built after 1940, but before 1973, are best represented by "moderate." If built before about 1940 (i.e., before significant seismic codes were implemented), "low" is most appropriate. According to the 2000 census data, about 0.3% of the housing units in Hesperia date from 1939 and earlier, 12.6% of the housing units were built between 1940 and 1969, and the remaining 87% of the structures (in 2000) were built between 1970 and 2000. More recent data show that between 2000 and 2006, housing in Hesperia increased by about 26%. Therefore, most of the housing stock in Hesperia can be described as in the high seismic design criteria for earthquake resistance.

Fires Following Earthquakes: Fires following earthquakes can cause severe losses. In some instances, these losses can outweigh the losses from direct damage, such as collapse of buildings and disruption of lifelines. Many factors affect the severity of the fires following an earthquake, including but not limited to: ignition sources, types and density of fuel, weather conditions, functionality of water systems, and the ability of fire fighters to suppress the fires.

A complete fire-following-earthquake model requires extensive input about the readiness of local fire departments and the types and availability (functionality) of water systems. The fire following earthquake model presented here is simplified. With better understanding of fires that will be garnered after future earthquakes, forecasting capability will undoubtedly improve. For additional information regarding this topic, refer to Section 1.8.4.8 and Chapter 4.

Estimating Casualties: Casualties are estimated based on the assumption that there is a strong correlation between building damage (both structural and non-structural) and the number and severity of casualties. In smaller earthquakes, non-structural damage will most likely control the casualty estimates. In severe earthquakes where there will be a large number of collapses and partial collapses, there will be a proportionately larger number of fatalities. Data regarding earthquake-related injuries are not of the best quality, nor are they available for all building types. Available data often have insufficient information about the type of structure in which the casualties occurred and the casualty-generating mechanism. HazUS casualty estimates are based on the injury classification scale described in Table 1-3.

In addition, HazUS produces casualty estimates for three times of day:

- Earthquake striking at 2:00 A.M. (population at home)
- Earthquake striking at 2:00 P.M. (population at work/school)
- Earthquake striking at 5:00 P.M. (commute time).

Table 1-3: Injury Classification Scale

Injury Severity Level	Injury Description
Severity 1	Injuries requiring basic medical aid without requiring hospitalization.
Severity 2	Injuries requiring a greater degree of medical care and hospitalization, but not expected to progress to a life-threatening status.
Severity 3	Injuries which pose an immediate life-threatening condition if not treated adequately and expeditiously. The majority of these injuries are the result of structural collapse and subsequent entrapment or impairment of the occupants.
Severity 4	Instantaneously killed or mortally injured.

Displaced Households/Shelter Requirements: Earthquakes can cause loss of function or habitability of buildings that contain housing. Displaced households may need alternative short-term shelter, provided by family, friends, temporary rentals, or public shelters established by the City, County or by relief organizations such as the Red Cross. Long-term alternative housing may require import of mobile homes, occupancy of vacant units, net emigration from the impacted area, or, eventually, the repair or reconstruction of new public and private housing. The number of people seeking short-term public shelter is of most concern to emergency response organizations. The longer-term impacts on the housing stock are of great concern to local governments, such as cities and counties.

Economic Losses: HazUS estimates structural and nonstructural repair costs caused by building damage and the associated loss of building contents and business inventory. Building damage can cause additional losses by restricting the building's ability to function properly. Thus, business interruption and rental income losses are estimated. HazUS divides building losses into two categories: (1) direct building losses and (2) business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

Earthquakes may produce indirect economic losses in sectors that do not sustain direct damage. All businesses are forward-linked (if they rely on regional customers to purchase their output) or backward-linked (if they rely on regional suppliers to provide their inputs) and are thus potentially vulnerable to interruptions in their operation. Note that indirect losses are not confined to immediate customers or suppliers of damaged enterprises. All of the successive rounds of customers of customers and suppliers of suppliers are affected. In this way, even limited physical earthquake damage causes a chain reaction, or ripple effect, that is transmitted throughout the regional economy.

1.8.2 HazUS Scenario Earthquakes for the Hesperia Area

Two specific scenario earthquakes were modeled using the HazUS-HMMH (Multi-Hazard) loss estimation software available from FEMA: an earthquake on the southern San Andreas fault rupturing the San Bernardino and Coachella segments, and an earthquake on the North Frontal Fault Zone. Specifics about each of these earthquake-producing faults are provided in Section 1.5 above, and in Table 1-4 below.

Table 1-4: HazUS Scenario Earthquakes for the City of Hesperia

Fault Source	Magnitude	Description
San Andreas - San Bernardino - Coachella segments	7.7	A large earthquake that ruptures both the San Bernardino and Coachella segments of the San Andreas fault is modeled because of its high probability of occurrence, and closeness to Hesperia.
Frontal Fault Zone	7.2	Low probability but high-risk earthquake event. The HazUS results indicate that this earthquake scenario has the potential to cause significant damage in Hesperia.

1.8.3 Inventory Data Used in the HazUS Loss Estimation Models for Hesperia

As mentioned previously, the population numbers used for the analyses are based on the 2000 Census data and the region encompassed by the census tract boundaries that best cover the Hesperia study area. As shown on Figure 1-5, the area covered in the HazUS analysis extends beyond the city's borders – the region analyzed is about 113 square miles in area and contains 16 census tracts (whereas the city of Hesperia is approximately 75 square miles in area and its Sphere of Influence covers an additional 32 square miles, for a total of about 107 square miles). Population in this region is increasing at a quick pace: the 2000 Census reported a population in the city of 68,442 (Hazus reports a 2000 population in the slightly larger area included in the analyses of 69,074, showing that the outlying areas were only lightly populated), but by 2006, the City estimates that its population had increased to 84,645. Therefore, the Hazus results may be under-representative of current conditions, although most damage is expected to occur in the older sections of town that were included in the analyses.

The HazUS database includes 21,000 buildings in the region, with a total building replacement value (excluding contents) of $3.754 billion. Approximately 99% of the buildings considered in the analysis (and 90% of the building value) are associated with residential housing (Hesperia estimates that in 2006, the number of occupied dwellings in the city is 26,456, for an increase from the 2000 numbers of about 26%, consistent with the 26% increase in population reported earlier). In terms of building construction types found in the region, wood-frame construction makes up approximately 93% of the building inventory. The remainder is distributed between the other general building types. The replacement value for the transportation and utility lifeline systems in the region is estimated at $1.53 billion and $58.1 million, respectively. This inventory includes over 261 kilometers (162 miles) of highways, 18 bridges, and 2,897 kilometers (1,800 miles) of pipes.

The HazUS inventory of unreinforced masonry (URM) buildings includes 16 structures, whereas the 2003 Seismic Safety Commission data indicate that there is only one URM in Hesperia. According to Mr. Regner of the Building and Safety Department (personal communication), there is indeed only one URM structure in Hesperia. Additional URMs could be present in the Sphere of Influence, but not 15 of them. Therefore, the HazUS numbers are over-representative of the URMs in the General Plan area. Since URMs are assigned a "Low" seismic design criteria and are considered likely to collapse or experience significant structural damage during an earthquake, the casualty numbers provided below may include a few victims associated with these non-existent URMs. However, the casualty numbers are primarily related to damaged residential structures, as discussed further in Sections 1.8.4.1 and 1.8.4.2, below.

1.8.4 Estimated Losses Associated with the Earthquake Scenarios

HazUS loss estimations for Hesperia based on the modeled earthquake scenarios are presented concurrently below. These scenarios include an earthquake that ruptures both the San Bernardino and Coachella segments of the San Andreas fault, and an earthquake on the West segment of the North Frontal fault. Of the two earthquake scenarios modeled for the city, the results indicate that a Mw 7.2 earthquake on the North Frontal fault has the potential to cause more damage in Hesperia than a larger, but more distant earthquake on the San Andreas fault.

1.8.4.1 Building Damage

HazUS estimates that between approximately 1,400 and 4,100 buildings will be at least moderately damaged in response to the earthquake scenarios presented herein, with the lower number representative of damage as a result of an earthquake on the San Andreas fault, and the higher number representing damage as a result of an earthquake on the North Frontal fault. These figures represent about 7 and 20%, respectively, of the total number of buildings in the region considered in the analysis. An estimated 80 to 750 buildings will be completely destroyed. Table 1-5 summarizes the expected damage to buildings by general occupancy type, whereas Table 1-6 summarizes the expected damage to buildings in the region, classified by construction type.

The data presented in Tables 1-5 and 1-6 show that most of the buildings damaged will be wood-frame residential structures. A high percentage of manufactured housing is also expected to be damaged. More specifically, the San Andreas fault earthquake scenario has the potential to cause at least slight damage to about 24% of the single-family residential structures in the Hesperia region, and moderate to complete damage to about 4% of the single-family residential stock. The North Frontal fault earthquake scenario has the potential to cause at least slight damage to about 58% of the single-family residential structures, and moderate to complete damage to about 17% of the single-family residential stock.

Table 1-5: Number of Buildings Damaged, by Occupancy Type

Scenario	Occupancy Type	Slight	Moderate	Extensive	Complete	Total
San Andreas	Agriculture	0	0	0	0	0
	Commercial	19	12	3	0	34
	Education	0	0	0	0	0
	Government	0	0	0	0	0
	Industrial	2	1	0	0	3
	Other Residential	380	412	160	22	974
	Religion	1	1	0	0	2
	Single Family	4,017	669	27	59	4,772
	Total	**4,419**	**1,095**	**190**	**81**	**5,785**
North Frontal	Agriculture	0	0	0	0	0
	Commercial	29	26	8	5	68
	Education	0	0	0	0	0
	Government	0	0	0	0	0
	Industrial	4	4	1	1	10
	Other Residential	407	458	195	75	1,135
	Religion	2	1	0	0	3
	Single Family	6,913	2,445	196	660	10,214
	Total	**7,355**	**2,934**	**400**	**741**	**11,430**

Table 1-6: Number of Buildings Damaged, by Construction Type

Scenario	Structure Type	Slight	Moderate	Extensive	Complete	Total
San Andreas	Wood	4,050	661	24	59	4,794
	Steel	9	7	2	0	18
	Concrete	9	5	1	0	15
	Precast	4	3	1	0	8
	Reinforced Masonry	31	22	5	1	59
	Unreinforced Masonry	3	2	0	0	5
	Manufactured Housing	313	395	157	21	886
	Total	**4,419**	**1,094**	**190**	**81**	**5,785**
North Frontal	Wood	6,980	2,435	183	663	10,261
	Steel	11	12	4	2	29
	Concrete	14	10	3	2	29
	Precast	6	8	3	1	18
	Reinforced Masonry	50	53	18	9	130
	Unreinforced Masonry	4	4	2	1	11
	Manufactured Housing	290	412	187	63	952
	Total	**7,355**	**2,934**	**400**	**741**	**11,430**

Multi-family residential structures, including condominiums and apartments, are expected to be impacted in even higher proportions, with the San Andreas fault earthquake scenario causing at least slight damage to about 63% of these structures. The North Frontal fault earthquake scenario would impact about 73% of the multi-family residential structures.

Similarly, the San Andreas fault scenario has the potential to cause moderate to complete damage to about 50% of the manufactured homes (mobile homes), whereas the North Frontal fault earthquake would cause moderate to complete damage to about 55% of these homes.

The commercial and industrial structures in the Hesperia region will also be impacted (Table 1-5), with the San Andreas fault earthquake scenario causing at least slight damage to about 30% and 20%, respectively, of the commercial and industrial buildings in the region. The North Frontal fault earthquake scenario is anticipated to cause at least slight damage to 59%, and 67%, respectively, of the commercial and industrial buildings in Hesperia.

1.8.4.2 Casualties

Table 1-7 provides a summary of the casualties estimated for these scenarios. The analysis indicates that the worst time for an earthquake to occur in Hesperia is during maximum residential occupancy, at 2 o'clock in the morning, when most people are at home. This is because, as Tables 1-5 and 1-6 above show, residential wood structures and manufactured housing are expected to experience a large proportion of the overall structural damage. The North Frontal fault earthquake scenario is anticipated to cause the largest number of casualties.

Table 1-7: Estimated Casualties

Type and Time of Scenario			Level 1: Medical treatment without hospitalization	Level 2: Hospitalization but not life threatening	Level 3: Hospitalization and life threatening	Level 4: Fatalities due to scenario event
San Andreas	2A.M. (max. residential occupancy)	Residential	30	5	0	0
		Non-Residential	1	0	0	3
		Commute	0	0	0	0
		Total	**31**	**5**	**0**	**0**
	2 P.M. (max educational, industrial, and commercial)	Residential	7	2	0	0
		Non-Residential	15	2	0	1
		Commute	0	0	0	0
		Total	**22**	**4**	**0**	**1**
	5 P.M. (peak commute time)	Residential	12	3	0	0
		Non-Residential	12	2	0	1
		Commute	0	0	0	0
		Total	**24**	**5**	**0**	**1**
North Frontal	2A.M. (max. residential occupancy)	Residential	176	39	3	4
		Non-Residential	2	0	0	0
		Commute	0	0	0	0
		Total	**178**	**39**	**3**	**4**
	2 P.M. (max educational, industrial, and commercial)	Residential	45	10	2	1
		Non-Residential	64	18	2	6
		Commute	0	0	0	0
		Total	**109**	**28**	**4**	**7**
	5 P.M. (peak commute time)	Residential	70	15	1	1
		Non-Residential	53	15	2	5
		Commute	0	0	1	0
		Total	**123**	**30**	**4**	**6**

The second worst time for an earthquake to occur in the region is during the peak commute time, at 5 o'clock in the afternoon. However, a closer review of the data shows that the casualties at this time are not related to commuters, but rather to residential occupancies. That is, at this time there is already a high proportion of individuals (i.e., children and caregivers) at home. The scenarios also show that about 40% to 50% of casualties at this time are expected to occur in the non-residential occupancies, which include commercial, educational, and industrial facilities. Comparison of these data with data in Table 1-5 shows that commercial and industrial facilities combined make up a large percentage of these non-residential casualties, possibly highlighting the structural deficiencies of precast, tilt-up concrete construction typical of many strip malls, shopping centers, warehouses and industrial complexes.

1.8.4.3 Essential Facility Damage

The loss estimation model calculates the total number of hospital beds in Hesperia that will be available after each earthquake scenario. HazUS calculates how many hospital beds will be available for use by patients already in the hospital and those injured by the earthquake on the day of the earthquake, one week after the earthquake, and 30 days (1 month) after the earthquake. The results of the earthquake scenarios are summarized below.

Table 1-8: Hospital Beds Available After the Earthquake Scenario

Scenario	# of beds available on day of earthquake	# of beds available 1 week after earthquake	# of beds available 30 days after earthquake
San Andreas	79	83	83
North Frontal	59	79	81

The regional hospital used in the analysis serves not only the city of Hesperia, but also Victorville, Apple Valley and other nearby communities that would also be impacted by the earthquake scenarios modeled for this study. That, coupled with the estimates of the number of injured people that will require hospitalization after an earthquake on the North Frontal fault (see Table 1-7), suggests that the regional hospital will be unable to meet the demand for medical care, especially immediately after the earthquake. Other hospitals in nearby cities could be expected to help, although given the regional impact that a magnitude 7.2 earthquake is likely to have, it is reasonable to expect that the other nearby hospitals will be similarly overwhelmed. The data suggest that an earthquake on the San Andreas fault, alternatively, will not place severe demands on the hospital, at least not as a result of casualties in Hesperia.

HazUS also estimates the damage to other essential facilities in the city, including schools, fire stations, and police stations. According to the model, an earthquake on the San Andreas fault will not cause significant damage to any of the schools, police stations or fire stations in Hesperia. A maximum magnitude earthquake on the North Frontal fault does have the potential to impact some of the essential facilities in Hesperia. Specifically, the North Frontal fault earthquake is anticipated to cause at least minor damage to 8 of the 23 schools in the area, and to 3 of the 4 fire stations (only 15 of the 23 schools, and 1 of the 4 fire stations are expected to be more than 50% functional the day of the earthquake). Furthermore, one of the fire stations is expected to suffer at least moderate damage.

Similarly, the police station is expected to experience minor damage so that it will not be more than 50% functional the day of the earthquake. This loss of functionality on the day of the earthquake may be in part related to non-structural damage, such as toppled bookshelves and computers, which would prevent these facilities from functioning immediately after the earthquake.

1.8.4.4 Economic Losses

The model estimates that total economic losses in the Hesperia area will range from about $98 million for an earthquake on the San Andreas fault, to nearly $392 million for an earthquake on the North Frontal fault (see Table 1-9 below). These figures include building- and lifeline-related losses based on the region's available inventory, and business interruption losses. Business interruption losses account for 5% to 6% of the losses in the region. The residential occupancies would suffer the most, comprising about 83% of the total loss in either earthquake scenario.

Table 1-9: Estimated Economic Losses

Scenario	Property Damage	Business Interruption	Total
San Andreas	$92.75 million	$5.4 million	$98.15 million
North Frontal	$382.62 million	$9.05 million	$391.67 million

Table 1-10: Building-Related Economic Loss Estimates (in millions of dollars)

		Area	Single-Family	Other Residential	Commercial	Industrial	Others	Total
San Andreas	Income Losses	Wage	0.00	0.02	1.41	0.08	0.04	1.55
		Capital-Related	0.00	0.01	1.21	0.05	0.01	1.28
		Rental	1.22	0.4	0.63	0.02	0.01	2.28
		Relocation	0.13	0.02	0.04	0.00	0.01	0.20
		Subtotal	1.35	0.44	3.29	0.16	0.07	5.31
	Capital Stock Loses	Structural	8.54	1.54	1.71	0.35	0.18	12.32
		Non-Structural	43.32	6.34	4.78	1.25	0.57	56.25
		Content	13.84	1.26	2.37	0.81	0.28	18.56
		Inventory	0.00	0.00	0.12	0.19	0.00	0.32
		Subtotal	65.70	9.14	8.97	2.60	1.03	87.45
		Total	**67.05**	**9.58**	**12.26**	**2.76**	**1.10**	**92.75**
North Frontal	Income Losses	Wage	0.00	0.05	4.60	0.27	0.13	5.04
		Capital-Related	0.00	0.02	3.59	0.17	0.04	3.82
		Rental	7.00	1.92	2.06	0.08	0.04	11.10
		Relocation	0.77	0.06	0.13	0.01	0.02	0.99
		Subtotal	7.77	2.05	10.38	0.53	0.22	20.94
	Capital Stock Loses	Structural	41.54	3.87	6.63	1.24	0.58	53.86
		Non-Structural	179.72	21.47	20.12	5.67	2.08	229.06
		Content	55.71	5.35	11.08	3.91	1.14	77.18
		Inventory	0.00	0.00	0.61	0.94	0.02	1.56
		Subtotal	276.97	30.69	38.44	11.76	3.82	361.67
		Total	**284.74**	**32.73**	**48.82**	**12.29**	**4.04**	**382.62**

Table 1-10 provides a summary of the estimated building-related economic losses anticipated as a result of the two earthquake scenarios considered herein. Table 1-10 shows that a substantial amount of the property damage is due to non-structural losses, that is, cosmetic damage to a structure that does not result in the collapse of the structure and is repairable. This is essentially what building codes are designed to do.

1.8.4.5 Transportation Damage

Damage to transportation systems in Hesperia is based on a generalized inventory of the region, which includes areas outside of the city, since the transportation network extends beyond corporate boundaries. Table 1-11 provides specific information about the damage estimates to specific components of the transportation system. Roadway segments and railroad tracks are assumed to be damaged by ground failure only. Since none of the faults considered in the HazUS analysis extend through Hesperia, damage as a result of ground failure is not considered likely.

Table 1-11: Expected Damage to the Transportation Systems

Scenario	System	Component	Locations/ Segments	With at Least Moderate Damage	With Complete Damage	Functionality >50%		Economic Loss (Millions $)
						After Day 1	*After Day 7*	
San Andreas	Highway	Segments	6	0	0	6	6	2.61
		Bridges	18	0	0	18	18	0.54
		Tunnels	0	0	0	0	0	0.00
	Railways	Segments	20	0	0	20	20	0.03
		Bridges	0	0	0	0	0	0.00
		Tunnels	0	0	0	0	0	0.00
		Facilities	0	0	0	0	0	0.00
	Bus	Facilities	1	0	0	1	1	0.13
	Airport	Facilities	1	0	0	1	1	1.18
		Runways	1	0	0	1	1	0.02
North Central	Highway	Segments	6	0	0	6	6	3.10
		Bridges	18	0	0	18	18	0.58
		Tunnels	0	0	0	0	0	0.00
	Railways	Segments	20	0	0	20	20	0.08
		Bridges	0	0	0	0	0	0.00
		Tunnels	0	0	0	0	0	0.00
		Facilities	0	0	0	0	0	0.00
	Bus	Facilities	1	0	0	1	1	0.4
	Airport	Facilities	1	1	0	1	1	2.38
		Runways	1	0	0	1	1	0.12

The facilities associated with the transportation systems considered herein, however, can be impacted by strong ground shaking. The analyses suggest that the transportation system in Hesperia will not be impacted significantly by either of the earthquake scenarios considered. In fact, all of the components in the transportation system are anticipated to be more than 50% functional on the day of the earthquake in Hesperia. Nevertheless, economic losses due to damage, albeit minor, to the transportation facilities amounts to between $4.5 and $6.7 million, with the lower figure associated with an earthquake on the

San Andreas fault. It is important to remember that these same transportation systems may be significantly impacted in other areas near Hesperia due to surface fault rupture, landsliding, liquefaction and other types of seismically induced ground deformation, which could directly and indirectly have an impact on Hesperia's residents (especially those that commute) and businesses that rely on products shipped on these transportation systems.

1.8.4.6 Utility Systems Damage

The HazUS inventory for the Hesperia region provides a site-specific length of pipelines for potable water, wastewater, natural gas and oil. From this inventory, the model calculates the expected number of leaks and breaks in the system. Table 1-12 summarizes the expected damage to these systems in Hesperia as a result of the earthquake scenarios on the San Andreas and North Frontal faults. The models suggest that the potable water, wastewater and natural gas systems in Hesperia will experience moderate damage as a result of an earthquake on either the San Andreas or North Frontal faults, with dozens of leaks and breaks anticipated in these systems. Where potable water and wastewater pipes occupy the same trench, leaks in both can result in contamination of the potable water supply.

Table 1-13 shows the expected performance of the potable water and electric power systems using empirical relationships based on the number of households served in the area. According to the models, earthquakes on the North Frontal fault has the potential to leave nearly 2,000 households without potable water for one or two days. Given these results, Hesperia residents should be strongly encouraged to store at a minimum, a 2-day supply of drinking water for the entire household (including pets), with a 7-day supply being preferable.

At least 6,000 residents are also expected to be without electricity for the few days after the earthquake. The damage estimates also show that whereas the potable water system may be mostly repaired two days after the earthquake, at least 200 households may be without electric power even a month after the earthquake. This may force many to seek shelter elsewhere, as discussed in the next section.

Table 1-12: Expected Utility System Pipeline Damage (Site Specific)

Scenario	System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
San Andreas	Potable Water	1,449	58	22
	Wastewater	869	46	18
	Natural Gas	580	49	19
	Oil	0	0	0
North Frontal	Potable Water	1,449	96	71
	Wastewater	869	76	56
	Natural Gas	580	81	60
	Oil	0	0	0

Table 1-13: Expected Performance of Potable Water and Electric Power Services

Scenario	Utility	Number of Households without Service*				
		Day 1	Day 3	Day 7	Day 30	Day 90
San Andreas	Potable Water	0	0	0	0	0
	Electric Power	0	0	0	0	0
North Frontal	Potable Water	1,954	0	0	0	0
	Electric Power	5,918	3,387	1,253	228	9

*Based on Total Number of Households = 22,017

1.8.4.7 Shelter Requirements

HazUS estimates that approximately 74 households in Hesperia may be displaced due to the San Andreas fault earthquake modeled for this study (a household contains four people, on average). About 16 people will seek temporary shelter in public shelters (see Table 1-14 below). The rest of the displaced individuals are anticipated to seek shelter with family or friends. An earthquake on the North Frontal fault is anticipated to displace about 780 households, with approximately 200 people seeking temporary shelter. These numbers however, may be low, given the large Hispanic population in Hesperia. Hispanics, especially those of Mexican and Central American ancestry, generally prefer to camp out in parks and other open spaces rather than return to their house soon after an earthquake, even if their house appears to be undamaged. This was observed in the greater Los Angeles area following the 1994 Northridge earthquake, as well as other previous earthquakes in California, such as the 1987 Whittier Narrows and 1989 Loma Prieta earthquakes (Tierney, 1994; Tierney, 1995; Andrews, 1995).

Table 1-14: Estimated Shelter Requirements

Scenario	Displaced Households	People Needing Short-Term Shelter
San Andreas	74	16
North Frontal	783	200

1.8.4.8 Fire Following Earthquake

Fires often occur after an earthquake as a result of toppled stoves, sparks caused by downed electrical wires, leaks of flammable materials, and other reasons. The lack of water to fight the fires can then lead to many of these to burn out of control. HazUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area as a result of an earthquake. For the San Andreas fault earthquake scenario ran for Hesperia, HazUS estimates 3 ignitions immediately following an earthquake. The burnt area resulting from these ignitions will vary depending on wind conditions. Normal wind conditions of about 10 miles per hour (mph) are expected to result in burn areas of about 0.04 square miles (0.03% of the region's total area). The model estimate that about 35 people will be displaced by fire, and the value of lost structures will be about $2.1 million. Similarly, an earthquake on the North Frontal fault is estimated to result in 2 ignitions that will burn about 0.04 square miles (0.03% of the region's total area). The model also estimates that about 58 people will be displaced by these fires, with the value of the lost

structures amounting to about $3.7 million. If severe wind conditions are present at the time of these earthquakes, the burnt areas can be expected to be significantly larger.

Table 1-15: Fire-Following-Earthquake Losses

Scenario	Number of Ignitions	Population Exposed	Value Exposed (in thousands of $)
San Andreas	3	35	2,077
North Frontal	2	58	3,364

1.8.4.9 Debris Generation

HazUS estimates the amount of debris that will be generated by the scenario earthquakes. The model breaks the debris into two general categories: 1) brick/wood, and 2) concrete/steel. The distinction is made because of the different types of material-handling equipment required to handle the debris. The San Andreas earthquake is estimated to generate a total of 23,000 tons of debris, with brick/wood amounting to about 52% (12,000 tons) of this total. Removing this debris would require approximately 920 truckloads (at 25 tons/truckload). The model estimates that the North Frontal earthquake will generate 49,000 tons of brick and wood, and 50,000 tons of concrete and steel, for a total of 99,000 tons of debris. If the debris tonnage is converted to an estimated number of truckloads, it would require approximately 3,960 truckloads to remove the debris generated by this earthquake.

Table 1-16: Debris Generation (in Thousands of Tons)

Scenario	Brick, Wood & C	Concrete &	Total
San Andreas	12	11	23
North Frontal	49	50	99

1.9 Vulnerability of Structures to Earthquake Hazards

This section assesses the general earthquake vulnerability of structures and facilities common in the Hesperia area. This analysis is based on past earthquake performance of similar types of buildings in the U.S. The effects of design earthquakes on particular structures within the city are beyond the scope of this study.

Although it is not possible to prevent earthquakes from occurring, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning and enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake disaster.

With these goals in mind, the State Legislature passed Senate Bill 547, addressing the identification and seismic upgrade of Unreinforced Masonry (URM) buildings. In addition, the law encourages identification and mitigation of seismic hazards associated with other types of potentially

hazardous buildings, including pre-1971 concrete tilt-ups, soft-stories, mobile homes, and pre-1940 homes.

1.9.1 Potentially Hazardous Buildings and Structures

Most of the loss of life and injuries due to an earthquake are related to the collapse of hazardous buildings and structures. FEMA (1985) defines a hazardous building as "any inadequately earthquake resistant building, located in a seismically active area, that presents a potential for life loss or serious injury when a damaging earthquake occurs." Building codes have generally been made more stringent following damaging earthquakes.

Building damage is commonly classified as either structural or non-structural. Structural damage impairs the building's support. This includes any vertical and lateral force-resisting systems, such as frames, walls, and columns. Non-structural damage does not affect the integrity of the structural support system, but includes such things as broken windows, collapsed or rotated chimneys, unbraced parapets that fall into the street, and fallen ceilings.

During an earthquake, buildings get thrown from side to side and up and down. Given the same acceleration, heavier buildings are subjected to higher forces than lightweight buildings. Damage occurs when structural members are overloaded, or when differential movements between different parts of the structure strain the structural components. Larger earthquakes and longer shaking duration tend to damage structures more. The level of damage can be predicted only in general terms, since no two buildings undergo the exact same motions, even in the same earthquake. Past earthquakes have shown us, however, that some types of buildings are far more likely to fail than others.

Unreinforced Masonry Buildings – Unreinforced masonry buildings (URMs) are prone to failure due to inadequate anchorage of the masonry walls to the roof and floor diaphragms, lack of steel reinforcing, the limited strength and ductility of the building materials, and sometimes, poor construction workmanship. Furthermore, as these buildings age, the bricks and mortar tend to deteriorate, making the buildings even weaker.

In response to the 1986 URM Law, Hesperia inventoried its URMs. In the year 2003, the City reported to the Seismic Safety Commission (SSC, 2003) that there is only one URM in Hesperia, the old school house, a building that is considered of historical significance, although it has not been designated as such.

Soft-Story Buildings – Of particular concern are soft-story buildings (buildings with a story, generally the first floor, lacking adequate strength or toughness due to too few shear walls). Apartments above glass-fronted stores, and buildings perched atop parking garages are common examples of soft-story buildings. Collapse of a soft story and “pancaking” of the remaining stories killed 16 people at the Northridge Meadows apartments during the 1994 Northridge earthquake (EERI, 1994). There are many other cases of soft-story collapses in past earthquakes. The City of Hesperia should consider conducting an inventory of their soft-stories, and encouraging the structural retrofit of these structures to withstand collapse during an earthquake.

Wood-Frame Structures – The HazUS analysis indicates that a large percentage of wood-

frame structures in Hesperia are expected to experience slight to complete damage as a result of ground shaking expected in the region. Structural damage to wood-frame structures often results from an inadequate connection between the superstructure and the foundation. These buildings may slide off their foundations, with consequent damage to plumbing and electrical connections. Unreinforced masonry chimneys may also collapse. These types of damage are generally not life threatening, although they may be costly to repair. Wood frame buildings with stud walls generally perform well in an earthquake, unless they have no foundation or have a weak foundation constructed of unreinforced masonry or poorly reinforced concrete. In these cases, damage is generally limited to cracking of the stucco, which dissipates much of the earthquake's induced energy. The collapse of wood frame structures, if it happens, generally does not generate heavy debris, but rather, the wood and plaster debris can be cut or broken into smaller pieces by hand-held equipment and removed by hand in order to reach victims (FEMA, 1985).

Pre-Cast Concrete Structures – Partial or total collapse of buildings where the floors, walls and roofs fail as large intact units, such as large pre-cast concrete panels, cause the greatest loss of life and difficulty in victim rescue and extrication (FEMA, 1985). These types of buildings are common not only in southern California, but abroad. Casualties as a result of collapse of these structures in past earthquakes, including Mexico (1985), Armenia (1988), Nicaragua (1972), El Salvador (1986 and 2001), the Philippines (1990) and Turkey (1999) add to hundreds of thousands. In southern California, many of the parking structures that failed during the Northridge earthquake, such as the Cal-State Northridge and City of Glendale Civic Center parking structures, consisted of pre-cast concrete components (EERI, 1994).

Collapse of this type of structure generates heavy debris, and removal of this debris requires the use of heavy mechanical equipment. Consequently, the location and extrication of victims trapped under the rubble is generally a slow and dangerous process. Extrication of trapped victims within the first 24 hours after the earthquake becomes critical for survival. In most instances, however, post-earthquake planning fails to quickly procure equipment needed to move heavy debris. The establishment of Heavy Urban Search and Rescue teams, as recommended by FEMA (1985), has improved victim extrication and survivability. Buildings that are more likely to fail and generate heavy debris need to be identified, so that appropriate mitigation and planning procedures are defined prior to an earthquake.

Tilt-up Buildings – Tilt-up buildings have concrete wall panels, often cast on the ground, or fabricated off-site and trucked in, that are tilted upward into their final position. Connections and anchors have pulled out of walls during earthquakes, causing the floors or roofs to collapse. A high rate of failure was observed for this type of construction in the 1971 San Fernando and 1987 Whittier Narrows earthquakes. Tilt-up buildings can also generate heavy debris.

Reinforced Concrete Frame Buildings – Reinforced concrete frame buildings, with or without reinforced infill walls, display low ductility. Earthquakes may cause shear failure (if there are large tie spacings in columns, or insufficient shear strength), column failure (due to inadequate rebar splices, inadequate reinforcing of beam-column joints, or insufficient tie anchorage), hinge deformation (due to lack of continuous beam reinforcement), and

non-structural damage (due to the relatively low stiffness of the frame). A common type of failure observed following the Northridge earthquake was confined column collapse (EERI, 1994), where infilling between columns confined the length of the columns that could move laterally in the earthquake.

Multi-Story Steel Frame Buildings – Multi-story steel frame buildings generally have concrete floor slabs. However, these buildings are less likely to collapse than concrete structures. Common damage to these types of buildings is generally non-structural, including collapsed exterior curtain wall (cladding), and damage to interior partitions and equipment. Overall, modern steel frame buildings have been expected to perform well in earthquakes, but the 1994 Northridge earthquake broke many welds in these buildings, a previously unanticipated problem.

Older, pre-1945 steel frame structures may have unreinforced masonry such as bricks, clay tiles and terra cotta tiles as cladding or infilling. Cladding in newer buildings may be glass, infill panels or pre-cast panels that may fail and generate a band of debris around the building exterior (with considerable threat to pedestrians in the streets below). Structural damage may occur if the structural members are subject to plastic deformation, which can cause permanent displacements. If some walls fail while others remain intact, torsion or soft-story problems may result.

Mobile Homes – Mobile homes are prefabricated housing units that are placed on isolated piers, jackstands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes are usually plywood, and outside surfaces are covered with sheet metal. Mobile homes typically do not perform well in earthquakes. Severe damage occurs when they fall off their supports, severing utility lines and piercing the floor with jackstands.

Combination Types – Buildings are often a combination of steel, concrete, reinforced masonry and wood, with different structural systems on different floors or different sections of the building. Combination types that are potentially hazardous include: concrete frame buildings without special reinforcing, precast concrete and precast-composite buildings, steel frame or concrete frame buildings with unreinforced masonry walls, reinforced concrete wall buildings with no special detailing or reinforcement, large capacity buildings with long-span roof structures (such as theaters and auditoriums), large un-engineered wood-frame buildings, buildings with inadequately anchored exterior cladding and glazing, and buildings with poorly anchored parapets and appendages (FEMA, 1985). Additional types of potentially hazardous buildings may be recognized after future earthquakes.

In addition to building types, there are other factors associated with the design and construction of the buildings that also have an impact on the structures' vulnerability to strong ground shaking. Some of these conditions are discussed below:

Building Shape – A building's vertical and/or horizontal shape can also be important. Simple, symmetric buildings generally perform better than non-symmetric buildings. During an earthquake, non-symmetric buildings tend to twist as well as shake. Wings on a building tend to act independently during an earthquake, resulting in differential

movements and cracking. The geometry of the lateral load-resisting systems also matters. For example, buildings with one or two walls made mostly of glass, while the remaining walls are made of concrete or brick, are at risk. Asymmetry in the placement of bracing systems that provide a building with earthquake resistance can result in twisting or differential motions.

Pounding – Site-related seismic hazards may include the potential for neighboring buildings to "pound", or for one building to collapse onto a neighbor. Pounding occurs when there is little clearance between adjacent buildings, and the buildings "pound" against each other as they deflect during an earthquake. The effects of pounding can be especially damaging if the floors of the buildings are at different elevations, so that, for example, the floor of one building hits a supporting column of the other. Damage to a supporting column can result in partial or total building collapse.

1.9.2 Essential Facilities

Essential facilities are those parts of a community's infrastructure that must remain operational after an earthquake. Buildings that house essential services include schools, hospitals, fire and police stations, emergency operation centers, and communication centers. Plate 1-4 shows the locations of the city's fire stations, police station, schools, and other essential facilities. A vulnerability assessment for these facilities involves comparing their locations to potentially hazardous areas identified in the city, including areas underlain by active and potentially active faults (Plate 1-2), liquefaction-susceptible areas (Plate 1-3), potential flood areas due to either storm events (Plate 3-1) or dam failure inundation (Plate 3-2), and sites that generate, use or store hazardous materials (Plate 5-1).

High-risk facilities, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, and industrial plants that use or store explosives, toxic materials or petroleum products.

High-occupancy facilities have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes.

Dependent-care facilities, such as preschools and schools, hospitals, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations.

Economic facilities, such as banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers, are those facilities that should remain operational to avoid severe economic impacts.

It is crucial that essential facilities have no structural weaknesses that can lead to collapse. For example, the Federal Emergency Management Agency (FEMA, 1985) has suggested the following seismic performance goals for health care facilities:

- The damage to the facilities should be limited to what might be reasonably expected after a destructive earthquake and should be repairable and not be life-threatening.

NOTES:

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Mojave River Forks Dam

Cedar Springs Dam

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: City of Hesperia

N

W E

S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

- City Hall
- Fire Station
- Emergency Operations Center
- Hospital
- Police Station
- Schools
- Reservoir
- Hazardous Materials Drop Off Site
- Dam
- Airport
- Hesperia City Limit
- Hesperia Sphere of Influence

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Critical Facilities Map
in and near Hesperia, California

Plate 1-4

- Patients, visitors, and medical, nursing, technical and support staff within and immediately outside the facility should be protected during an earthquake. Emergency utility systems in the facility should remain operational after an earthquake.
- Occupants should be able to evacuate the facility safely after an earthquake.
- Rescue and emergency workers should be able to enter the facility immediately after an earthquake and should encounter only minimum interference and danger.
- The facility should be available for its planned disaster response role after an earthquake.

1.9.3 Lifelines

Lifelines are those services that are critical to the health, safety and functioning of the community. They are particularly essential for emergency response and recovery after an earthquake. Furthermore, certain critical facilities designed to remain functional during and immediately after an earthquake may be able to provide only limited services if the lifelines they depend on are disrupted. Lifeline systems include water, sewage, electrical power, communication, transportation (highways, bridges, railroads, and airports), natural gas, and liquid fuel systems. The improved performance of lifelines in the 1994 Northridge earthquake, relative to the 1971 San Fernando earthquake, shows that the seismic codes upgraded and implemented after 1971 have been effective. Nevertheless, the impact of the Northridge earthquake on lifeline systems was widespread and illustrates the continued need to study earthquake impacts, to upgrade substandard elements in the systems, to provide redundancy in systems, to improve emergency response plans, and to provide adequate planning, budgeting and financing for seismic safety. Some of the lifelines in the city of Hesperia are shown in Plate 1-5. This plate, however, does not show all of the utility pipes that extend through the city, as there are so many that showing them would make the graphic unusable.

Water supply facilities, such as dams, reservoirs, pumping stations, water treatment plants, and distribution lines are especially critical after an earthquake, not only for drinking water, but to fight fires. Possible failure of reservoirs during an earthquake is discussed further in Chapter 3.

Some of the observations and lessons learned from the Northridge earthquake are summarized below (from Savage, 1995; Lund, 1996).

- Several electrical transmission towers were damaged or totally collapsed. Collapse was generally due to foundation distress in towers that were located near ridge tops where amplification of ground motion may have occurred. One collapse was the result of a seismically induced slope failure at the base of the tower.
- Damage to above ground water tanks typically occurred where piping and joints were rigidly connected to the tank, due to differential movement between the tank and the piping. Older steel tanks not seismically designed under current standards buckled at the bottom (called "elephant's foot"), in the shell, and on the roof. Modern steel and concrete tanks generally performed well.

NOTES:

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Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: National Pipeline mapping system, 2010.

N
W E
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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

- California Aqueduct
- Railroad
- Power line
- Major Road
- Airport
- Approximate Location of Gas Transmission Pipeline
- Approximate Location of Hazardous Liquid Pipeline
- Hesperia City Limit
- Hesperia Sphere of Influence

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Date: February 2010

Major Utility and Lifelines Map

Hesperia, California

Plate 1-5

- The most vulnerable components of pipeline distribution systems were older threaded joints, cast iron valves, cast iron pipes with rigid joints, and older steel pipes weakened by corrosion. In the case of broken water lines, the loss of fire suppression water forced fire departments to utilize water from swimming pools and tanker trucks.
- Significant damage occurred in water treatment plants due to sloshing in large water basins.
- A number of facilities did not have an emergency power supply or did not have enough power supply capacity to provide their essential services.
- Lifelines within critical structures, such as hospitals and fire stations, may be vulnerable. For instance, rooftop mechanical and electrical equipment is not generally designed for seismic forces. During the Northridge quake, rooftop equipment failed causing malfunctions in other systems.
- A 70-year old crude oil pipeline leaked from a cracked weld, spreading oil for 12 miles down the Santa Clara River.

The above list is by no means a complete summary of the earthquake damage, but it does highlight some of the issues pertinent to the Hesperia area. All lifeline providers should make an evaluation of the seismic vulnerability within their systems a priority. The evaluation should include a plan to fund and schedule the needed seismic mitigation.

1.10 Reducing Earthquake Hazards in the City of Hesperia

This section identifies and discusses the opportunities available for seismic upgrading of existing development and capital facilities, including potentially hazardous buildings and other critical facilities. Many of the issues and opportunities available to the City apply to new development as well as redevelopment and infilling. Issues involving rehabilitation and strengthening of existing development are decidedly more complex given the economic and societal impacts inherent to these issues.

Prioritizing rehabilitation and strengthening projects requires that the City consider where its resources would be better spent to reduce earthquake hazards in the existing development, and how the proposed mitigation programs can be implemented so as not to cause undue hardship on the community. Rehabilitation programs should target, on a priority basis, potentially hazardous buildings, critical facilities, and high-risk lifeline utilities. The City can best address rehabilitation issues. However, the hazard evaluation is intended to define the scope of the problem.

Recent earthquakes, with their relatively low loss of life, have demonstrated that the best mitigation technique in earthquake hazard reduction is the constant improvement of building codes with the incorporation of the lessons learned from past earthquakes. The most recent building codes (UBC 1997; CBC 2001; IBC, 2006; CBC, 2007) are prime examples of how incorporating past experience can further reduce the devastating effects of an earthquake. However, while new building codes reduce the hazard, increases in population leading to building in vulnerable areas and the aging of the existing building stock work toward increasing the earthquake hazard in a given region.

1.10.1 Building Code Impacts on the City of Hesperia

To mitigate for seismic shaking in new construction, recent building codes use amplification factors to account for the impacts that soft sediments and proximity to earthquake sources have on ground motion. Three main effects are considered: 1) soft soils, 2) proximity to earthquake sources (referred to as near-source factors), and 3) the seismic characteristics of the nearby earthquake sources (seismic source type).

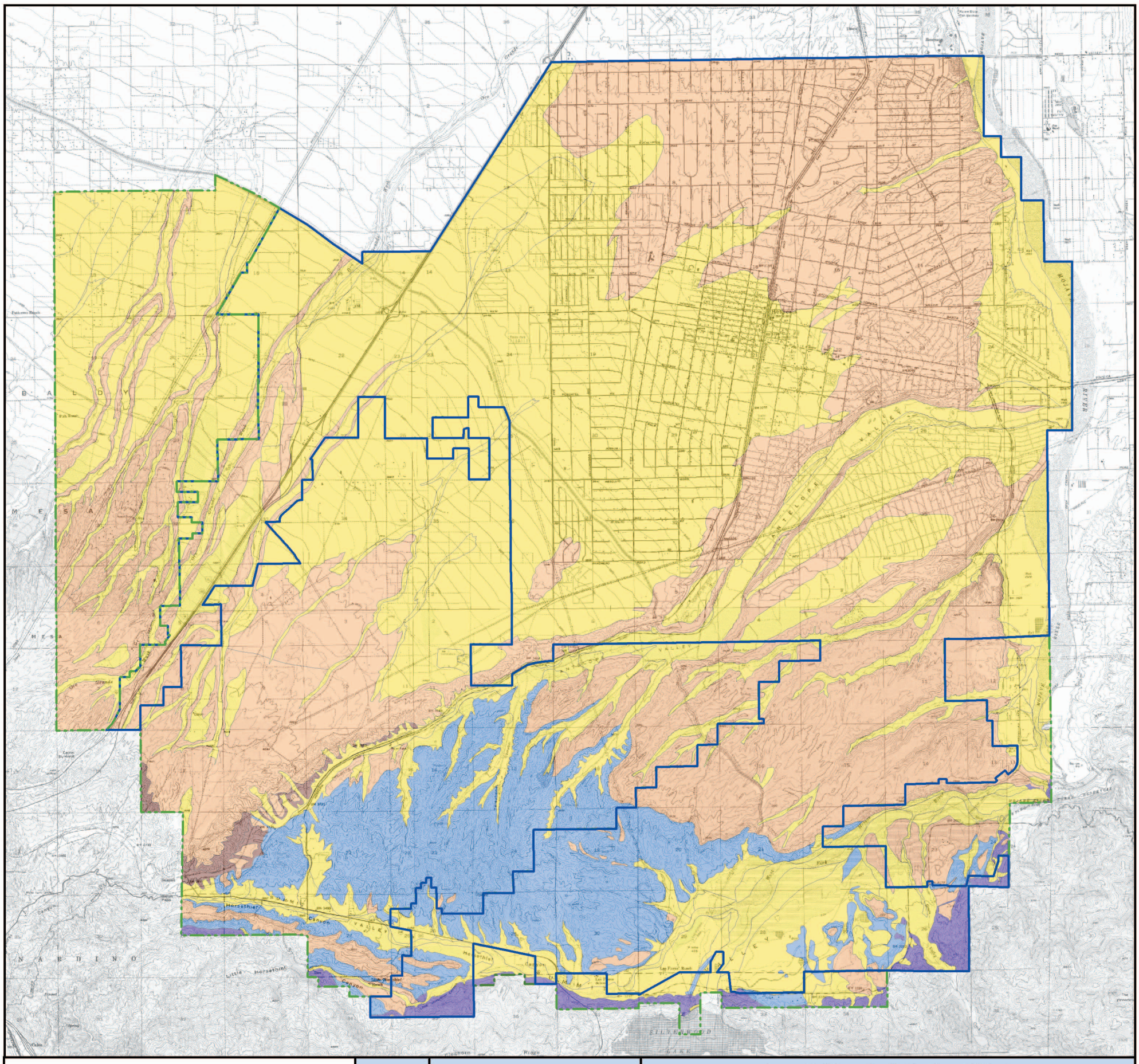
Soft-Soil Effects: The soft soil amplification factors were developed from observations made after the 1985 Mexico City, 1989 Loma Prieta and other earthquakes that showed the amplifying impact that underlying soil materials have on ground shaking. The ground-shaking basis for code design includes six soil types based on the average soil properties for the top 100 feet of the soil profile (see Table 1-17 and Plate 1-6).

Table 1-17: Site Class Definitions (Based on Soil Profile Types) (from CBC, 2007)

Site Class	Soil Profile Name/ Generic Description	Average Soil Properties for the Upper 100 Feet		
		Shear Wave Velocity (feet/second)	Standard Penetration Resistance (blows/foot)	Undrained Shear Strength (psf)
A	Hard Rock	>5,000	N/A	N/A
B	Rock	2,500 to 5,000	N/A	N/A
C	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
D	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
E	Soft soil profile	<600	<15	<1,000
	Any profile with more than 10 feet of soil having the following characteristics: 1. Plasticity index PI > 20 2. Moisture Content w>= 40%, and 3. Undrained shear strength < 500 psf			
F	Any profile containing soil having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays, where the thickness of this section is more than 10 feet. 3. Very high plasticity clays (more than 25 feet of clay with plasticity index PI > 75). 4. Very thick soft/medium stiff clays (thickness of the soil > 120 feet).			

From Table 1613.5.2 of the 2007 California Building Code
Psf = pounds per square foot

Given the youthful, unconsolidated nature of the alluvial sediments underlying most of the city, a large portion of the Hesperia area can be designated as having a site class type E profile. Denser soils more characteristic of the class type D profile are also present throughout, in areas underlain by older sedimentary deposits. Denser soil profiles, described as rock or hard rock occur in the southern, less-developed portions of the city and its Sphere of Influence (see Plate 1-6). Mapping of these soil types in the General Plan area is based on published descriptions of the geologic units that occur in the area (see



NOTES:

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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

N W E S

Site Class	Soil Profile Name/Generic Description	Average Soil Properties for the Upper 100 feet		
		Shear Wave Velocity (feet/second)	Standard Penetration Resistance (blows/foot)	Undrained Shear Strength (psf)
A	Hard Rock	>5,000	N/A	N/A
B	Rock	2,500 to 5,000	N/A	N/A
C	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
D	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
E	Soft soil profile	<600	<15	<1,000
	Any profile with more than 10 feet of soil having the following characteristics: 1. Plasticity index PI > 20 2. Moisture Content w>= 40%, and 3. Undrained shear strength < 500 psf			
F	Any profile containing soil having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays, where the thickness of this section is more than 10 feet. 3. Very high plasticity clays (more than 25 feet of clay with plasticity index PI > 75). 4. Very thick soft/medium stiff clays (thickness of the soil > 120 feet).			

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Sources: Based on data from Morton and Miller, 2003 and Table 1613.5.2 of the 2007 California Building Code
psf = pounds per square foot

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Engineering Soil Types in Hesperia, California

(In Accordance with 2007 California Building Code)

Plate 1-6

Plate 2-2). Site-specific studies designed to characterize the shear wave velocity and undrained shear strength of the soil column need to be conducted to confirm which site class is most applicable in the design analysis for a specific project.

Near- Source Factors*:* The Hesperia area is subject to near-source design factors given that there are several active faults located within 15 km of the city (see Table 1-2). These parameters, which first appeared in the 1997 Uniform Building Code (UBC), address the proximity of potential earthquake sources (faults) to the site. These factors were present in earlier versions of the UBC for implementation into the design of seismically isolated structures, but are now included for all structures. The adoption into the 1997 code of all buildings in UBC zone 4 was a result of the observation of more intense ground shaking than expected near the fault ruptures at Northridge in 1994, and again one year later at Kobe, Japan. The 1997 UBC also included a near-source factor that accounts for directivity of fault rupture. The direction of fault rupture was observed to play a significant role in distribution of ground shaking at Northridge and Kobe. For Northridge, much of the earthquake energy was released into the sparsely populated mountains north of the San Fernando Valley, while at Kobe, the rupture direction was aimed at the city and was a contributing factor in the extensive damage. However, the rupture direction of a given source cannot be predicted, and as a result, the UBC required a general increase in estimating ground shaking of about 20% to account for directivity.

Seismic Source Type*:* Near-source factors also include a classification of seismic sources based on slip rate and maximum magnitude potential. These parameters are used in the classification of three seismic source types (A, B and C) summarized on Table 1-18.

Table 1-18: Seismic Source Type

Seismic Source Type	Seismic Source Description	Seismic Source Definition	
		Maximum Moment Magnitude, M	Slip Rate, SR (mm/yr.)
A	Faults which are capable of producing large magnitude events and which have a high rate of seismicity.	$M \geq 7.0$ and	$SR \geq 5$
B	All faults other than Types A and C.		
C	Faults which are not capable of producing large magnitude earthquakes and which have a relatively low rate of seismic activity.	$M < 6.5$	$SR \leq 2$

Type A faults are highly active and capable of producing large magnitude events. Most segments of the San Andreas fault, for example, are classified as Type A. The Type A slip rate (>5 mm/yr) is common only to tectonic plate boundary faults. Type C seismic sources are considered not capable of producing large magnitude events such that their potential ground shaking effects can be ignored. Type B sources include most of the active faults in California and include all faults that are neither Type A nor C. Type A faults near Hesperia include the San Andreas and San Jacinto faults. Type B faults in the region include the

Cleghorn, Cucamonga, Helendale-South Lockhart, Lenwood-Lockhart-Old Woman Springs, North Frontal and Sierra Madre faults (Cao et al., 2003).

To establish near-source factors for any proposed project in the city of Hesperia, the first step is to identify and locate the known active faults in the region. The International Conference of Building Officials (ICBO) has provided an Atlas of the location of known faults for California to accompany the 1997 UBC, although this map is now dated, and consultants should refer to more recent sources as well. The rules for measuring distance from a fault are provided by the 1997 UBC. The criteria for determining distance to vertical or near-vertical strike-slip faults, such as the San Andreas or San Jacinto faults, are relatively straightforward. However, the distance to thrust faults and blind thrust faults, such as the Cucamonga and North Frontal fault, is assumed as 0 for anywhere above the dipping fault plane to a depth of 10 kilometers. This greatly increases the areal extent of high ground shaking parameters, but is warranted based on observations of ground shaking at Northridge.

Summary: Seismic codes have been undergoing their most significant changes in history. These improvements are a result of experience in recent earthquakes, as well as extensive research under the National Earthquake Hazard Reduction Program (NEHRP). Inclusion of soil and near-field effects in the most recent building codes represents a meaningful and impactive change put forth by the geoscience community. Seismic codes will continue to improve with new versions of the building code, and as new data are obtained from both past and future earthquakes.

1.10.2 Retrofit and Strengthening of Existing Structures

Building codes are generally not retroactive, and past earthquakes have shown that many types of structures are potentially hazardous. Structures built before the lessons learned from the 1971 Sylmar earthquake are particularly susceptible to damage during an earthquake, including unreinforced masonry (URM) structures, pre-cast tilt-up concrete buildings, soft-story structures, unreinforced concrete buildings, as well as pre-1952 single-family structures. Other potentially hazardous buildings include irregular-shaped structures and mobile homes. Therefore, while the earthquake hazard mitigation improvements associated with the current building codes address new construction, the retrofit and strengthening of existing structures requires the adoption of ordinances.

Potentially hazardous buildings, such as pre-1971 concrete tilt-up structures and soft-story buildings should be inventoried. Potentially hazardous buildings can be identified and inventoried following the recommendations set forth in publications such as "Rapid Visual Screening of Buildings for Potential Seismic Hazards: Handbook and Supporting Documentation" and "A Handbook for Seismic Evaluation of Existing Buildings and Supporting Documentation", both prepared by the Applied Technology Council in Redwood City, California, and supplied by the Federal Emergency Management Agency (FEMA publications 154 and 155, and 175 and 178, respectively).

The building inventory phase of a seismic hazard mitigation program should accurately record the potentially hazardous buildings in an area. To do so, a GIS system is invaluable. The database should include information such as the location of the buildings, the date and type of construction, construction materials and type of structural framing

system, structural conditions, number of floors, floor area, occupancy and relevant characteristics of the occupants (such as whether the building houses predominantly senior citizens, dependent care or handicapped residents, etc.), and information on structural elements or other characteristics of the building that may pose a threat to life.

Once buildings are identified as potentially hazardous, a second, more thorough analysis may be conducted. This step may be carried out by local officials, such as the City's Building and Safety Department, or building owners may be required to submit a review by a certified structural engineer that has conducted an assessment of the structural and non-structural elements and general condition of the building, and has reviewed the building's construction documents (if available). The nonstructural elements should include the architectural, electrical and mechanical systems of the structure. Cornices, parapets, chimneys and other overhanging projections should be addressed too, especially in areas with high pedestrian traffic, as these may pose a significant threat to passersby, and to individuals who, in fear, may step out of the building during an earthquake. State of repair of buildings should also be noted, including cracks, rot, corrosion, and lack of maintenance, as these conditions may decrease the seismic strength of a structure. Occupancy should be noted as this factor is very useful in prioritizing the buildings to be abated for seismic hazards.

For multi-story buildings, large occupancy structures, and critical facilities, the seismic analysis of the structure should include an evaluation of the site-specific seismic environment (e.g., response spectra, estimates of strong ground motion duration, etc.), and an assessment of the building's loads and anticipated deformation levels. The resulting data should be weighted against acceptable levels of damage and risk chosen by the City for that particular structure. Once these guidelines are established, mitigation techniques available (including demolition, strengthening and retrofitting, etc.) should be evaluated, weighted, and implemented.

With the inventory and analysis phases complete, a retrofit program can be implemented. Although retrofit buildings may still incur severe damage during an earthquake, the mitigation results in a substantial reduction of casualties by preventing collapse. The societal and economic implications of rehabilitating existing buildings are discussed in many publications, including "Establishing Programs and Priorities for the Seismic Rehabilitation of Buildings – A Handbook and Supporting Report," and "Typical Costs for Seismic Rehabilitation of Existing Buildings: Summary and Supporting Documentation," (FEMA Publications 174 and 173, and 156 and 157, respectively). Another appropriate source is the publication prepared by Building Technology, Inc. entitled "Financial Incentives for Seismic Rehabilitation of Hazardous Buildings – An Agenda for Action" (Report and Appendices).

The City of Hesperia should set a list of priorities by which strengthening of the buildings identified as hazardous will be established and conducted. Currently, there are no Federal or State mandated criteria established to determine the required structural seismic resistance capacity of structures. Retrofitting to meet the most current CBC standards may be cost-prohibitive, and therefore, not feasible. The City may develop its own set of criteria, however, this task should be carried out following a comprehensive development and review process that involves experienced structural engineers, building officials,

insurance representatives, and legal authorities. Selection of the criteria by which the structural seismic resistance capacity of structures will be measured may follow a review of the performance during an earthquake of similar types of buildings that had been retrofit prior to the seismic event. Upgrading potentially hazardous buildings to, for example, 1973 standards may prove inefficient if past examples show that similar buildings retrofit to 1973 construction codes performed poorly during a particular earthquake, and had to be demolished anyway. Issues to be addressed include justification for strengthening a building to a performance level less than the current code requirements, the potential liabilities and limitations on liability, and the acceptable damage to the structure after strengthening (FEMA, 1985).

The mitigation program established by the City could be voluntary or mandatory. Voluntary programs to encourage mitigation of potentially hazardous buildings have been implemented with various degrees of success in California. Incentives that have been used to engender support among building owners include tax waivers, tax credits, and waivers from certain zoning restrictions. Other cities have required a review by a structural engineer when the building is undergoing substantial improvements.

1.11 Summary and Recommendations

Since it is not possible to prevent an earthquake from occurring, local governments, emergency relief organizations, and residents are advised to take action and develop and implement policies and programs aimed at reducing the effects of earthquakes. Individuals should also exercise prudent planning to provide for themselves and their families in the aftermath of an earthquake.

Earthquake Sources:

- There are no known earthquake sources within the Hesperia General Plan area. However, Hesperia is close to the North Frontal, Cleghorn, and San Andreas faults (within 15 km or 9 miles). Therefore, proposed new developments in Hesperia should incorporate near-source factors in the design of the structures. Specifically, near-source factors need to be used if the proposed structure is located within 10 km of a Type A fault (the San Andreas fault), or within 5 km of any of the Type B faults (Cleghorn or North Frontal faults).

- A number of historic earthquakes have caused strong ground shaking in Hesperia. Strong ground shaking due to future earthquakes on nearby regional sources should be expected and designed for.

Design Earthquake Scenarios:

- Geologists, seismologists, engineers and urban planners typically use maximum magnitude and maximum probable earthquakes to evaluate the seismic hazard of a region, the assumption being that if we plan for the worst-case scenario, smaller earthquakes that are more likely to occur can be dealt with more effectively.

- The North Frontal, San Andreas, and Cleghorn faults have the potential to generate earthquakes that would be felt strongly in the Hesperia region. Unfortunately, we cannot predict when a fault will break causing an earthquake, but we can anticipate the size of the

resulting earthquake and estimate the level of damage that the earthquake would generate in the region. The North Frontal fault is though capable of generating an earthquake of magnitude 7.2. The San Andreas fault is thought capable of generating an earthquake of magnitude between 7.4 and 8.0, depending on how many segments of the fault rupture together during a single event. The Cleghorn fault is thought capable of generating a magnitude 6.5 earthquake. With the exception of the Cleghorn, most other faults within 100 km (62 miles) of the city can generate earthquakes as large or larger than the M_w 6.7 Northridge earthquake, the single most-expensive earthquake yet to impact the United States.

- The loss estimation analyses conducted for this study indicate that the North Frontal fault has the potential to be the worst-case scenario for Hesperia, causing moderate to significant damage in the city. Although capable of generating a larger magnitude earthquake, the San Andreas fault is not expected to cause as much damage in Hesperia.

Fault Rupture and Secondary Earthquake Effects:

- A few potentially active faults have been mapped near the southern boundary of the General Plan area, but no Alquist-Priolo Earthquake Fault Zones have not been defined within the Hesperia area. These faults are potentially active because they have not been studied in sufficient detail to determine their recency of activity and relationship to other nearby faults that have been shown to the active. Specifically, some of the north- to north-east trending faults near the city's southeastern boundary may be carrying some of the slip from the North Frontal fault. These and the east-west trending faults along the study area's southern boundary could also move, albeit slightly, in response to an earthquake on a nearby fault such as the San Andreas fault. As a result, if a critical facility (either high-risk or high-occupancy) is proposed across the trace of any of these faults, geological studies to evaluate its recency of activity and future surface fault rupture potential should be conducted as a condition of approval prior to development. These studies should be conducted to the level of detail required by California Geological Survey for fault studies under the purview of the Alquist-Priolo Act. If these studies determine that the fault trace of concern is active, structural setbacks or other measures designed to mitigate the potential for future surface fault rupture should be implemented.

- The California Geological Survey (CGS) has not conducted mapping in the Hesperia area under the Seismic Hazards Mapping Act. This report presents a liquefaction susceptibility map that was prepared using a similar but simpler form of the method used by the California Geological Survey (geotechnical data providing density of the near-surface sediments were not reviewed). Studies in accordance with the guidelines prepared by the CGS should be conducted in those areas identified as susceptible to liquefaction, at least until sufficient studies have conclusively shown whether or not the sediments are indeed susceptible to liquefaction. Currently, shallow ground water levels (less than 30 feet from the ground surface) are known to occur in the Mojave River floodplain, especially near the recharge outlets and reclaimed water discharge locations. Increased dependence on imported water could lead to decreased pumping for ground water, which could result in an even higher groundwater table in the floodplain. Groundwater levels in the areas elevated above the Mojave River channel are reportedly in the hundreds of feet, so an increase in water levels in these areas due to decreased pumping rates is not anticipated to

result in liquefaction susceptibility. Development in the floodplain should be discouraged given the potential for storm-induced or dam-failure flooding, liquefaction, and other environmental concerns associated with the protection of riparian vegetation and fauna. However, in the event that infrastructure or other projects are proposed in this area, liquefaction evaluation studies following the guidelines established by the CGS should be conducted and if liquefaction is found to be a hazard, mitigation measures should be implemented.

- Given that most of the developed area in Hesperia has low relief, the hazard of seismically induced slope failure in the General Plan area is low. However, slope damage in the San Bernardino Mountains and foothills to the south could impact the highways and roads that provide access to Hesperia, with substantial impacts to Hesperia residents and businesses.

- Some parts of Hesperia may be susceptible to seismically induced settlement given the youthfulness and unconsolidated nature of the alluvial deposits that underlie the region. Geotechnical studies to evaluate this potential hazard should be conducted in areas underlain by Holocene sediments where developments are proposed. If the sediments are found to be susceptible to this hazard, mitigation measures designed to reduce settlement should be incorporated into the design.

Earthquake Hazard Reduction:

- Most of the loss of life and injuries that occur during an earthquake are related to the collapse of hazardous buildings and structures, or from non-structural components, including contents, in those buildings. The HazUS analyses conducted for this study indicate that a large percentage of the single-family, wood-frame structures in Hesperia are anticipated to experience at least slight damage during an earthquake. The total losses expected as a result of any of these earthquakes are in the millions of dollars.

- The HazUS results indicate that dozens of people could be injured if and when an earthquake strikes the region during the night, when a large portion of the population is at home. A lesser, but still significant number of casualties is associated with damage to commercial and industrial facilities.

- The regional hospital may not be able to meet the demand for medical care in the aftermath of an earthquake in the area. An inventory of regional hospitals should be conducted in advance of the next earthquake to identify alternate medical care providers. Ultimately, more hospitals should be planned and built in this area to accommodate the large increase in population that this region has experienced in the last decade, and the increase in population expected in the decades to come.

- The inventory and retrofit of potentially hazardous structures, such as pre-1952 wood-frame buildings, concrete tilt-ups, pre 1971- reinforced masonry, soft-story buildings and mobile homes, are recommended.

- The best mitigation technique in earthquake hazard reduction is the constant improvement of building codes with the incorporation of the lessons learned from each past earthquake. This is especially true in areas not yet completely developed. In addition, current building

codes should be adopted for re-development projects that involve more than 50% of the original cost of the structure. Current building codes incorporate two significant changes that impact the city of Hesperia. First, there is recognition that soil types can have a significant impact on the amplification of seismic waves, and second, the proximity of earthquake sources will result in high ground motions and directivity effects. However, for those areas of Hesperia already developed, and given that building codes are generally not retroactive, the adoption of the most recent building code is not going to improve the existing building stock, unless actions are taken to retrofit the existing structures. Retrofitting existing structures to the most current building code is in most cases cost-prohibitive and not practicable. However, specific retrofitting actions, even if not to the latest code, that are known to improve the seismic performance of structures should be attempted.

- The eastern and southern portions of Hesperia are subject to near-source design factors because the city is located near three active fault systems (North Frontal fault to the east, San Andreas and Cleghorn faults to the south).

- While the earthquake hazard mitigation improvements associated with the latest building code address new construction, the retrofit and strengthening of existing structures requires the adoption of ordinances. The City of Hesperia should consider the implementation of a mandatory ordinance aimed at retrofitting older wood-frame residential buildings, pre-cast concrete buildings, and soft-story structures, among others. Although retrofitted buildings may still incur severe damage during an earthquake, their mitigation results in a substantial reduction of casualties by preventing collapse.

- Adoption of new building codes does not mitigate local secondary earthquake hazards such as liquefaction and ground failure. Therefore, these issues are best mitigated at the local level. Avoiding areas susceptible to earthquake-induced liquefaction or settlement is generally not feasible. The best alternative for the City is to require "special studies" within these zones for new construction, as well as for significant redevelopment, and require implementation of the engineering recommendations for mitigation.

- Effective management of seismic hazards in Hesperia includes technical review of consulting reports submitted to the City. For projects in areas susceptible to liquefaction, the City should consider following the State law that requires that the reviewer be a licensed engineering geologist and/or civil engineer having competence in the evaluation and mitigation of seismic hazards (CCR Title 14, Section 3724). Because of the interrelated nature of geology, seismology, and engineering, most projects will benefit from review by both the geologist and civil engineer. The California Geological Survey has published guidelines to assist reviewers in evaluating site-investigation reports (CDMG, 1997; CGS, 2008).

- The HazUS analyses suggest that the potable water, wastewater and electric systems in Hesperia will be slightly to moderately damaged by an earthquake on the North Frontal fault. The City and its lifeline service providers should consider retrofitting the existing pipelines, replacing the older lines first.

CHAPTER 2: GEOLOGIC HAZARDS

2.1 Physiographic Setting

Hesperia lies across the boundary of two very distinct geomorphic provinces, each having a unique landscape formed by geologic, topographic, and climatic processes. The very southern edge of the city encroaches into the Transverse Ranges Province, a region whose characteristic features are a series of east-west trending ranges that include the San Gabriel and San Bernardino Mountains. The ranges are called "transverse" because they lie at an oblique angle to the prominent northwesterly grain of the southern California landscape, a trend that is aligned with the San Andreas fault. The Transverse Ranges are being intensely compressed by active tectonic forces, therefore they are some of the fastest rising (and fastest eroding) mountains in the world.

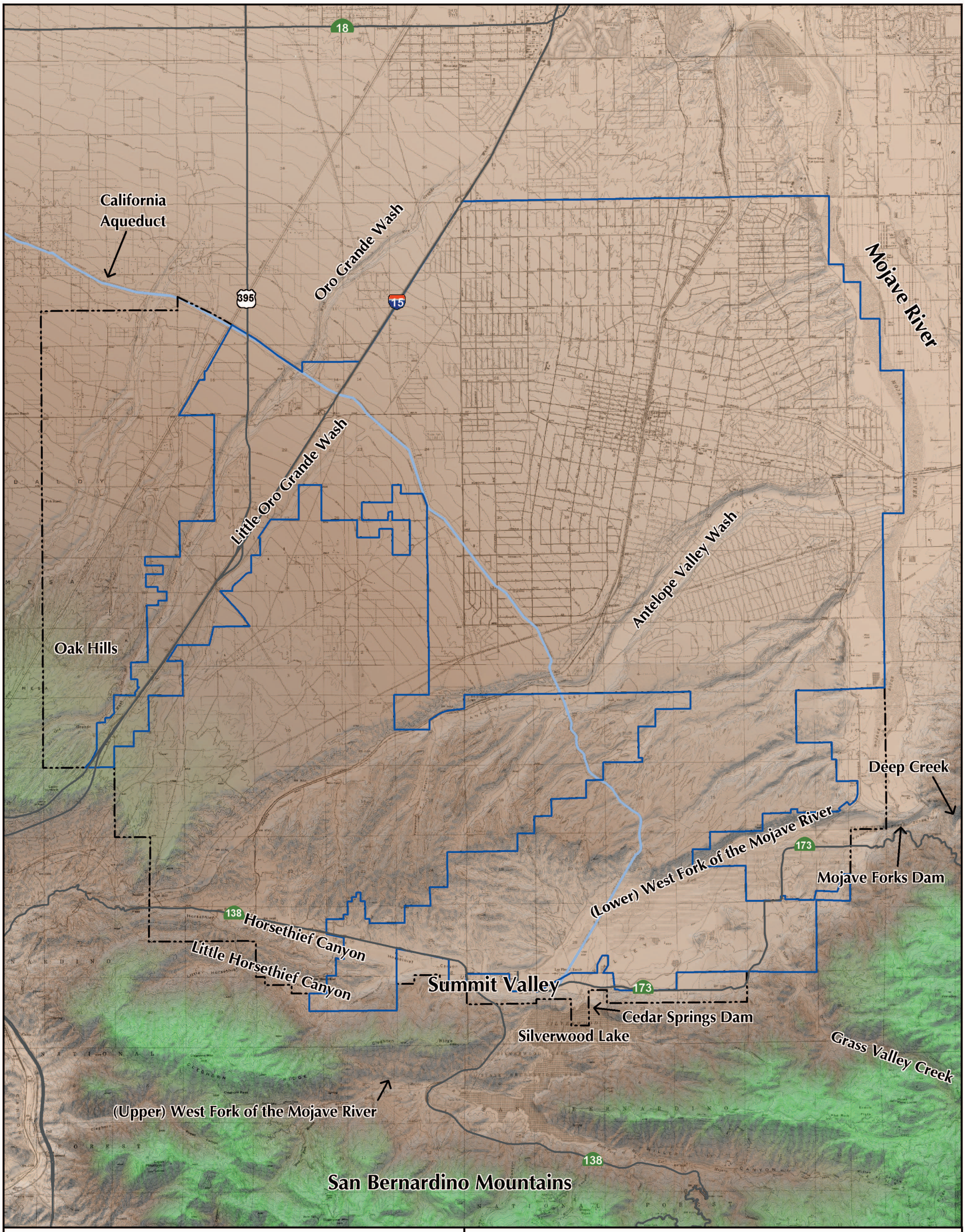
North of the mountains, the greater part of Hesperia lies within the Mojave Desert Province, an arid region of alluvial fans, desert plains, dry lakebeds, and scattered mountain ranges. This province covers a large portion of eastern California, stretching from the southern end of the Sierra Nevada Mountains to the Colorado River. Faults in the Mojave Desert Province have a predominant northwesterly trend; however, some faults with a trend more aligned with the Transverse Ranges are also present. The east-west trending Garlock fault defines the northern boundary of the province, whereas the northwest-trending San Andreas fault roughly defines its western boundary.

The central and northern parts of the city lie upon a moderately to gently sloping alluvial fan. Ranging in elevation from about 4,200 feet at the top of the fan to about 2,900 feet at the Mojave River, the lower reaches of the fan are the most densely populated. The southern part of the city, which encompasses low foothills and a broad valley (Summit Valley area), is very sparsely populated. The southernmost boundary of the city encroaches onto the base of the rugged San Bernardino Mountains, with parts of the city lying inside the National Forest. Farther south, the mountains rise to an elevation of more than 6,000 feet. One of the most prominent features in Hesperia is the Mojave River, a wide floodplain that defines the city's eastern boundary. Nearly every drainage channel in the region eventually reaches the river, making it the largest drainage system in the Mojave Desert, and one of the largest in southern California (Plate 2-1).

Hesperia is located within the high desert portion of the Inland Empire, an area that is rapidly changing. In fact, this region, which includes San Bernardino and Riverside counties, has the fastest growing populations in all of California. Hesperia is no exception, with its current population of approximately 84,000 residents expected to double by the year 2025. Development on the alluvial fan is expanding westward and into the upper reaches of the fan. Widely scattered semi-rural development is present in Summit Valley and the foothills, however large-scale master planned developments have been proposed for the Summit Valley area. Future developments and the associated infrastructure will be increasingly impacted by geologic hazards, such as flooding and slope stability, unless coordinated mitigation measures are developed on both a regional and site-specific basis.

2.2 Geologic Setting

The physical features described above reflect geologic and climatic processes that have affected this region in the last few million years. The most striking feature is the dramatic contrast between



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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

Elevation Shading (meters)

500 1000 1500 2000

Hesperia City Limit

Hesperia Sphere of Influence

Base Map: USGS 30-meter Digital Elevation Model.

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Date: February 2010

Physiographic Map
of
Hesperia, California and Surrounding Areas

Plate 2-1

the Mojave Desert and the adjacent mountains – a direct result of movement along faults that have both elevated and down-dropped great blocks of the Earth's crust. As a result, the mountain ranges that form the backdrop to Hesperia are composed of rocks that have been sheared and intensely fractured under the strain of tectonic movement. Along the base of the mountains, multiple generations of overlapping alluvial fans have a range of ages coincident with the rise of the mountains. Hesperia is underlain by the informally named Victorville Fan (Morton and Miller, 2003) and is composed of sediments ranging in age from early Pleistocene to Holocene (approximately 1 million years to less than 10,000 years old). Because the Victorville Fan was constructed with sediments shed primarily from the San Gabriel Mountains, their composition reflects that of the rocks eroded by the various streams that entered the valley from the south.

Within the eastern and southwestern parts of the city, older, highly dissected fan surfaces are widespread. In the eastern part of the foothills, south of Antelope Valley Wash, the deeply channeled fan surface forms a broad plateau. In Summit Valley, remnants of the older fans can only be found in isolated areas, generally capping low ridges. In the central to northwestern parts of the city, younger fan sediments blanket the eroded surface of the older deposits. Deposition is still ongoing, with the youngest alluvium filling drainage channels and the Mojave River floodplain. At depth, this sequence of alluvial sediments is underlain by crystalline bedrock similar to that exposed in the San Bernardino Mountains to the south.

The physiography and geologic history of the Hesperia area are important in that they control to a great extent the geologic hazards, as well as the natural resources, within the city. For example, the city receives great quantities of runoff from the nearby mountains during storms, leading to flooding problems within the developed areas. Regional tectonic subsidence along the valley floor, concurrent with uplift of the adjacent mountains, is responsible to a great extent for the rapid deposition of poorly consolidated alluvium that is susceptible to consolidation and/or collapse. On the other hand, the deep alluvium-filled basin, which is bounded by relatively impermeable rock and faults, provides a natural underground reservoir (aquifer) for ground water, the city's source of all its domestic water.

2.3 Geologic Units and Their Engineering Properties

The geologic units in Hesperia consist mainly of water-laid sand, silt, and gravel. The various alluvial units and their estimated ages have been categorized by researchers primarily by noting the degree of soil development on the fan surface, stratigraphic position, degree of stream incision, relative uplift, and other physical characteristics. Most of these units do not have formal names, but they have been labeled with symbols that emphasize their age and mode of deposition. A few older sedimentary units in the region have been given formal names, and the oldest rock units, exposed in the San Bernardino Mountains, are named primarily for their texture and mineral composition. The general distribution of geologic units that are exposed at the surface is shown on the Geologic Map (Plates 2-2 and 2-2a). In the section that follows, the characteristics of each unit are discussed using the nomenclature and descriptions published by Morton and Miller (2003). The units are described in the following pages, from youngest to oldest.

2.3.1 Artificial Fill

There are many deposits of man-made fill throughout the city, including, most notably, man-made fills associated with roadway, bridge, and railway embankments; levees; and graded developments. These deposits vary widely in size, age, and composition, and

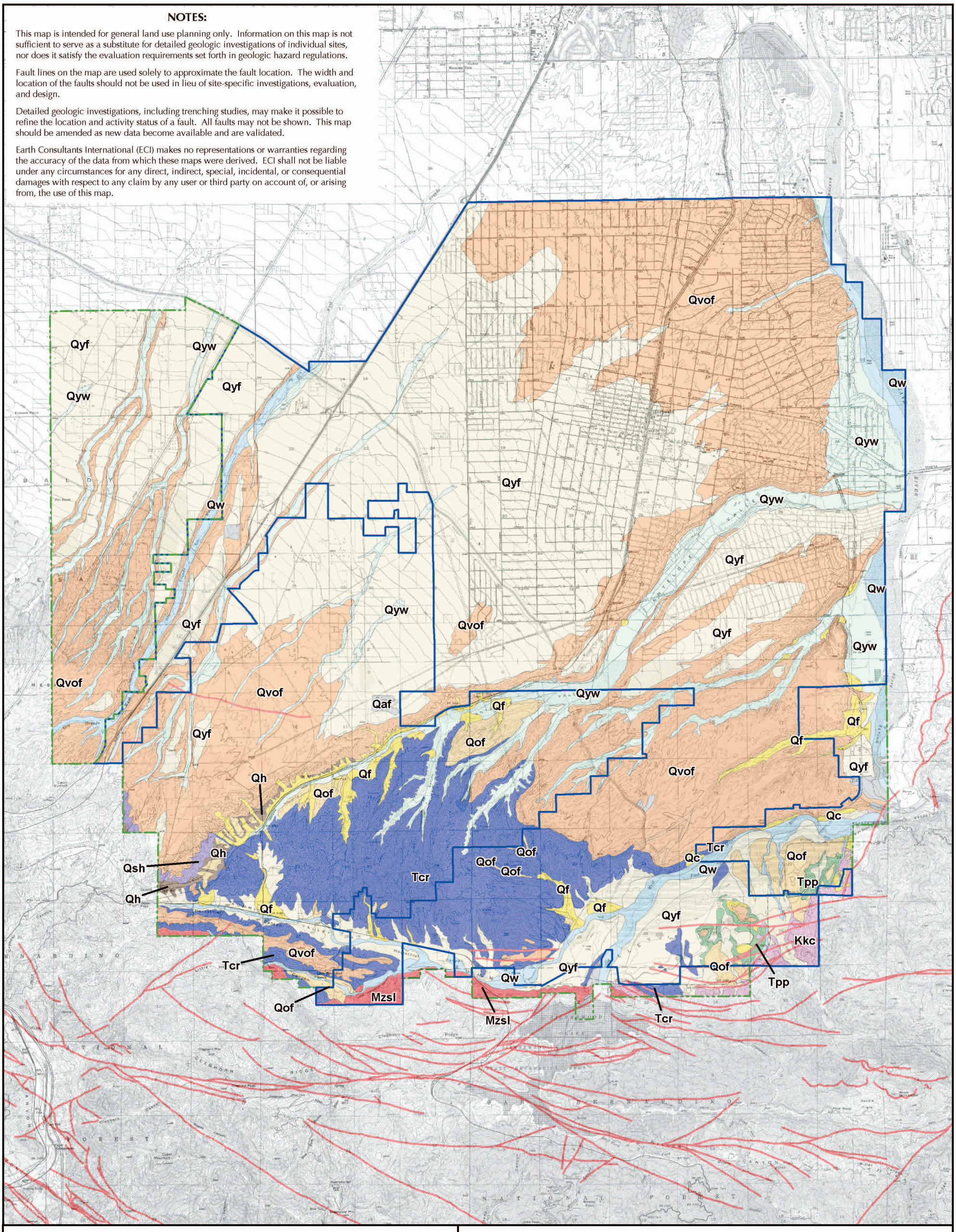
NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Fault lines on the map are used solely to approximate the fault location. The width and location of the faults should not be used in lieu of site-specific investigations, evaluation, and design.

Detailed geologic investigations, including trenching studies, may make it possible to refine the location and activity status of a fault. All faults may not be shown. This map should be amended as new data become available and are validated.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.



N

W E

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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

For Geologic Unit Descriptions See Plate 2-2b

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: Morton and Miller, 2003

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Geologic Map

Hesperia, California

Plate 2-2a

Symbols

Fault; solid where location known, dashed where approximate, dotted where concealed. (for more information refer to Plate 1-2)

Geologic Contact

Hesperia City Boundary

Hesperia Sphere of Influence

Geologic Unit Descriptions

Cenozoic	Quaternary	Holocene	Qaf	Artificial Fill- Not all fill areas are shown
			Qf	Very Young Alluvial Fan Deposits- Unconsolidated silt, sand, and gravel on active and recently active fans
			Qw	Very Young Wash Deposits- Unconsolidated sand, gravel, cobbles, and boulders in active washes
			Qc	Very Young Colluvium- Unconsolidated silt and sand in drainage swales and on toes of natural slopes
		Pleistocene	Qyf	Young Alluvial Fan Deposits- Unconsolidated to slightly consolidated silt and sand; locally with gravel
			Qyw	Young Wash Deposits- Unconsolidated to slightly consolidated silt, sand, and cobbles in the marginal parts of active and recently active washes
			Qof	Old Alluvial Fan Deposits- Moderate to well consolidated silt, sand, and gravel
			Qvof	Very Old Alluvial Fan Deposits- Well consolidated sand with minor gravel
			Qsh	Shoemaker Gravel- Conglomerate and sandstone
			Qh	Harold Formation- Sandstone and conglomeratic sandstone, with minor conglomerate
	Tertiary	Pliocene	Tpp	Phelan Peak Deposits- Claystone and siltstone
		Miocene	Tcr	Crowder Formation- Sandstone, pebbly sandstone, and conglomerate
Mesozoic	Triassic - Cretaceous		Kkc	Monzogranite of Kinley Creek- Quartz-rich muscovite-biotite monzogranite
			Mzsl	Mixed granitic rocks of Silverwood Lake- Biotite granodiorite and monzogranite; hornblende-biotite quartz monzonite, quartz monzodiorite, and tonalite; hornblende monzonite

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Explanation for Geologic Map

Plate 2-2b

although some may cover a significant area, due to the scale of Plate 2-2, most are not shown on the Geologic Map.

2.3.2 Very Young Sediments: Alluvial Fan, Wash, and Colluvium Deposits (Map Symbols Qf, Qw, and Qc)

Very young alluvial fan deposits (Qf) are present chiefly as small fans emanating from canyons and channels tributary to the upper reaches of Antelope Valley Wash, the West Fork of the Mojave River, and Horsethief Canyon. These sediments are unconsolidated to slightly compacted, lack soil development, are undissected, and generally consist of poorly bedded silt, sand, and gravel.

Very young wash deposits (Qw) consist of unconsolidated sand and gravel lining active drainage courses, including Oro Grande Wash, Horsethief Creek, West Fork of the Mojave River, and the Mojave River floodplain (Figure 2-1). Although too small to show on Plate 2-2, nearly all of the drainages west of the Mojave River have narrow, active channels that are filled with young, recently deposited sediments. North of the foothills, these sediments consist primarily of fine- to very coarse-grained sand with a lesser amount of gravel and pebbles. These deposits have no soil development on the surface, and may be reworked or buried by new sediment during winter storms. The upper reaches of the drainages, especially near the mountains may contain large boulders deposited during flash floods.

Figure 2-1: Very Young Wash Deposits in Horsethief Creek.
These sediments consist primarily of unconsolidated sand, gravel, and small boulders.



Modern colluvium (Qc) is similar in character to the Qf deposits. In hillside areas, colluvium is commonly present lining drainage swales and along the toes of natural slopes, where it has accumulated from a combination of slope wash and in-place weathering of

the underlying units. Colluvial deposits are typically massive, unconsolidated, and may contain organic material.

2.3.3 Young Sediments: Alluvial Fan and Wash Deposits (Map Symbols Qyf and Qyw)

Young alluvial fan deposits (Qyf) of middle to late Holocene age form a veneer of relatively uniform silt and sand with scattered gravel over much of the central part of the city. Near the mountains, above the Mojave Forks Dam, these deposits may contain cobbles and boulders. The surface of this unit is slightly to moderately dissected by stream channels resulting in low amplitude ridges and swales.

Young wash deposits (Qyw) include unconsolidated to slightly consolidated silt, sand, and cobbles lining well-developed drainage channels and in localized areas along the west side of the Mojave River. These units differ from those described in Section 2.3.2 in that they are typically elevated above, and incised by, the active channel containing the modern wash sediments (Qw). Young wash deposits are typically of low density and have very little soil development. Most are Holocene in age (i.e., were deposited in the past 11,000 years), although the oldest sediments in this group date back to the latest Pleistocene (a little more 11,000 years ago).

How and where these young and very young deposits were laid down have a significant bearing on the properties of these materials. At the base of the mountains and hills, the alluvium is coarse grained, poorly sorted, often has organic debris, and was typically deposited rapidly. As a result, the major engineering issues affecting these geologically young deposits are: 1) compressibility, which occurs when additional loads are applied, and 2) collapse (hydroconsolidation) upon introduction of irrigation water if the deposit is dry. Being unconsolidated, the sandy alluvium is also highly susceptible to erosion. Colluvium filling swales on slopes with gradients steeper than about 27 degrees (50-percent slope) may form mudflows if the sediment becomes saturated. Boulders in the alluvium near the base of slopes and in active channels may be a hindrance to earthwork and foundation construction. Alluvium and colluvium are suitable for use as fill, once organic materials and oversized rocks are removed, however they typically require the addition of water to achieve compaction. The alluvial deposits have moderate to high permeability, except where silt layers may retard the downward percolation of water. The potential for expansive soils is generally low, except where floodplain deposits of silt and clay are exposed.

2.3.4 Older Alluvial Fan Deposits (Map Symbols Qof and Qvof)

Older alluvial fan deposits (Qof) are late to middle Pleistocene in age (about 11,000 to 500,000 years old), and consist of moderately to well-consolidated silt, sand and gravel. Near the base of the mountains, these deposits may contain boulders. In Hesperia, these deposits occur as scattered erosional remnants in Summit Valley and in the upper reaches of Antelope Valley Wash, where they are typically elevated above and are more dissected than the Qyf deposits.

Very old alluvial fan deposits (Qvof) are early to middle Pleistocene in age (about 500,000 to 1 million years old), and consist primarily of medium to coarse sand, with a lesser amount of gravel. These medium to dark reddish brown sediments are moderately to well consolidated and have a deeply dissected surface with drainage channels as much as 100

feet deep. This unit is crudely bedded and has a well-developed soil at the surface. These deposits are widespread, covering large areas in the western and eastern parts of the city.

Older alluvium is generally more consolidated than young alluvium, and therefore may provide better structural support. Clayey soils that develop on the fan surface, however, may be expansive. Slope stability is generally only a problem where slopes have become oversteepened, typically by stream erosion.

Figure 2-2: Eastern Part of Summit Valley.
The elevated plateau on the top-left side of the photo is underlain by very old alluvial fan sediments. Most of the valley floor is covered with young alluvial fan sediments, with very young wash deposits of Horsethief Creek in the foreground. The mountains on the right side of the photo are comprised of ancient granitic rocks.



2.3.5 Sedimentary Rocks (Map Symbols Qsh, Qh, Tpp and Tcr)

The Pleistocene-age Shoemaker Gravel (Qsh) has been exposed by erosion in the Cajon Pass area, where it underlies the very old fan deposits. This unit consists of pale grayish brown, moderately well consolidated conglomerate and sandstone. Bedding is crudely defined locally by large conglomeratic lenses, but its appearance overall is generally massive. Clasts range in size from pebble to boulder, and are rounded to well-rounded. The contact with the underlying Harold Formation (Qh) is gradational.

The Harold Formation is similar in appearance to the Shoemaker Gravel, but finer grained. This tan to light brown unit consists of sandstone, conglomeratic sandstone, and minor

conglomerate. Bedding consists of relatively thin beds and lenses. This unit is well consolidated, friable, and contains discontinuous carbonate-cemented layers.

Pliocene-age (1 million to 10 million years old) claystone and siltstone of the Phelan Peak deposits are present as isolated patches in the southeast corner of the city. This unit is orangish brown, moderately well to very well consolidated, and contains carbonate-cemented layers, as well as argillic (clay-rich) old soils (paleosols).

The western part of the foothills is underlain by Miocene-age (10 to 26 million years old) sandstone, pebbly sandstone, and conglomerate of the Crowder Formation (Figure 2-3). Pinkish-tan, pale gray, and pale brown in color, this unit has massive to planar bedding and large-scale cross-bedding.

Figure 2-3: Western Part of Summit Valley.
Pinkish-colored foothills are underlain by sandstone, pebbly sandstone, and conglomerate of the Crowder Formation. Highway 138 bridge across Horsethief Creek is on the left.



Most of the sedimentary rocks in the Hesperia area are granular and poorly bedded. These characteristics are generally favorable for gross slope stability, as the units are permeable and do not have well-developed potential slip planes. Conversely, they are highly susceptible to erosion and surficial failures on natural slopes as well as graded slopes made from these materials. The exception is the Phelan Peak siltstone and claystone. This unit may be susceptible to gross instability if clay-rich beds are undermined by stream erosion or grading. These rock types are more likely to have low permeability and moderate to high expansion characteristics.

2.3.6 Crystalline Rocks of the San Bernardino Mountains (Map Symbols Kkc and MzSl)

Crystalline rocks of the San Bernardino Mountains are only exposed along the southern boundary of the city, near Silverwood Lake. Elsewhere in the city they have been buried by younger sedimentary deposits. East of the lake, the rocks consist of a Cretaceous-age (65 to 135 million years old) granitic rock named the Monzogranite of Kinley Creek (Kkc). This quartz-rich, medium-grained rock underlies a large area of the mountains between Lake Arrowhead and Hesperia. West of the lake there is mix of rock types that are also variable in age and texture. This unit is referred to as Mixed Granitic Rocks of Silverwood Lake (MzSl) and are thought to have an age range spanning the Triasssic through Cretaceous periods (about 65 to 225 million years old). These rocks are very weathered, and form rounded, bouldery outcrops on slopes within the city.

These bedrock units have similar engineering properties. They are very hard where not highly weathered, and tend to form steep, rugged slopes and deep canyons. They are typically non-water bearing, except where extensively jointed and fractured. Accordingly, these materials have low to moderately low permeabilities, except where joints, shears and foliation surfaces provide avenues for water to move in and around the rock mass. Unweathered rock cannot be excavated easily; blasting is typically required.

Because these rocks are brittle and have been subjected to millions of years of tectonic activity, they are typically very fractured, locally crushed, and sheared. These deformation features, along with the inherent jointing present in granitic rocks, locally serve as planes of weakness along which slope instability can occur. Large prehistoric landslides have been mapped in these units, however these mapped slides are outside of the city limits.

2.4 Geologic Hazards in the Hesperia Area

Geologic hazards are generally defined as surficial earth processes that have the potential to cause loss or harm to the community or the environment. The basic elements involved in the assessment of geologic hazards are climate, geology, soils, topography, and land use. The types of geologic hazards effecting Hesperia are discussed in the following sections.

2.4.1 Landslides and Slope Instability

A significant portion of the city encompasses hillside terrain. This includes the foothills between Antelope Valley Wash and Summit Valley, as well as the base of the San Bernardino Mountains. At present these areas are sparsely occupied; however, large-scale development has been proposed for parts of Summit Valley and the adjacent foothills. In other parts of the city, deeply incised drainage channels, some ranging up to 100 feet in depth, have been locally developed, including the channel margins, sides and bottoms (Figure 2-4).

Consequently, slope instability remains a significant hazard in the areas of Hesperia mentioned above, particularly in winters characterized by heavy and persistent rainfall, or during winters following hillside wildfires. Although a slope failure tends to affect a relatively small area (as compared to an earthquake or major flood), and is generally a problem for only a short period of time, the dollar loss can be high. Insurance policies typically do not cover land slippage, and this can add to the anguish of the affected property owners.

Figure 2-4: Upper Reach of Oro Grande Wash, One of the Deepest Drainage Channels in Hesperia. Side slopes in the canyon are formed from very old alluvial fan sediments.



Large landslides are present in the San Bernardino Mountains, however these are outside of the city limits. Nevertheless, the foothills, washes, and mountains within and adjacent to Hesperia have steep slopes along which slope failures can occur during or after periods of intense rainfall or in response to strong seismic shaking (see Plate 1-3, Chapter 1). Areas of high topographic relief, such as steep canyon walls, are most likely to be impacted by rockfalls, rockslides, and soil slips, and to a lesser degree, large landslides. In the Summit Valley area, the older surficial sediments and sedimentary rocks that occur in the shallow subsurface are generally granular in texture (sands and gravels), and massive to poorly bedded. These types of deposits are typically more stable than sediments that consist of thinly bedded silt and clay, since well-developed bedding planes provide surfaces along which landslides can occur. Nevertheless, even thick or poorly bedded sedimentary deposits can have localized well-developed clay beds that become planes of slippage when undermined.

2.4.1.1 *Types of Slope Failures*

Slope failures occur in a variety of forms, and there is usually a distinction made between gross failures (sometimes also referred to as "global" failures) and surficial failures. Gross failures include deep-seated or relatively thick slide masses, such as landslides, whereas surficial failures can range from minor soil slips to destructive mud or debris flows. Failures can occur on natural or man-made slopes. For man-made slopes, most failures occur on older slopes, many of which were built at slope gradients steeper than those allowed by today's grading codes. Although infrequent, failures can also occur on newer, graded slopes, generally due to poor engineering or poor construction. Furthermore, slope failures often occur as elements of interrelated natural hazards in which one event triggers a secondary event, such earthquake-induced landsliding, fire-flood sequences, or storm-induced mudflows.

- **Gross Instability**

Landslides **–** Landslides are movements of relatively large landmasses, either as nearly intact bedrock blocks, or as jumbled mixes of bedrock blocks, fragments, debris, and soils. Landslide materials are commonly porous and very weathered in the upper portions and along the margins of the slide. They may also have open fractures and joints. The head of the slide may have a graben (pull-apart area) that has been filled with soil, bedrock blocks and fragments.

From an engineering perspective, landslides are generally unstable (may be subject to reactivation), and may be compressible, especially around the margins, which are typically highly disturbed and broken. The headscarp area above the landslide mass is also unstable, since it is typically oversteepened, cracked, and subject to additional failures. The type of movement is generally described as follows:

- Translational - slippage on a relatively planar, dipping layer.
- Rotational - circular-shaped failure plane.
- Wedge - movement of a wedge-shaped block from between intersecting planes of weakness, such as fractures, faults and bedding.

The potential for slope failure is dependent on many factors and their interrelationships. Some of the most important factors include slope height, slope steepness, shear strength and orientation of weak layers in the underlying geologic unit, as well as pore water pressures. Joints and shears, which weaken the rock fabric, allow penetration of water leading to deeper weathering of the rock along with increasing the pore pressures, increasing the plasticity of weak clays, and increasing the weight of the landmass. For engineering of earth materials, these factors are combined in calculations to determine if a slope meets a minimum safety standard. The generally accepted standard is a factor of safety of 1.5 or greater (where 1.0 is equilibrium, and less than 1.0 is failure). Natural slopes, graded slopes, or graded/natural slope combinations must meet these minimum engineering standards where they impact planned homes, subdivisions, or other types of developments. Slopes adjacent to areas where the risk of economic losses from landsliding is small, such as parks and roadways, are often allowed, at the discretion of the local reviewing agency, a lesser factor of safety.

- **Surficial Instability**

Surficial failures are too small to map at the scale used in Plate 2-2, however they are common in hillside areas, typically occurring in drainage swales and in the thick colluvial sediments and deeply weathered bedrock near the base of steep slopes. Soil slips are generally widespread throughout the mountains during winters of particularly heavy and/or prolonged rainfall.

Slope Creep – Slope creep in general involves deformation and movement of the outer soil or rock materials in the face of the slope due to the forces of gravity overcoming the shear strength of the material. Movement is imperceptibly slow and relatively continuous on moderate to steep slopes. Creep occurs most often in soils that develop on fine-grained bedrock units. Rock creep is a similar process, and involves permanent deformation of the

outer few feet of the rock face resulting in folding and fracturing. Rock creep is most common in highly fractured, fine-grained rock units, such as Phelan Peak Deposits (claystone and siltstone), but can also occur in igneous rocks, such as those present along the southern edge of the Hesperia General Plan area..

Creep also occurs in graded fill slopes. This is thought to be related to the alternate wetting and drying of slopes constructed with fine-grained, expansive soils. The repeated expansion and contraction of the soils at the slope face leads to loosening and fracturing of the soils, thereby leaving the soils susceptible to creep. While soil creep is not catastrophic, it can cause damage to structures and improvements located at the tops of slopes.

- Natural slope creep and creep of graded fill slopes are not a widespread hazard in Hesperia, since most soils in this area are coarse-grained and non-expansive.

Soil Slip **–** This type of failure is generated by strong winter storms, and is widespread in steeper slope areas, particularly after winters with prolonged and/or heavy rainfall. Failure occurs on canyon sideslopes, and in soils that have accumulated in swales, gullies and ravines. Slope steepness has a strong influence on the development of soil slips, with most slips occurring on slopes having gradients between about 27 and 56 degrees (Campbell, 1975).

- Slopes susceptible to soil slip are common in the foothills and mountains surrounding Summit Valley. Steep slopes are also present locally along incised drainage channels, particularly in the eastern part of Summit Valley, and intermittently along the Mojave River (Figure 2-5).

Figure 2-5: Soil Slippage on Steep Bluffs along the West Fork of the Mojave River in Summit Valley. Slippage has resulted in a small debris flow at the base of the slope.



Earth Flow – This type of slope failure is a persistent, slow-moving, lobe-shaped slump that typically comes to rest on the slope not far below the failure point. Earth flows commonly form in fine-grained soils (clay, silt and fine sand), and are mobilized by an increase in pore water pressure caused by infiltration of water during and after winter rains. Earth flows occur on moderate to steep slopes, typically in the range of about 15 to 35 degrees (Keefer and Johnson, 1983).

- Within Hesperia, this type of failure is likely to be rare, due to the granular nature of most geologic units.

Debris Flow – This type of failure can be the most dangerous and destructive of all types of slope failure. A debris flow (also called mudflow, mudslide, and debris avalanche) is a rapidly moving slurry of water, mud, rock, vegetation and debris. Larger debris flows are capable of moving trees, large boulders, and even cars. This type of failure is especially dangerous as it can move at speeds as fast as 40 feet per second, is capable of crushing buildings, and can strike with very little warning. As with soil slips, the development of debris flows is strongly tied to exceptional storm periods of prolonged rainfall. Failure typically occurs during an intense rainfall event, following saturation of the soil by previous rains.

A debris flow most commonly originates as a soil slip in the rounded, soil-filled "hollow" at the head of a drainage swale or ravine. The rigid soil mass is deformed into a viscous fluid that moves down the drainage, incorporating into the flow additional soil and vegetation scoured from the channel. Debris flows also occur on canyon walls, often in soil-filled swales that do not have topographic expression. The velocity of the flow depends on the viscosity, slope gradient, height of the slope, roughness and gradient of the channel, and the baffling effects of vegetation. Even relatively small amounts of debris can cause damage from inundation and/or as a result of crashing into a structure (Ellen and Fleming, 1987; Reneau and Dietrich, 1987). Recognition of this hazard led FEMA to modify its National Flood Insurance Program to include inundation by "mudslides."

Watersheds that have been recently burned typically yield greater amounts of soil and debris than those that have not burned. Erosion rates during the first year after a fire are estimated to be 15 to 35 times greater than normal, and peak discharge rates range from 2 to 35 times higher. These rates drop abruptly in the second year, and return to normal after about 5 years (Tan, 1998). In addition, debris flows in burned areas can develop in response to small storms and do not require a long period of antecedent rainfall. These kinds of flows are common in small gullies and ravines during the first rains after a burn, and can become catastrophic when a severe burn is followed by an intense storm season (Wells, 1987).

- Areas of Hesperia that are most susceptible to debris flow are those properties at the base of moderate to steep slopes, or at the mouths of small to large drainages.

Rockfalls – Rockfalls are free-falling to tumbling masses of bedrock that have broken off steep canyon walls or cliffs. The debris from repeated rockfalls typically collects at the base of extremely steep slopes in cone-shaped accumulations of angular rock fragments

called talus. Rockfalls can happen wherever fractured rock slopes are oversteepened by stream erosion or man's activities.

Granitic rock commonly weathers into large, rounded boulders that perch precariously on slopes, posing a rock fall hazard to areas adjacent to and below these slopes. Rock falls can occur suddenly and without warning, but are more likely to occur in response to earthquake-induced ground shaking, during periods of intense rainfall, or as a result of man's activities, such as grading and blasting.

- This hazard is largely restricted to the southern edge of the General Plan area, where outcrops of granitic rock are present (Figure 2-6).

Figure 2-6: Rounded Granitic Boulders on the South Side of Summit Valley.
Boulders like these can become dislodged during earthquakes or intense rainfall and roll down on properties below without warning.



2.4.1.2 Susceptibility to Slope Failure

Developments that encroach upon the edge of natural slopes may be impacted by slope failures. Even if a slope failure does not reach the adjacent property, the visual impact will generally cause alarm to homeowners. The city's natural hillsides, illustrated by steepness in Plate 2-3, are vulnerable to the types of slope instability mentioned above, especially surficial failures. Table 2-1 below summarizes the geologic conditions in various parts of the city that provide the environment for slope instability to occur. These conditions usually include such factors as terrain steepness, rock or soil type, condition of the rock (such as degree of fracturing and weathering), internal structures within the rock (such as bedding, foliation, faults) and the prior occurrence of slope failures. Catalysts that ultimately allow slope failures to occur in vulnerable terrain are most often water (as a result of heavy and prolonged rainfall, intense irrigation over a long period of time, or leaks from broken water mains), erosion and undercutting by streams, man-made alterations to

the slope, and seismic shaking. The summary in Table 2-1 was derived from the Geologic Map (Plate 2-2), the Seismic Hazards Map (Plate 1-3) and the Slope Distribution Map (Plate 2-3).

Table 2-1: General Slope Instability Potential within Hesperia

Area	Existing Geologic Conditions	Types of Potential Slope Instability
Base of the San Bernardino Mountains (southern edge of General Plan area)	Moderate to very steep natural slopes, many in excess of 26 degrees. Fractured, sheared, faulted, and locally crushed bedrock; existing rockslides and talus slopes; soils and loose debris at the toes of slopes and in drainage courses. Locally, small to large boulders weathered out on slope faces.	***Most Common***: Rockfalls and rockslides, falling boulders, soil slips, and surficial landslides on steep slopes; small to large debris and mudflows in canyons; sedimentation at the mouths of canyons. ***Less Common:*** Large, deep-seated landslides.
Foothills north of Summit Valley	Moderate to steep natural slopes; most sloping at between 10 and 26 degrees; locally steeper than 40 degrees. **Western Part:** Crudely bedded sandstone and gravelly sandstone of the Crowder Formation; young surficial deposits in drainage swales and at the base of the slopes. **Eastern Part:** Very old alluvium consisting of moderately well consolidated silt, sand, and gravel; young surficial deposits in drainage swales and at the base of slopes; oversteepened, raveling slopes adjacent to the West Fork of the Mojave River.	***Most Common:*** Surficial soil slips; erosion and slumping of oversteepened slopes; small to moderate debris/mudflows; sedimentation at the base of the hills. ***Less Common:*** Large, deep-seated landslides; large debris flows.
Antelope Valley Wash and other deeply incised drainge channels	Poorly consolidated to well consolidated granular sediments, primarily sand and gravel; undefined to crudely defined bedding; raveling slopes; erosion gullies in channel banks, loose soil and debris at the toes of slopes and in channels.	***Most Common*** Erosion and slumping of channel walls; soil slips, sedimentation aprons and small to moderate debris flows from incised tributary channels during heavy rains. ***Least Common*** Large, deep-seated landslides; large debris flows.

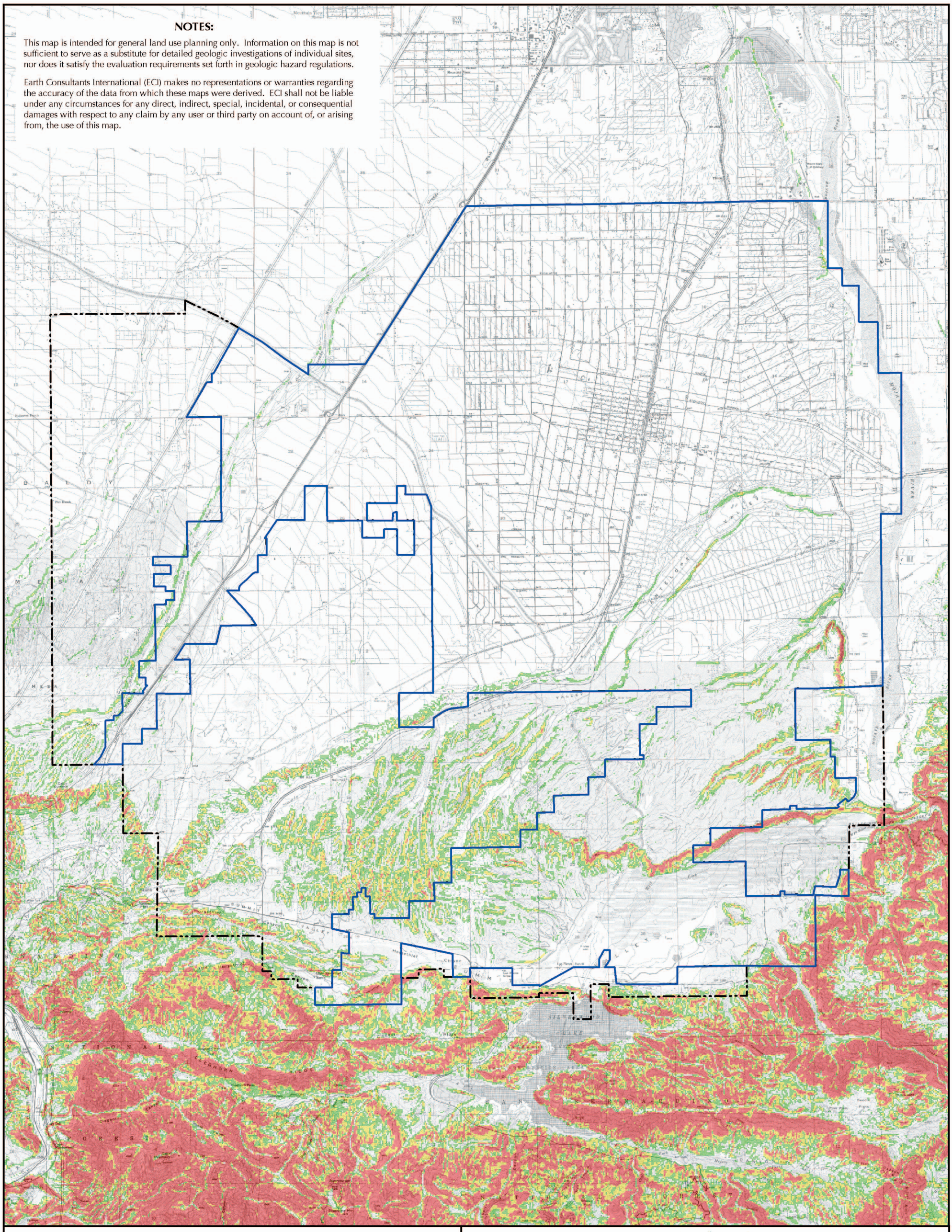
2.4.1.3 Mitigation of Slope Instability in Future Development

Careful land management in hillside areas can reduce the risk of economic and social losses from slope failures. This generally includes land use zoning to restrict development in unstable areas, grading codes for earthwork construction, geologic and soil engineering investigation and review, construction of drainage structures, and where warranted, placement of warning systems. Other important factors are risk assessments (including susceptibility maps), a concerned local government, and an educated public.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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N
W E
S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

Slope (in percent)

- 0 to 19
- 20 to 29
- 30 to 39
- 40 and greater
- Hesperia City Limit
- Hesperia Sphere of Influence

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: Derived from USGS 30m Digital Elevation Model

Earth Consultants International

Project Number: 2617
Date: February 2010

Slope Distribution Map

Hesperia, California

Plate 2-3

The Municipal Code for the city of Hesperia includes standards and guidelines for construction in hillside areas (Title 16: Development Code, Chapter 16.40: Hillside Development Regulations). The intent of this Chapter is to: 1) protect and preserve existing landforms, drainage patterns, natural ridgelines and rock outcroppings, scenic vistas, and native vegetation as much as possible; 2) discourage mass grading and terracing; 3) encourage variety in design; 4) provide safe traffic circulation in hillside areas; and 5) mitigate slope instability, erosion, and sedimentation by requiring soils reports, and where necessary, engineered drainage facilities. The Code defines hillside areas as those with a slope of 20 percent or greater (illustrated by the colored areas on Plate 2-3, the Slope Distribution Map). Further, slopes are classified in the Code (according to steepness), in order to define areas of maximum development density, areas to remain natural, and grading standards. Plate 2-3 generally illustrates slope gradients that correspond to the slope classes in Hesperia's Development Code.

For unincorporated areas, the San Bernardino County Development Code provides similar standards and guidelines for growth and development, in addition to providing a basis for county-wide planning and construction of public facilities such as flood control. The Code addresses zoning, permitting, grading, and investigation requirements for areas subject to potential geologic problems, including slope stability.

The Oak Hills Community Plan, prepared to establish clear guidelines for the future development in the unincorporated area within Hesperia's Sphere of Influence known as Oak Hills, contains land use policies to augment those set forth in the General Plans of Hesperia and San Bernardino County. Chapter 1 of the Community Plan Policies provides additional criteria for hillside development where slope gradients exceed 15 percent.

Soils reports for hillside areas, as required by Development Codes, should include a geotechnical evaluation of any slopes that may impact the future use of the property, as well as any impact to adjacent properties. This includes existing slopes that are to remain natural, and any proposed graded slopes. This type of investigation typically includes borings to collect geologic data and soil samples, laboratory testing to determine soil strength parameters, and engineering calculations. Numerous soil-engineering methods are available for stabilizing slopes that pose a threat to development. These methods include designed buttresses (replacing the weak portion of the slope with engineered fill); reducing the height of the slope; designing the slope at a flatter gradient; and adding reinforcements such as soil cement or layers of geogrid (a tough polymeric net-like material that is placed between the horizontal layers of fill). Most slope stabilization methods include a subdrain system to prevent excessive ground water (typically landscape water) from building up within the slope area. If it is not feasible to mitigate the slope stability hazard, building setbacks are typically imposed.

Temporary slope stability is also a concern, especially where earthwork construction is taking place next to existing improvements. Temporary slopes are those made for slope stabilization backcuts, fill keys, alluvial removals, retaining walls, and underground utility lines. The risk of slope failure is higher in temporary slopes because they are generally cut at a much steeper gradient. In general, temporary slopes should not be cut steeper than 1:1 (horizontal:vertical), and depending on actual field conditions, flatter gradients may be necessary. The potential for slope failure can also be reduced by cutting and filling large

excavations in segments, and not leaving temporary excavations open for long periods of time. The stability of large temporary slopes should be analyzed prior to construction, and mitigation measures provided as needed.

For debris flows, assessment of this hazard for individual sites should focus on structures located or planned in vulnerable positions. This generally includes canyon areas; at the toes of steep, natural slopes; and at the mouth of small to large drainage channels. Mitigation of soil slips, earth-flows, and debris flows is usually directed at containment (debris basins), or diversion (impact walls, deflection walls, diversion channels, and debris fences). A system of baffles may be added upstream to slow the velocity of a potential debris flow. Other methods include removal of the source material, placing subdrains in the source area to prevent pore water pressure buildup, or avoidance by restricting building to areas outside of the potential debris flow path.

There are numerous methods for mitigating rock falls. Choosing the best method depends on the geological conditions (i.e., slope height, steepness, fracture spacing, bedding orientation), safety, type and cost of construction repair, and aesthetics. A commonly used method is to regrade the slope. This ranges from locally trimming hazardous overhangs, to completely reconfiguring the slope to a more stable condition, possibly with the addition of benches to catch small rocks. Another group of methods focuses on holding the fractured rock in place by draping the slope with wire mesh, or by installing tensioned rock bolts, tie-back walls, or even retaining walls. A third type of mitigation includes catchment devices at the toe of the slope, such as ditches, walls, or combinations of both. Designing the width of the catchment structure requires analysis of how the rock will fall. For instance, the slope gradient and roughness of the slope determines if rocks will fall, bounce, or roll to the bottom (Wyllie and Norrish, 1996).

2.4.1.4 Mitigation of Slope Instability in Existing Development

There are a number of options for management of potential slope instability where development has already taken place. Implementation of these options should reduce the hazard to an acceptable level, including reducing or eliminating the potential for loss of life or injury, and reducing economic loss to tolerable levels. Mitigation measures may include:

- Protecting existing development and population where appropriate by physical controls such as improved drainage, slope-geometry modification, protective barriers, and retaining structures;
- Posting warning signs in areas of potential slope instability;
- Encouraging homeowners to install landscaping consisting primarily of drought-resistant, preferably native vegetation that helps stabilize the hillsides;
- Incorporating recommendations for potential slope instability into geologic and soil engineering reports for building additions and new grading; and
- Providing public education on slope stability, including the importance of maintaining drainage devices and avoiding heavy irrigation. U.S. Geological Survey Fact Sheet FS-071-00 (May, 2000) and California Geological Survey Note 33 (March, 2004) provide

public information on landslide and mudslide hazards. Both of these are available on the World Wide Web (see Appendix A).

2.4.2 Compressible Soils

Compressible soils are typically geologically young (Holocene age) unconsolidated sediments of low density that may compress under the weight of proposed fill embankments and structures. Geologic units that are generally susceptible to this hazard include young alluvium, the upper weathered part of older alluvium, colluvium/slope wash that collects near the base of natural slopes, and slope failure debris. The settlement potential and the rate of settlement in these sediments can vary greatly, depending on the soil characteristics (texture and grain size), natural moisture and density, thickness of the compressible layer(s), the weight of the proposed load, the rate at which the load is applied, and drainage.

- The portion of Hesperia where compressible soils are most likely to occur is where young alluvial fan and wash deposits are present. This would generally include the floor of Summit Valley, the Mojave River bed, and the central part of the alluvial fan, as well as the bottoms of active and recently active stream channels. Compressible soils are also commonly found in hillside areas, typically in canyon bottoms, swales, and at the base of natural slopes. Deep fill embankments, generally those in excess of about 60 feet deep, will also compress under their own weight.

2.4.2.1 Mitigation of Compressible Soils

When development is planned within areas that contain potentially compressible soils, a geotechnical soil analysis is required to identify the presence of this hazard. The analysis should consider the characteristics of the soil column in that specific area, and also the load of any proposed fills and structures that are planned, the type of structure (i.e. a road, pipeline, or building), and the local groundwater conditions. Removal and recompaction of the near-surface soils is generally the minimum that is required. Deeper removals may be needed for heavier loads, or for structures that are sensitive to minor settlement. Based on the location-specific data and analyses, partial removal and recompaction of the compressible soils is often performed, followed by settlement monitoring for a number of months after additional fill has been placed, but before buildings or infrastructure are constructed. Similar methods are used for deep fills. In cases where it is not feasible to remove the compressible soils, buildings can be supported on specially engineered foundations that may include deep caissons or piles.

2.4.3 Collapsible Soils

Hydroconsolidation or soil collapse typically occurs in recently deposited, Holocene-age soils that accumulated in an arid or semi-arid environment. Soils prone to collapse are commonly associated with wind-deposited sands and silts, and alluvial fan and debris flow sediments deposited during flash floods. These soils are typically dry and contain minute pores and voids. The soil particles may be partially supported by clay, silt or carbonate bonds. When saturated, collapsible soils undergo a rearrangement of their grains and a loss of cementation, resulting in substantial and rapid settlement under relatively light loads. An increase in surface water infiltration, such as from irrigation, or a rise in the groundwater table, combined with the weight of a building or structure, can initiate rapid

settlement and cause foundations and walls to crack. Typically, differential settlement of structures occurs when landscaping is heavily irrigated in close proximity to the structure's foundation.

- The young and very young alluvial sediments in the Hesperia area may be susceptible to this hazard due to the granular nature of the soils, rapid deposition in the alluvial fan environment, and generally dry condition of the upper soils. These soil types are present primarily in the low-lying portions of the city.

2.4.3.1 Mitigation of Collapsible Soils

The potential for soils to collapse should be evaluated on a site-specific basis as part of the geotechnical studies for development. If the soils are determined to be collapsible, the hazard can be mitigated by several different measures or combination of measures, including excavation and recompaction, or pre-saturation and pre-loading of the susceptible soils in place to induce collapse prior to construction. After construction, infiltration of water into the subsurface soils should be minimized by proper surface drainage design, which directs excess runoff to catch basins and storm drains.

2.4.4 Expansive Soils

Fine-grained soils, such as silts and clays, may contain variable amounts of expansive clay minerals. These minerals can undergo significant volumetric changes as a result of changes in moisture content. The upward pressures induced by the swelling of expansive soils can have significant harmful effects upon structures and other surface improvements.

- The valley and canyon areas of Hesperia are underlain by sediments that are largely composed of granular soils (silty sand, sand, gravel). Such units typically have a low expansion potential, although pockets of fine-grained expansive soils are not uncommon within these units. Sediments within the floodplain of the Mojave River may locally contain fine-grained (silts and clays) sediments, and these deposits may be moderately to highly expansive. Argillic soil profiles (due to weathering of the surface) that have developed on the older fan deposits are commonly clay-rich and probably fall in the moderately expansive range.

- Granitic and metamorphic basement rocks underlying the mountains generally have low expansion characteristics, however faults and shear zones within these rocks may contain clays with expansive minerals. In some cases, engineered fills may be expansive and cause damage to improvements if such soils are incorporated into the fill near the finished surface.

2.4.4.1 Mitigation of Expansive Soils

The best defense against this hazard in new developments is to avoid placing expansive soils near the surface. If this is unavoidable, building areas with expansive soils are typically "presaturated" to a moisture content and depth specified by the soil engineer, thereby "pre-swelling" the soil prior to constructing the structural foundation or hardscape. This method is often used in conjunction with stronger foundations that can resist small ground movements without cracking. Good surface drainage control is essential for all types of improvements, both new and old. Property owners should be educated about the importance of maintaining relatively constant moisture levels in their landscaping.

Excessive watering or alternating wetting and drying can result in distress to improvements and structures.

2.4.5 Ground Subsidence

Ground subsidence is the gradual settling or sinking of the ground surface with little or no horizontal movement. Most ground subsidence is man-induced. In the areas of southern California where ground subsidence has been reported (such as the San Joaquin Valley, Coachella Valley, and Wilmington), this phenomenon is usually associated with the extraction of ground water, oil, or gas from below the surface in sediment-filled valleys and floodplains. Less commonly, ground subsidence can also occur as a response to natural forces such as earthquake movements.

Ground-surface effects related to regional subsidence can include earth fissures, sinkholes or depressions, and disruption of surface drainage. Damage is generally restricted to structures sensitive to slight changes in elevations, such as canals, levees, underground pipelines, and drainage courses; however, significant subsidence can result in damage to wells, buildings, roads, railroads, and other improvements. Subsidence due to the overdraft of ground water supplies can also result in the permanent loss of aquifer storage capacity. Subsidence has largely been brought under control in affected areas by careful management of local water supplies, including reducing pumping of local wells, importing water, and use of artificial recharge (Johnson, 1998; Stewart et al., 1998).

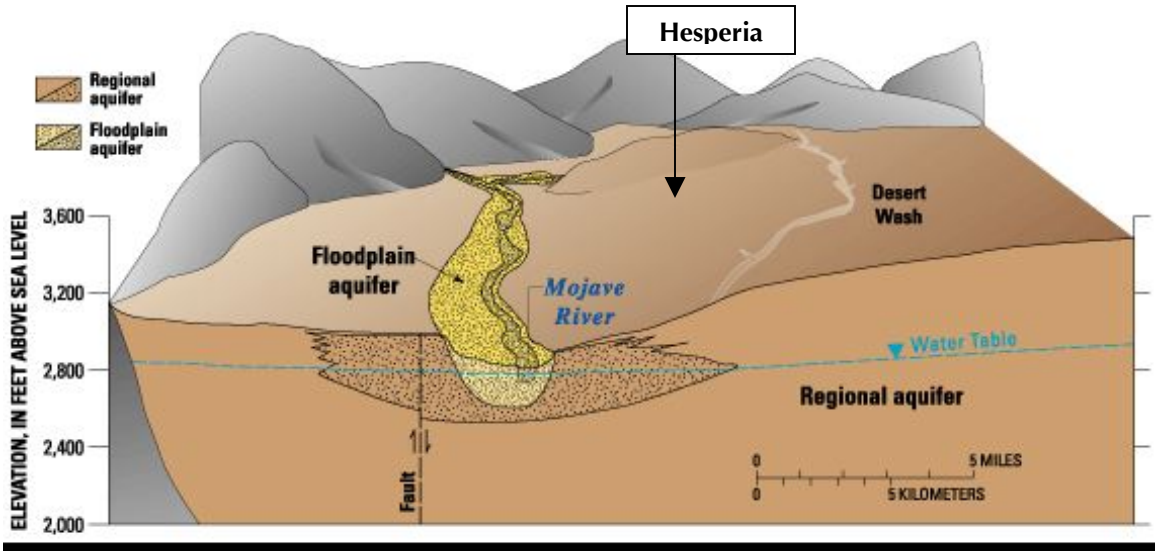
Hesperia is located above the southern end of the Mojave River Groundwater Basin. With an area covering 1,400 square miles and an estimated storage capacity of nearly five million acre-feet (an acre-foot equals about 326 thousand gallons), this basin is one of the largest groundwater reservoirs in southern California (Schlumberger, 2004). The basin consists of two interconnected aquifers, one underlying the Mojave River floodplain, and a larger, regional aquifer within the alluvial fan sediments (Figure 2-7). Natural recharge to the basin comes primarily from the Mojave River (more than 80 percent), with the remainder coming from runoff that infiltrates the upper reaches of tributary washes. Water extraction from the basin has been ongoing for decades, at rates exceeding the natural replenishment, leading to an overdraft condition in the basin. In fact, regional groundwater levels in the basin have dropped more than 100 feet between the 1950s and 1990s, and approximately 30 feet in the last 20 years alone (Carollo Engineers, 2005).

Because surface water is scarce, the high desert communities, including Hesperia, have relied almost entirely on ground water from the Mojave Basin for their domestic supply since the early 1900s. The thick alluvial deposits comprising the aquifer may be susceptible to compaction (with resulting subsidence at the surface) should rapid ground water withdrawal occur beneath the area in response to the water needs of a growing population. Recognizing the potential for declining water levels to induce or renew land subsidence, the United States Geological Survey (USGS), in cooperation with the Mojave Water Agency (MWA), have conducted geologic and hydrologic studies of the basin, including the detection and measurement of subsidence. Three areas within the Mojave Basin showed minor subsidence (01.5 to 0.3 feet) during the study period of 1992-1999, although the subsidence could not be tied definitively to groundwater levels, due to insufficient groundwater data. However, during the time that measurements were recorded, groundwater levels in these areas were at or below historically low levels. The

closest subsidence area to Hesperia was northwest of Adelanto, approximately 16 miles from the city.

- To date, subsidence has not been detected within Hesperia.

Figure 2-7: Aquifers Underlying Hesperia, shown in the diagram below, are currently the City's sole source of domestic water.



Source: US Geological Survey, Fact Sheet 122-01, dated November 2001.

2.4.5.1 Mitigation of Ground Subsidence

Prevention of subsidence requires a regional approach to groundwater conservation and recharge. The Mojave Basin has been managed by the MWA since the agency's inception in 1960. The primary goal of the MWA is to insure a low-cost, sustainable supply of quality water for the future. To that end, the agency, in conjunction with the U.S. Geological Survey (USGS), has implemented programs with the following elements, all of which will result either directly or indirectly in the prevention of ground subsidence:

- Better understand the basin's geology, hydrology, and hydraulic control. Several different types of tests, including geophysical surveys, surface water measurements, ground water level measurements, water quality sampling, meteorological measurements, and well production tests, need to be conducted to adequately characterize the basin.
- Increase the use of imported water. Since July 1994, imported water has been released to the Mojave River southeast of Hesperia, near Rock Springs Road. The imported water supply is crucial to the area's survival, since residents have been using more water than is replaced naturally. The MWA is entitled to 75,800 acre-feet of State Water Project (SWP) water per year via the California Aqueduct, however the amount that is actually available each year is variable, depending on for instance, if the state has a wet or dry year, or if there are multiple dry years.

This variability is expected to increase as users compete for the available supply. To help alleviate this, programs continue to be developed to allow transfers of allotments between water contractors in order to maximize storage of SWP water supplies when they are available (Schlumberger, 2004).

- Increase the use of wastewater. Currently the Mojave Basin receives treated wastewater from several mountain communities. This water is discharged to the Mojave River in the Hesperia area. Within the Mojave Basin, the Victor Valley Wastewater Reclamation Authority provides collection and treatment of wastewater for a number of high desert cities, including Hesperia. The reclaimed water is discharged directly into the Mojave River channel or into percolation ponds. Additional wastewater treatment facilities are currently being planned.
- Continue to develop artificial recharge programs. Studies by the USGS show that artificial recharge can significantly reduce the decline in water levels. In 2002, the MWA conducted a pilot recharge project by constructing four percolation ponds at the Oro Grande Wash and pumping water into the basins to test the recharge capabilities of the aquifer. The results of this study will be used in the design and construction of permanent recharge facilities in the basin. In addition, the Mojave River Pipeline will bring SWP water to spreading basins where it can percolate down to the aquifer. Eventually this pipeline is expected to deliver up to 45,000 acre-feet per year to local communities (www.mojavewater.org). SWP water is also released periodically from Silverwood Lake into the West Fork of the Mojave River.
- Determine the safe yields of the groundwater basins, so that available supplies can be balanced with extraction.
- Monitor the groundwater levels and basin conditions. The MWA has developed a 2,000-foot deep monitoring well in the Oro Grande Wash near Hesperia. This is in addition to approximately 140 shallower monitoring wells that have been installed in the basin since the 1990s (www.mojavewater.org).
- Continue to monitor land subsidence.
- Reduce long-term water demand with specific programs of water conservation.
- Encourage water conservation through public education and water conservation programs.
- Compile and archive collected data for future analysis, as needed.

All of Hesperia's water currently comes from underground sources local to the area. The Hesperia Water District, which supplies water to users within the current city boundary, maintains 13 active wells, all of which are located on the alluvial fan north of the foothills. The district also has eleven aboveground storage reservoirs with a total capacity of 49.5 million gallons (Carollo Engineers, 2005). Hesperia has numerous ongoing and planned improvements to their water distribution infrastructure, including additional wells and reservoirs, new pipelines, replacement of old leaking pipelines, and the addition of alternative energy sources (such as generators) in the case of power failures.

The city has prepared or is in the process of preparing various studies that set forth their goals and actions for water management in the next couple of decades. These include the

Urban Water Management Plan (Carollo Engineers, 2005), the Water Master Plan that is based on land uses within various parts of the city, and a Water Reuse Master Plan to optimize the use of recycled water.

Hesperia has already implemented several water conservation programs including retrofitting older homes with water-saving fixtures or devices, and providing public information on water conservation, landscaping, and resource management. Information on these programs is available at City Hall, the City's website, schools, community events, and with the purchase of new homes. The City also has tiered pricing to encourage conservation and has adopted ordinances that prohibit wasting of water. In order to cope with water shortages, the City has developed a three-stage rationing plan that includes both voluntary and mandatory measures. A severe water shortage contingency plan can be implemented during drought conditions, or during an emergency situation such as an earthquake or loss of electrical power.

The City currently does not utilize recycled water, primarily because it does not have the necessary infrastructure in place. However, new housing developments are required to install dual water systems, so that when recycled water mains are installed, these developments will have a distribution system already available for this recycled water. Future plans also being considered are additional water treatment plants and conveyance routes. Excess recycled water not used by future customers would be used instead to recharge the groundwater basin.

According to the Hesperia's Urban Water Management Plan, the City currently has water supply capabilities to meet daily demands as well as future demands into the year 2030 (Carollo, 2005). However, this will require aggressive water management by the City, the use of recycled water, the continued development for new water sources, and the implementation and enforcement of stringent water conservation measures, especially during droughts.

2.4.6 Erosion

Erosion, runoff, and sedimentation are influenced by several factors, including climate, topography, soil and rock types, and vegetation. The topographic relief between the desert and the adjacent mountains makes erosion and sedimentation an important issue for communities built on alluvial fans and within hillside areas. The fractured condition of the bedrock forming the mountains, combined with rapid geologic uplift and infrequent but powerful winter storms leads to high erosion rates. Further, erosion can increase significantly when mountain slopes are denuded by wildfires, such as those that occurred in the local mountains in 2003. Winter storms that follow a season of mountain wildfires can transport great volumes of sediment onto the low-lying areas below.

Natural erosion processes are often accelerated through man's activities – whether they are agricultural or land development. Development often increases the potential for erosion and sedimentation by removing protective vegetation, altering natural drainage patterns, and constructing cut and fill slopes that may be more susceptible to erosion than the natural condition. Developments also reduce the surface area available for infiltration, leading to increased flooding and sedimentation downstream of the project.

- Near-surface sediments in Hesperia are generally sandy and highly susceptible to erosion, particularly the younger, unconsolidated materials. Erodible deposits are widespread, covering nearly all the General Plan area, with the exception of the southern edge, where rock of the San Bernardino Mountains is exposed.

2.4.6.1 Mitigation of Erosion

Erosion will have an impact on those portions of Hesperia located above and below natural and man-made slopes. Hilltop homes or structures above natural slopes should not be permitted at the head of steep drainage channels or gullies without protective measures against headward erosion of the gully. Structures placed near the base of slopes and/or near the mouths of small canyons, swales, washes, and gullies will need protection from sedimentation. Developments in the valley that are adjacent to natural drainage channels should be adequately set back from eroding channel banks, or modification of the channel to reduce erosion should be included in the project design.

Mitigation of erosion and sedimentation typically includes structures to slow down stream velocity, such as check dams and drop structures, devices to collect and channel the flow, catchment basins, and elevating structures above the toes of the slopes. Diversion dikes, interceptor ditches, swales, and slope down-drains are commonly lined with asphalt or concrete, however ditches can also be lined with gravel, rock, decorative stone, or grass.

There are many options for protecting manufactured slopes from erosion, such as terracing slopes to minimize the velocity attained by runoff, the addition of berms and v-ditches, and installing adequate storm drainage structures. Other measures include establishing protective vegetation, and placing mulches, rock facings (either cemented on non-cemented), gabions (rock-filled galvanized wire cages), or building blocks with open spaces for plantings on the slope face. All slopes within developed areas should be protected from concentrated water flow over the tops of the slopes by the use of berms or walls. All ridge-top building pads should be engineered to direct drainage away from slopes.

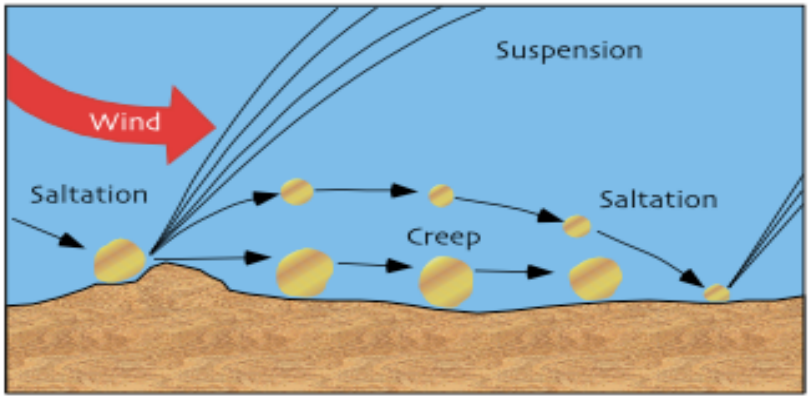
Temporary erosion control measures must be provided during the construction phase of a development, as required by local building codes and ordinances, as well as State and Federal stormwater pollution regulations (National Pollutant Discharge Elimination System – NPDES, see Chapter 5). In addition, permanent erosion control and clean water runoff measures are required for new developments. These measures might include desilting basins, percolation areas to cleanse runoff from the development, proper care of drainage control devices, appropriate irrigation practices, and rodent control. Erosion control devices should be field-checked following periods of heavy rainfall to assure they are performing as designed and have not become blocked by debris.

2.4.7 Wind-Blown Sand

Wind erosion is a serious environmental problem attracting the attention of many across the globe. It is a common phenomenon occurring mostly in flat, bare areas; where dry, sandy soils are present; or anywhere the topsoil is loose, dry, and finely granulated. Wind erosion damages land and natural vegetation by removing soil from one place and depositing it in another. It causes soil loss, dryness and deterioration of soil structure, nutrient and productivity losses, air pollution, and sediment transport and deposition.

Soil movement is initiated as a result of wind forces exerted against the surface of the ground. For each specific soil type and surface condition, there is a minimum velocity required to move soil particles. This is called the threshold velocity. Once this velocity is reached, the quantity of soil moved is dependent upon the particle size, the cloddiness of the particles, and the wind velocity itself. Suspension, saltation, and surface creep are the three types of soil movement that occur during wind erosion (Figure 2-8). While soil can be blown away at virtually any height, the majority (over 93 percent) of soil movement takes place at or within one meter (3 feet) of the ground surface.

Figure 2-8: Wind-Induced Soil Movement



Wind-induced soil movement is initiated as a result of wind forces exerted against the surface of the ground, and includes suspension, saltation, and surface creep. Soil can be blown high into the atmosphere; however, most soil movement takes place at or within one meter of the ground surface.

- Hesperia is affected by strong gusts of wind associated with the Cajon Pass, as well as climatic differences between the high desert, the mountains, and the inland valleys south of the pass. Combined with the sandy surface soils that are common in Hesperia, the wind poses an environmental, and often destructive, hazard. The presence of dust particles in the air is also the source of several major health problems. Atmospheric dust causes respiratory discomfort, and may carry pathogens that cause eye infections and skin disorders. Dust storms also reduce highway and air traffic visibility.

2.4.7.1 Mitigation of Wind-Blown Sand

Mitigation measures that have been used and are used in windy areas include hedges and other barriers to wind. Increased development in the Hesperia area has the positive side-effect of significantly reducing the local sand available to be picked up and transported by the wind. This is due to the increasing amount of hardscape (asphalt and concrete) and vegetation (such as grass and ornamental plants) in the area, covering the soil and isolating it from the wind. During grading and construction stages, however there is the potential for increased amounts of soils available for transport. Therefore, water is typically sprayed at construction sites to reduce dust in the air by weighting down the soil. To further

decrease the potential for air-born dust, earthwork construction should be curtailed on very windy days.

2.5 Summary of Issues

The Hesperia area is highly diverse geologically. This diversity is strongly related to the youthful (in geologic terms) seismic setting of the area, which includes the ongoing uplift of the San Bernardino Mountains to the south as a result of tectonic movement along the San Andreas fault and its broad zone of subsidiary faults. This, along with the effects of climate, has resulted in a landscape that is complex in geologic processes and hazards. As the City's population grows in the next few years, new development will be needed to meet the demand for homes. When meeting this demand, it is imperative to manage land uses in a responsible way, as development disrupts natural processes, often leading to negative impacts on the environment as well as on the development and adjacent projects. The impacts of land development can be minimized, however, if both site-specific and regional planning elements are recognized and considered, the project incorporates knowledge gained from scientific research in developing and implementing a design appropriate to the area, and protective measures are constructed and maintained for the lifetime of the project.

Most of Hesperia is situated on an older alluvial fan surface that has well-established, deeply incised drainage channels. In contrast, the southern part of the city contains low foothills and a broad, sediment-filled valley. The southernmost boundary encroaches onto the base of the San Bernardino Mountains, a range of mountains that not only forms a dramatic backdrop to the city, but also greatly influences its climate, geology, and hydrology. These elements combine in various ways to create geologic hazards, as well as benefits (such as Mojave River aquifers) to the community. Hazards that have the greatest impact on Hesperia are summarized below.

Slope instability is a potential hazard where development has encroached into the foothills and washes. This may take the form of small landslides, but is more likely to consist of surficial failures and erosion of the sandy geologic materials. Such failures typically occur during exceptional and/or prolonged rainfall events, and may manifest as mud or debris flows. Rockfall is a hazard near the base of the mountains where bedrock forms bouldery outcrops. Rockfall is more likely to occur as a result of earthquake-induced ground shaking, posing a threat to structures and passing motorists.

Potentially compressible and/or collapsible soils underlie a significant part of the city, typically on parts of the alluvial fan, in Summit Valley, and within washes and canyon bottoms. These are generally young sediments of low density with variable amounts of organic materials. Under the added weight of fill embankments or buildings, these sediments will settle, causing distress to improvements.

Although not prevalent, some of the geologic units in the Hesperia area, including both surficial soils and bedrock, may have fine-grained components locally that are moderate to highly expansive. These materials may be present at the surface or exposed by grading activities. Man-made fills can also be expansive, depending on the soils used to construct them.

Regional ground subsidence from groundwater withdrawal is a potential hazard that the City of Hesperia can proactively help to prevent by supporting the proper management of the

groundwater supplies, creating water conservation programs, encouraging water recycling, and through public education. With the expected increase in population, one of the most serious challenges ahead is the potential overdraft of the aquifers underlying the Mojave Basin, with a resultant negative impact on the region's environmental quality.

Because of the topographic relief in and around Hesperia, erosion and sedimentation are inherently significant elements of the natural setting. Land development can have adverse impacts on these elements by altering natural processes, topography, and protective vegetation, in addition to reducing the area of natural infiltration. This in turn can lead to damage from increased flooding, erosion, and sedimentation in other areas, typically downstream. Erosion and sedimentation are also important considerations on a site-specific basis, with respect to developments adjacent to slopes and drainage channels. These issues are not only critical during the design of a project, but also during construction and during the long-term maintenance of the developed site.

Strong winds are also inherent to the Hesperia area, due to the tunneling effect of air through the Cajon Pass, as well as climatic differences between the desert, the mountains, and the inland valleys. Wind is also an important agent of erosion that can damage land and vegetation. In this region, where surface sediments are predominantly dry and granular, wind-blown sand and dust can impact surface improvements, air quality (creating health hazards), and visibility.

Losses resulting from geologic hazards are generally not covered by insurance policies, causing additional hardship on property owners. The potential for damage can be greatly reduced by:

- Strict adherence to grading ordinances – many of which have been developed as a result of past disasters.
- Sound land planning and project design that avoids severely hazardous areas.
- Detailed, site-specific geotechnical investigations, followed by geotechnical oversight during grading and during construction of foundations and underground infrastructures.
- Effective geotechnical and design review of projects performed by qualified, California-registered engineering geologists, soil engineers, and design engineers.
- Public education that focuses on reducing losses from geologic hazards, including the importance of proper irrigation practices, in addition to the care and maintenance of slopes and drainage devices.

CHAPTER 3: FLOODING HAZARDS

Floods are natural and recurring events that only become hazardous when man encroaches onto floodplains, modifying the landscape and building structures in the areas meant to convey excess water during floods. Unfortunately, floodplains have been alluring to populations for millennia, since they provide level ground and fertile soils suitable for agriculture, and access to water supplies and transportation routes. Notwithstanding, these benefits come with a price – flooding is one of the most destructive natural hazards in the world, responsible for more deaths per year than any other geologic hazard. Furthermore, average annual flood losses (in dollars) have increased steadily over the last decades as development in floodplains has increased.

The city of Hesperia and surrounding areas are, like most of southern California, subject to unpredictable seasonal rainfall. Most years, the scant winter rains are barely sufficient to turn the hills green for a few weeks, but every few years the region is subjected to periods of intense and sustained precipitation that results in flooding. Flood events that occurred in southern California in 1862, 1884, 1916, 1938, 1969, 1978, 1980, 1983, 1988, 1992, 1995, 1998 and 2005 have caused an increased awareness of the potential for public and private losses as a result of this hazard, particularly in highly urbanized parts of floodplains and alluvial fans. As the population in the area increases, there is an increased pressure to build on flood-prone areas, and in areas upstream of previously developed land. With increased development also comes an increase in impervious surfaces, such as asphalt. Water that used to be absorbed into the ground becomes runoff to downstream areas. If the storm drainage systems are not designed or improved to convey these increased flows, areas that may have not flooded in the past may be subject to flooding in the future. This is especially true for developments near the base of the mountains and downstream from canyons that have the potential to convey mudflows.

3.1 Storm Flooding

3.1.1 Hydrologic Setting

The city of Hesperia and its Sphere of Influence (herein referred to as the city) encompass an area with sharp contrasts in terrain. High, steep slopes of the San Bernardino Mountains border the city on the south; deeply eroded foothills occupy the southern part of the city; and the central and northern parts are situated on a broad, moderately to gently sloping alluvial fan emanating from the adjacent mountain ranges.

Nearly all of the streams in the Hesperia high desert area eventually discharge into the Mojave River. Streams on the north flank of the San Bernardino Mountains form the headwaters of this great river, the largest drainage course in the Mojave Desert region. These streams include Horsethief Canyon, Little Horsethief Canyon, West Fork of the Mojave, Grass Valley Creek, Kinley Creek, Deep Creek, and many smaller, unnamed drainages (see Plate 2-1). The upper West Fork of the Mojave River flows into Silverwood Lake, a man-made reservoir formed by Cedar Springs Dam. Below the dam, the lower West Fork, along with flows from the Horsethief Canyon area, converge with Grass Valley Creek and Deep Creek above the Mojave Forks Dam, the only major flood control structure on the river.

After leaving the mountains, the Mojave River flows northward, along the eastern edge of the city, then bends eastward near Barstow, eventually reaching Soda Lake near Baker.

Along most of its length, water flows underground, rising only to the surface in areas where shallow, impermeable rock is present, such as the narrows near Victorville. During exceptional storms however, the Mojave River can carry flowing water along its entire length (Figure 3-1).

Figure 3-1: The Mojave River Bed Appears Dry Most of the Year as Water Travels Through Permeable Sands Below the Surface. During and after storms however, the river can carry fast-moving, sediment-laden waters the full width of its channel. View is to the south from Calpella Avenue in Hesperia.



The largest tributary to the Mojave River within the developed part of the city is the Antelope Valley Wash, a broad, deeply incised drainage channel that collects runoff from the low hills north of Summit Valley. The lower reaches of the wash have significant development, including a golf course and many single-family homes. The upper reaches are largely undeveloped except for Summit Valley Road and a rail line. North of Antelope Valley Wash, in the central part of the city, the alluvial fan surface is incised with numerous small, relatively shallow drainages. Near the Mojave River, some of the tributary drainages are deeply incised, ranging up to about 50 feet in depth. The head of the fan, in the southwestern part of the city, is also deeply eroded, with major drainages as deep as 100 feet.

The western part of Hesperia is crossed by several major stream channels, the largest of which is the Oro Grande Wash. These drainages originate in the uplifted alluvial fans of the Oak Hills area, near the base of the mountains, then flow north to northeastward, merging with the Mojave River north of the city. Hesperia is also traversed by the East Branch of the California Aqueduct, which for the most part is an open canal.

Most of Hesperia's existing development is situated on the alluvial fan surface. Although some newer projects consist of closely spaced tract homes, mass graded developments are not common. Older construction, as well as a considerable amount of recent construction, has been completed with minimal alteration to the natural topography. As a result, natural

drainage courses meander through developed areas. Small channels pass through private yards, and many homes are built within the larger drainages. Most streets follow the natural contours of the land, commonly (although not entirely) without culverts or bridges across drainage channels.

Floods on alluvial fans have characteristics that are significantly different from those caused by river flooding. Although typically shallow in depth, mudflows can strike with little warning, travel at very high speeds, and carry tremendous amounts of sediment and debris (National Research Council, 1996). The Federal Emergency Management Agency (FEMA) defines an *active* alluvial fan flood hazard based on three related criteria: (1) unpredictable flow paths; (2) abrupt deposition and erosion; and (3) an environment where the combination of sediment availability, slope, and topography creates an ultra-hazardous condition. These characteristics make realistic assessments of flood risk and development of reliable mitigation particularly challenging. FEMA also defines an *inactive* alluvial fan flooding hazard as one that has relatively stable flow paths, and a low level of sedimentation/erosion such that is does not cause instability in the established flow paths. A particular alluvial fan may show characteristics of both active and inactive processes, especially if it has been modified by man-made structures. The fans in the Hesperia area largely fall into this mixed category.

3.1.2 Meteorological Setting

The high mountains flanking the city of Hesperia have a powerful effect on the climatic conditions in this region. Capturing precipitation from strong Pacific storms that pass through, the mountains separate the semi-arid environment to the south and west from the dry, desert regions to the east and northeast. Most of the precipitation occurs in the winter months, between November and April. However, high intensity, short duration tropical storms emanating from the Baja California area are common during the summer and fall.

The high mountains south of the city receive significantly more precipitation than the adjacent desert. Average yearly precipitation in the Hesperia area is about 5 to 6 inches (see Table 3-1), whereas more than 42 inches (average) of precipitation fall annually in the local mountains (Table 3-2).

Table 3-1: **Average Annual Rainfall* by Month for Victorville Pump Plant (el. 2,857')**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	1.0	0.9	1.0	0.4	0.1	0.0	0.1	0.2	0.3	0.3	0.5	0.8	**5.6**

Data based on 56 complete years between 1938 and 1995.
Source: http://www.worldclimate.com/
*Average rainfall = Mean monthly precipitation, including rain, snow, hail, etc.

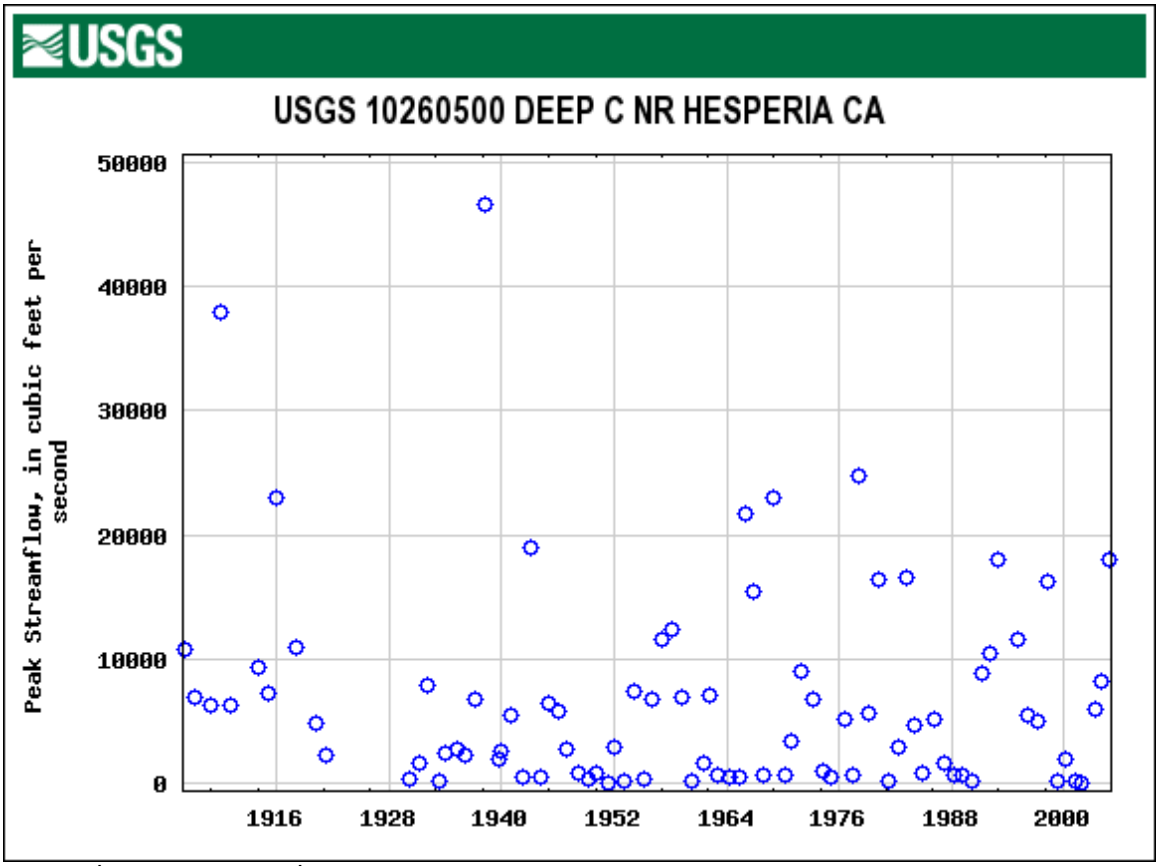
Table 3-2: **Average Annual Rainfall* by Month for Lake Arrowhead (el. 5,203')**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	9.1	8.1	7.1	3.4	1.1	0.2	0.1	0.4	0.9	1.6	4.6	6.3	**42.9**

Data based on 52 complete years between 1931 and 1995.
Source: http://www.worldclimate.com/
*Average rainfall = Mean monthly precipitation, including rain, snow, hail, etc.

Not only does rainfall vary from one location to the next, often within short distances, but precipitation in southern California is also extremely variable from year to year, ranging from less than one-fourth the average amount to more than double the average amount. For instance, record-breaking rainfall has occurred periodically in the area, as illustrated in the peak stream flow graph for Deep Creek (see Figure 3-2). This gage is located slightly upstream from the Mojave Forks Dam and therefore best represents the extreme fluctuations in stream discharge that can occur above Hesperia. With peaks typically on the order of about 500 to 1,000 cubic feet per second (cfs) for most years, peak flows reached about 23,000 cfs in 1969 and 1978, and more than 37,000 cfs in 1910. During the winter that remains the benchmark for damaging storms – February and March of 1938 – peak streamflow for Deep Creek was estimated to be more than 46,000 cfs! Downstream from Hesperia, peak streamflow for the Mojave River in 1938 swelled to more than 70,000 cfs (USGS stream gage 10261500 near Victorville).

Figure 3-2: Peak Annual Streamflow Values for Gage Station 10260500 on Deep Creek, located near the base of the mountains.



Source: http://nwis.waterdata.usgs.gov.

There are three types of storms that produce precipitation in southern California: winter storms, local thunderstorms, and summer tropical storms. All of these have the potential to impact the Hesperia area.

Winter storms are characterized by heavy and sometimes prolonged precipitation over a large area. These storms usually occur between November and April, and are responsible for most of the precipitation recorded in southern California. This is illustrated by the data presented above in Tables 3-1 and 3-2. The storms originate over the Pacific Ocean and move eastward (and inland). Mountain ranges, such as the San Gabriel and San Bernardino Mountains, form a rain shadow, slowing down or stopping the eastward movement of this moisture. A significant portion of the moisture is dropped on the San Gabriel and San Bernardino Mountains as snow. If large storms are coupled with snowmelt from these mountains, large peak discharges can be expected in the main watersheds at the base of the mountains.

Some of the severe winter storm seasons that have historically impacted the southern California area have been related to El Niño events. El Niño is the name given to a phenomenon that originates every few years, typically in December or early January, in the southern Pacific, off the western coast of South America, but whose impacts are felt worldwide. Warmer-than-usual waters in the southern Pacific are statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of hurricanes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific. Two of the largest and most intense El Niño events on record occurred during the 1982-83 and 1997-98 water years. [A water year is the 12-month period from October 1 through September 30 of the second year. Often a water year is identified only by the calendar year in which it ends, rather than by giving the two years, as above.] These are also two of the worst storm seasons reported in southern California.

More recently, the severe storms of December 2004 and January 2005 have been blamed on a different climatic condition, one where the sub-tropical jet stream carries moisture-laden air directly from the tropics to the west coast of California. Because it passes over the Hawaiian Islands, it is commonly referred to as the "Pineapple Express." At the same time this condition was developing, the northern jet stream shifted towards the California coast allowing storms from the north to tap into the deep tropical moisture, dramatically increasing the rainfall in southern California (NOAA, 2005a). Powerful winter storms during February 2005, however, have been attributed to a weak, but persistent El Niño condition, combined with an atmospheric condition that blocked or slowed the normal eastward movement of the storms (NOAA, 2005b). These events combined to give the region record-breaking rainfall in the 2005 water year, in addition to spawning numerous waterspouts and small tornadoes.

Local ***thunderstorms*** can occur at any time, but usually cover relatively small areas. These storms are usually prevalent in the higher mountains during the summer. ***Tropical rains*** typically occur in the summer or early fall, especially in the desert areas. These storms originate in the warm, southern waters off Baja California, in the Pacific Ocean, and move northward into southern California.

3.1.3. Past Floods: Implications for Existing Flood Hazard

Because of the arid, high desert climate and the generally dry local washes, residents might be surprised to learn that alluvial fans are the sites of infrequent but catastrophic flooding. Flood hazards to the Hesperia area can be classified into two general categories: flash flooding down natural channels, including the Mojave River, and sheet flooding across the alluvial fans upon which most of the development in the city currently lies.

Flash floods are short in duration, but have high peak volumes and high velocities. This type of flooding occurs in response to the local geology and geography, and the built environment (man-made structures). The mountains south of Hesperia are very steep and consist of rock types that are fairly impervious to water. Consequently, little precipitation infiltrates the ground; rainwater instead flows across the surface as runoff, collecting in the major drainages that disperse water into the Summit Valley area, behind the Mojave Forks Dam. Storm water from the mountains eventually reaches the Mojave River, via controlled release at the dam, and flows along the eastern boundary of Hesperia. When a major storm moves in over the city, water collects rapidly in the many natural or modified channels that are present throughout the area. Because of the locally steep terrain and erodible soils, stormwater flows often carry large amounts of mud, sand, and rock fragments. Sheet flow occurs when the capacities of the existing channels (either natural or man-made) are exceeded and water flows over and into the adjacent areas.

The duration and frequency of winter storms also have a significant impact on flooding potential. Near-surface soils in Hesperia are generally sandy and permeable, allowing the ground to quickly absorb runoff from small or widely spaced storms. However, during winters with intense, closely spaced storms, such as those in 1969, severe flooding occurs when the ground is already saturated from previous storms. In January and February of 1969, a series of closely spaced, intense storms in the mountains released heavy rainfall on saturated ground. Total precipitation in the mountains above Hesperia (Lake Arrowhead rain gage) reached more than 80 inches for the two-month period. As a result, storm flows in the Mojave River reached all the way to Soda Lake, causing heavy damage to highways, bridges, and properties. Erosion of stream banks, channels, and flood plains, as well as the deposition of sediment was severe (Waananen, 1969).

Historical descriptions suggest the flood of 1862 was probably the largest event in southern California, although very little discharge or rainfall data are available. During the last century, one of the most disastrous southern California storm periods on record occurred during February 27 to March 4, 1938, when a series of strong storms centered over the San Gabriel and San Bernardino Mountains unleashed record-breaking rainfall in areas already saturated by previous storms. Stream gages on rivers emanating from the mountains, Including the Mojave River, logged record discharges, and losses were estimated to be more than $78 million (1938 dollars) due to the extensive development that had taken place on the floodplains of major rivers (Troxell, 1942).

Prior to 1938, citizens had already developed an awareness of the need for flood control and water conservation; however, the 1938 floods made it clear that growing cities in the region did not have adequate flood protection. This led to the formation of new flood

control districts in San Bernardino and Riverside counties, as well as in other areas of southern California.

3.1.4 National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is mandated by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards. To promote sound land use and floodplain development, FEMA provides Flood Insurance Rate Maps (FIRMs) for local and regional planners. Flood risk information presented on FIRMs is based on historic, meteorological, hydrologic, and hydraulic data, as well as topographic surveys, open-space conditions, flood-control works, and existing development. Rainfall-runoff and hydraulic models are utilized by the FIRM program to analyze flood potential, adequacy of flood protective measures, surface-water and groundwater interchange characteristics, and the variable efficiency of mobile (sand bed) flood channels. It is important to realize that FIRMs only identify potential flood areas based on the conditions at the time of the study, and do not consider the impacts of future development.

To prepare FIRMs that illustrate the extent of flood hazards in a flood-prone community, FEMA conducts engineering studies referred to as Flood Insurance Studies (FISs). Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a "**base flood**" which FEMA sets as a 100-year flood. A **100-year flood** is defined by looking at the long-term average period between floods of a certain size, and identifying the size of flood that has a 1 percent chance of occurring during any given year. This base flood has a 26 percent chance of occurring during a 30-year period, the length of most home mortgages. However, a recurrence interval such as "100 years" represents only the long-term average period between floods of a specific magnitude; rare floods can in fact occur at much shorter intervals or even within the same year.

The base flood is a regulatory standard used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements nationwide. The Flood Disaster Protection Act requires owners of all structures in identified SFHAs to purchase and maintain flood insurance as a condition of receiving Federal or federally related financial assistance, such as mortgage loans from federally insured lending institutions.

The base flood is also used by Federal agencies, as well as most county and State agencies to administer floodplain management programs. The goals of floodplain management are to reduce losses caused by floods while protecting the natural resources and functions of the floodplain. The basis of floodplain management is the concept of the "**floodway**." FEMA defines this as the channel of a river or other watercourse, and the adjacent land areas that must be kept free of encroachment in order to discharge the base flood without cumulatively increasing the water surface elevation more than a certain height. The intention is not to preclude development, but to assist communities in managing sound development in areas of potential flooding. The community is responsible for prohibiting encroachments into the floodway unless it is demonstrated by detailed hydrologic and hydraulic analyses that the proposed development will not increase the flood levels downstream.

The NFIP is required to offer federally subsidized flood insurance to property owners in those communities that adopt and enforce floodplain management ordinances that meet minimum criteria established by FEMA. The National Flood Insurance Reform Act of 1994 further strengthened the NFIP by providing a grant program for State and community flood mitigation projects. The act also established the Community Rating System (CRS), a system for crediting communities that implement measures to protect the natural and beneficial functions of their floodplains, as well as managing the erosion hazard. **The City of Hesperia has participated as a regular member in the NFIP since 1989 (City ID No. – 060733#). The city's most current effective FIRM maps date from August 8, 2008. Some of these maps have been amended by Letters of Map Change (LOMCs) since the maps' original publication.** Because the City is a participating member of the NFIP, flood insurance is available to any property owner in the city. In fact, to secure financing to buy, build, or improve structures in SFHAs, property owners are required to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is located in a SFHA and must provide written notice requiring flood insurance. FEMA recommends that all property owners purchase flood insurance. Keep in mind that approximately 25 percent of all flood claims occur in low to moderate risk areas. Flooding can be caused by a combination of heavy rains, inadequate drainage systems, and failed protective devices such as levees.

3.1.5 FEMA Flood Zone Mapping

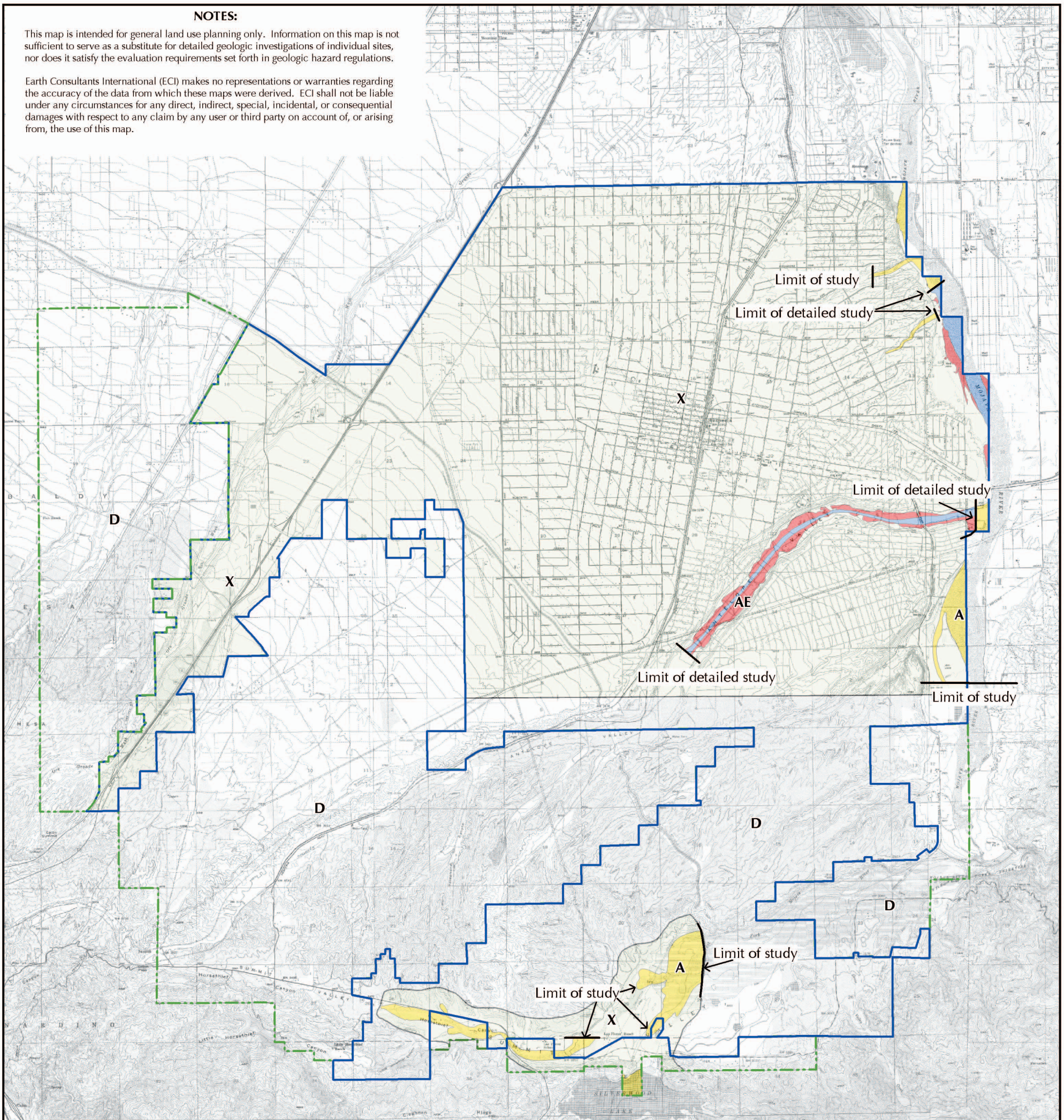
As mentioned above, Hesperia has participated in the National Flood Insurance Program since 1989. In the vicinity of Hesperia, the extent of flooding on the Mojave River, Antelope Valley Wash, the Oro Grande Wash, and the Summit Valley area has been analyzed through Flood Insurance Studies (FISs). The potential flood zones in the city mapped by FEMA are presented in Flood Insurance Rate Maps (FIRMs). Plate 3-1 shows the FIRM inundation limits for the 100-year flood, however it should be noted that the entire area was not studied and that the flood zones are incomplete. The FIRM maps are amended periodically to reflect changes in flood control facilities and/or changes in topography (usually as a result of development). Modifications to the FIRM maps typically accompany updated FISs or Letters of Map Revision (LOMRs) that FEMA issues in response to an agency supplying new hydraulic data that show that the flooding hazard in a specific area has changed or has been abated.

Plate 3-1 shows that portions of the Hesperia area are vulnerable to inundation during the 100-year flood along the Mojave River, Antelope Valley Wash, and Summit Valley. Except for the Antelope Valley Wash, most of the FEMA flood-prone areas are relatively undeveloped, or in the case of western Summit Valley, development is widely scattered. Although most of the existing homes in Summit Valley are above the flood zone, access to many of the homes would be cut off during severe flooding of the creek. Several major roadways in the 100-year flood zones would be affected, including Highways 138 and 173, Avenue I, Rock Springs Road, and Ranchero Road. The portion of the city adjacent to the Mojave River is now largely protected due to construction of the Mojave Forks Dam at the base of the mountains, however a few properties at the eastern boundary of the city are within the FEMA 100-year flood zone.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.



Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: Federal Emergency Management Agency, San Bernardino, Flood Insurance Rate Map (Panel Numbers: 06071C6480 H, 06071C6485 H, 06071C6495 H, 06071C6505 H, 06071C6515 H, and 06071C7225 H)

N
W E
S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

High Risk Areas

- **A** — Zone that corresponds to the 100-year flood areas, as determined by approximate methods. Because detailed hydraulic analyses were not performed, no base flood elevations or depths are shown. Mandatory flood insurance is required.
- **AE** — Zone that corresponds to the 100-year flood areas, as determined by detailed hydraulic analyses. In most cases, base flood elevations are shown at selected intervals.* Mandatory flood insurance is required.
- **AE** — Floodway zone.* Watercourse channel that generally must be kept free of encroachment. Development is subject to special regulations.

Low Risk Areas

- **X** — Zone that corresponds to areas outside of the 100-year flood or areas protected from the 100-year flood by levees. No base flood elevations or depths are shown. Flood insurance is available but not required.

Undetermined Risk Areas

- **D** — Zone that corresponds to unstudied areas where flood hazards are undetermined, but flooding is possible. Flood insurance is available but not required.

Hesperia City Boundary

Hesperia Sphere of Influence

* See FEMA Flood Insurance Rate Maps and FEMA Flood Insurance Study for Base Flood Elevations.

HESPERIA 1988

Earth Consultants International

Project Number: 2617
Date: February 2010

FEMA Flood Map
Hesperia, California

Plate 3-1

FEMA has analyzed the developed portion of Antelope Valley Wash, and identified the areas that would be inundated during the 100-year flood. From this analysis, FEMA also developed base flood elevations for the area. According to FEMA Map No. 06071C6495H, the Hesperia Golf Course, as well as numerous homes, streets, and associated improvements would be flooded by a 100-year flood event. The portion of the Oro Grande Wash that is within the city is considered by FEMA to be outside of the 100-year flood zone.

Figure 3-3: Development has Occurred Within Larger Drainages in Hesperia, Including Antelope Valley Wash, shown below. In spite of a leveed open flood control channel in the bottom of the wash, FEMA indicates many homes in Antelope Valley Wash are still vulnerable to flooding from the 100-year storm.



Copies of the Flood Insurance Study and FEMA maps are on file at the City. They can also be accessed at FEMA's website, http://msc.fema.gov. General provisions for flood hazard reduction are provided in the City's Municipal Code (Title 8, Chapter 8-28) and apply to all lands in Areas of Special Flood Hazard. The flood hazard areas are based on the FEMA maps, however these are the minimum areas of applicability. Additional areas may be included in the application of these provisions.

3.1.6 Local Flooding

Many storms smaller than the estimated 100-year event have caused localized flooding and sedimentation problems in Hesperia, particularly during and after intense precipitation that fell on already saturated ground. The City (including the unincorporated areas) does not have a comprehensive, interconnected storm drain system, nor does it have many bridges and culverts where streets cross numerous natural drainage channels. In addition,

flow in some drainages has been obstructed or altered by debris or construction – for example, the bermed or elevated rail lines, which pond water on the upstream side. The California Aqueduct has "overchutes" and drop inlets where it crosses natural drainages, but in some cases these are not adequate, and smaller drainages may be blocked all together. The city still has many dirt roads in older residential areas, and these, along with the natural channels, are vulnerable to erosion. Further, rapidly flowing storm water can carry significant amounts of sediment in suspension. Sediment loads are then deposited when the stream velocity slows due to an obstruction or when it reaches the Mojave River. These events can lead to property damage, or in some cases, parts of the community being temporarily isolated due to eroded or flooded access roads.

3.1.7 Bridge Scour

Scour at highway bridges involves sediment-transport and erosion processes that cause streambed material to be removed from the bridge vicinity. Nationwide, several catastrophic collapses of highway and railroad bridges have occurred due to scouring and a subsequent loss of support of foundations. This has led to a nationwide inventory and evaluation of bridges (Richardson et al., 1993).

Scour processes are generally classified into separate components, including pier scour, abutment scour, and contraction scour. ***Pier scour*** occurs when flow impinges against the upstream side of the pier, forcing the flow in a downward direction and causing scour of the streambed adjacent to the pier. ***Abutment scour*** happens when flow impinges against the abutment, causing the flow to change direction and mix with adjacent main-channel flow, resulting in scouring forces near the abutment toe. ***Contraction scour*** occurs when flood-plain flow is forced to flow through a narrow opening at the bridge, where the resultant increase in the velocity of the surface water can produce scour. ***Total scour*** for a particular site is the combined effects from all three components. Scour can occur within the main channel, on the flood plain, or both. While different materials scour at different rates, the ultimate scour attained for different materials is similar and depends mainly on the duration of peak stream flow acting on the material (Lagasse et al., 1991).

In the Hesperia area, bridge scour could occur along some of the roads and rail lines that extend across major drainage channels (such as the Mojave River and Horsethief Canyon). Furthermore, since the streams only flow occasionally, any scouring that occurs during the very sporadic but high intensity storms may go undetected. Therefore, bridges should be inspected during and after a flood event to determine whether or not there is scouring damage that could impact their foundations. Any damage observed near the bridge supports should be repaired as soon as possible, before the next storm event or storm season, as appropriate.

The State's Transportation Department (Caltrans) maintains a database on bridge scour. According their records, the State-owned bridges crossing waterways in Hesperia are stable with respect to the calculated scour. These include the Interstate 15 bridges, as well as State Routes 138 and 173 (Steve Ng, personal communication, 2006). Within the city, the only bridges across the Mojave River are the Bear Valley Road crossing, and the rail crossing at Rock Springs Road. Several other bridges are present within the city across tributaries to the Mojave River, and across the Aqueduct.

Figure 3-4: Bear Valley Road Bridge Across the Mojave River



3.1.8 Existing Flood Protection Measures

The alluvial fans in the Hesperia area have been greatly modified given that large portions are covered by development. Early development occurred in a piecemeal fashion over the years, without the benefit of a planned drainage network. Shortly after incorporation, the City adopted a policy of reducing flood damage in new developments by requiring the use of on-site retention basins and other methods, including engineered structures if warranted, until a comprehensive drainage system could be designed and constructed (Resolution No. 89-16). In the 1990s, the San Bernardino County Flood Control District published Master Plans of Drainage for the Hesperia area, thereby providing a regional "roadmap" for development of storm drain infrastructure. Since that time the City has constructed several of the recommended drainage facilities, in order to alleviate problematic flood areas. These include:

- The H-01 Line, Section 2 (located between Main Street, just east of Balsam Avenue, and Third Avenue, north of Mojave Street).

- The H-01 Line also drains the city's industrial area to the Mojave River. Culverts were constructed under Santa Fe Avenue, "C" Avenue, "E" Avenue, "I" Avenue, Valencia Street, Talisman Street, and Peach Avenue to prevent closing of these streets due to flooding.

- The G-01 Line, running roughly parallel to and south of the H Line. This line currently terminates near Talisman and Choiceana Avenue. The City is currently acquiring two properties to construct improvements to this outlet to the Mojave River, thereby eliminating recurring flood damage and repair.

- The D-02 Line is a 3.5-foot diameter pipe from Eleventh Avenue to Seventh Avenue. This pipe conveys storm runoff from developed residential areas across Ranchero Road. Another ¼ mile of 4-foot diameter pipe conveys these flows to the Antelope Valley Wash.

- The D-01-02 Line serves an area washed out during heavy storms in 1992. This 84-inch diameter pipe conveys flows from a basin adjacent to "E" Avenue to the Antelope Valley Wash.

- The A-01 Line serves the developing commercial area west of Interstate 15 on Main Street. This 54-inch diameter pipeline conveys storm flows from the new Hesperia Marketplace shopping center, as well as other existing hotels, gas stations, and restaurants. These flows are directed into the Oro Grande Wash, cross under the California Aqueduct, and continue northeast into the city of Victorville.

The City of Hesperia owns and maintains the localized storm-drain pipes, as well as the culverts, small bridges, and some small basins. In addition, it has added asphalt berms to a number of roadways where surface flows were problematic during major storm events. These include:

- "C" Avenue, between El Centro Street and Sage Street.
- "E" Avenue, between Fir Street and Joshua Street.
- Seventh Avenue, between Palm Street and Sultana Street.
- Oakwood Avenue, between Live Oak Street and Riverside Street.

One of the longest drainage structures in the city is a nearly 2-mile long, man-made channel with levees in the residential portion of the Antelope Valley Wash. This has reduced the flooding potential for homes near the bottom of the wash, but according to FEMA (2008), this channel still cannot accommodate the 100-year flood.

Much of Hesperia is rural or semi-rural in character. Where development is more widely spaced with larger lots, many private yards have their own flood control structures including basins, berms, improved channels, culverts, rock revetments, etc.

Along the western side of the Mojave River, in the northern part of the city, the San Bernardino County Flood Control District (SBCFCD) locally constructs levees of piled up sand. These are considered temporary structures that have to be rebuilt periodically. The only regional flood control structure protecting Hesperia from the Mojave River is the Mojave Forks Dam (discussed further in Section 3.2.1). Because the dam blocks the lower West Fork of the Mojave River, it increases the potential for flooding at the eastern end of

Summit Valley. Much of this area however, is within the Mojave River Forks Regional Park.

Figure 3-5: Drainage Canal in the Bottom of Antelope Valley Wash, near Ranchero Road.



The existing flood control structures have provided significant protection from flooding, such that recent storms have not had the catastrophic effect on homes and streets typical of earlier years, before these drainage projects were completed. Nevertheless, as indicated by the current FEMA maps, additional protection is needed. The Hesperia Master Plan of Drainage published by the SBCFCD (1996) indicates many new structures need to be constructed, including detention basins, open channels, storm drains and permanent levees for the Mojave River.

3.1.9 Future Flood Protection

The Master Plan of Drainage (MPD) for Hesperia addresses the area east of Interstate 15 (excluding Summit Valley). The MPD for Victorville covers the area west of Interstate 15, including the Oro Grande Wash. The Hesperia MPD concluded that at the time of the study, none of the existing facilities within the study area had the capacity to convey the anticipated 100-year flows (Williamson & Schmid/Huitt-/Zollars, 1996). The infrastructure plan recommended for Hesperia generally included two large detention basins and numerous open channels, most of which were sited to take advantage of existing drainage easements. The plan assumed that the Mojave River would be fully improved with levees, and that the new channels would outlet to the river at eight locations through the levees. Four basins were recommended in the Victorville MPD. Two of these are within Hesperia; one is recommended for the Oro Grande Wash just south of the Aqueduct, and one is recommended for the East Oro Grande Wash, south of the rail line crossing. The MPDs

are intended to be used as a guidelines only, and will need to be modified as the area continues to grow.

The Ranchero Road Grade Separation Project will significantly improve east-west travel across the city, for citizens and emergency personnel, by providing a much-needed second access road across the BNSF railroad tracks. The project will not only provide continuity of Ranchero Road beneath the tracks, but will elevate the road where it crosses the Antelope Valley Wash, thereby reducing the potential for road closures due to flooding. The Ranchero Road improvements are scheduled for completion in 2010.

Hesperia has also been actively improving streets within its corporate boundaries, paving many of the dirt roads and adding paved shoulders to direct water flow. New storm drains will also be constructed in the near future, as funding is available. In addition, the City of Hesperia General Land Use Map (dated March 7, 2006) indicates several major drainages, including Oro Grande Wash, East Oro Grande Wash, and parts of Antelope Valley Wash, are zoned as open space.

Hesperia has also joined the Storm Ready program with the National Weather Service. This program, which is staffed by volunteers from the city, establishes a local weather monitoring and communication system. The program includes public education, an important element of flood protection in Hesperia, given its rural characteristics. The City of Hesperia will also provide sandbags to residents and has flood preparedness information on its website (www.ci.hesperia.ca.us).

As new developments are considered, it is important that hydrologic studies be conducted to assess the impact that increased development may have on the existing development down gradient. These studies should quantify the effects of increased runoff and alterations to natural stream courses. Such constraints should be identified and analyzed in the earliest stages of planning. If any deficiencies are identified, the project proponent needs to prove that these can be mitigated to a satisfactory level prior to proceeding forward with the project, in accordance with the California Environmental Quality Act (CEQA) guidelines. Mitigation measures typically include flood-control devices such as catch basins, storm drain pipelines, culverts, detention basins, desilting basins, velocity reducers, as well as debris basins for protection from mud and debris flows in hillside areas.

The methodology for analysis and design of flood-control structures is set forth by the SBCFCD. Developers of new projects are required to design flood control measures and submit them for review. Future responsibilities for operation of regional flood control facilities will be with the SBCFCD, while the local storm drains and other structures outside of the regional system and within the corporate boundary of Hesperia will be with the City of Hesperia. Therefore, both agencies must be involved in the planning and approval of mitigation measures, along with the City of Victorville, to assure compatibility.

For new commercial and tract developments in Hesperia, the applicants are required to perform hydrologic studies and design structures that will retain the additional runoff created by the development onsite, so that downstream properties are not adversely

impacted. The goal is to allow an amount of runoff from the project site equal to the natural, predevelopment condition – not to retain all runoff. This has been addressed in recent developments by including small to large retention basins in private yards or in the lower end of the project. The addition of gravel-filled seepage pits in the basins has helped to percolate the collected water more rapidly and alleviate the problem of standing water in the basins. New construction cannot be permitted without review by the City's Floodplain Administrator for compliance with Chapter 8-28 of the City's Municipal Code.

Across the United States, substantial changes in the philosophy, methodology and mitigation of flood hazards are currently in the works. For example:

- Flood control in undeveloped areas should not occur at the expense of environmental degradation. Certain aspects of flooding are beneficial and are an important component of the natural processes that affect regions far from the particular area of interest. For instance, lining major channels with concrete reduces the area of recharge to the underlying groundwater table. Thus there is a move to leave nature in charge of flood control. The advantages include lower cost, preservation of wildlife habitats and improved recreation potential.
- Floodway management design in land development projects can also include areas where stream courses are left natural or as developed open space, such as parks or golf courses. Where flood control structures are unavoidable, they are often designed with a softer appearance that blends in with the surrounding environment.
- Environmental legislation is increasingly coming in conflict with flood control programs. Under the authority of the Federal Clean Water Act and the Federal Endangered Species Act, development and maintenance of flood control facilities has been complicated by the regulatory activities of several Federal agencies including the U.S. Army Corps of Engineers, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service. For instance, FEMA requires that San Bernardino County and its incorporated cities maintain the carrying capacity of all flood control facilities and floodways. However, this requirement can conflict with mandates from the U.S. Fish and Wildlife Service regarding maintaining the habitat of endangered or threatened species. Furthermore, the permitting process required by the Federal agencies is lengthy, and can last several months to years. Yet, if the floodways are not cleared of vegetation and other obstructing debris in a timely manner, future flooding of adjacent areas could develop. Zappe (1997) argues that reform of environmental laws is necessary to ease the burden on local governments, and ensure the health and safety of the public. In particular, Zappe calls for a categorical exemption from the Federal laws for routine maintenance and emergency repair of all existing flood control facilities.

3.1.10 Flood Protection Measures for Property Owners

As discussed above, flooding remains a significant risk to structures and residents in Hesperia. The City and property owners in susceptible areas can take measures, however, to promote safety during future floods and reduce damages from flooding and from flood-related erosion. Some of these measures are described further below.

At the City level:

- Continue enforcing the City's Municipal Code provisions for flood hazard reduction (Title 8 Safety, Chapter 8.28 Flood Hazard Protections and Regulations). This chapter includes construction standards that address the major causes of flood damage – i.e., structures that are not adequately elevated, flood-proofed, or otherwise protected from flooding. The Code applies to new construction or substantial improvements, and includes provisions for anchoring, placement of utilities, elevating the lowest floors, flood resistant materials, and other methods to minimize damage.
- Develop a system to conduct real-time storm warnings and a protocol to carry out evacuations when necessary.
- Continue to educate the public on the risks of flooding, including the uncertainties inherent in flood hazard zoning.
- Establish easements for entrenched flow paths.
- Create flood overlays for zoning and land use maps.
- Encourage residents to purchase flood insurance for areas outside of the 100-year flood zone.
- Create an atmosphere of working with nature and the natural processes inherent in the high desert environment.

For Property Owners:

- Elevate new homes on pads, foundations, or piers.
- Orient new homes and pads to provide minimum obstruction to the direction of flow, and do not force flows onto adjacent properties.
- Try to accommodate natural flows rather than restricting them.
- Any grading to direct flow around the home should include directing it back to its natural path downstream.
- Protect foundations or piers from erosion and scour.
- Numerous methods are available for flood protection – which methods are most appropriate for an individual lot should be based on local conditions surrounding and upstream from the lot.
- Some lots may require special engineering studies to determine the extent of the hazard and design appropriate mitigation.

FEMA has identified several flood protection measures that can be implemented by property owners to reduce flood damage. These include: installing waterproof veneers on the exterior walls of buildings; putting seals on all openings, including doors, to prevent the entry of water; raising electrical components above the anticipated water level; and installing backflow valves that prevent sewage from backing up into the house through the drainpipes. Obviously, these changes vary in complexity and cost, and some need to be carried out only by a professional licensed contractor. For additional information and ideas, refer to the FEMA web page at www.fema.gov. Structural modifications require a

permit from the City or County Building Departments. Refer to them for advice regarding whether or not flood protection measures would be appropriate for your property.

3.2 Seismically Induced Inundation

3.2.1 Dam Inundation

Seismically induced inundation refers to flooding that results when water retention structures, such as dams, fail due to an earthquake. Statutes governing dam safety are defined in Division 3 of the California State Water Code (California Department of Water Resources, 1986). These statutes empower the California Division of Dam Safety to monitor the structural safety of dams that are greater than 25 feet in dam height or have more than 50 acre-feet in storage capacity. Three structures in the Hesperia area meet these requirements: Mojave Forks Dam (Mojave Reservoir), Cedar Springs Dam (Silverwood Lake), and Lake Arrowhead Dam.

Mojave Forks Dam is located at the base of the San Bernardino Mountains, where Deep Creek and the West Fork of the Mojave River merge to form the Mojave River. The dam was constructed in 1971 to control flooding in desert communities downstream along the river. The entire Mojave River basin encompasses about 4,700 square miles, yet nearly all of the runoff that reaches the river is contributed by the 215-square miles of mountainous terrain above the dam (U.S. Army Corps of Engineers, 2006). The dam consists of a 200-foot-high embankment (height above the original streambed) constructed of compacted fill. During storm events, water can be retained temporarily in the reservoir, then released through a single outflow tunnel at a rate that will not overwhelm the downstream channel. Peak outflow for the reservoir design flood is 23,500 cubic feet per second (cfs), and 131,300 cfs for the spillway. To date, the maximum release from the dam was 16,600 cfs on January 11, 2005. That date also holds the record for the highest water elevation in the reservoir: 73 feet below the spillway crest.

Specific Information for the Mojave Forks Dam:

NPDP* ID Number:	CA10021
State ID Number:	60130
Owner:	U.S. Army Corps of Engineers, Los Angeles District
Type:	Earth fill
Purpose:	Flood Control and Storm Water Management
Drainage Basin Area:	215 square miles
Dam Height:	200 feet
Crest Length:	2,223 feet
Crest Width	20 feet
Freeboard:	6.6 feet
Storage Capacity:	179,400 acre-feet (normal and maximum)
Year Completed:	1971
NPDP Hazard Classification:	High

*National Performance of Dams Program

Figure 3-6: Aerial View of the Mojave Forks Dam



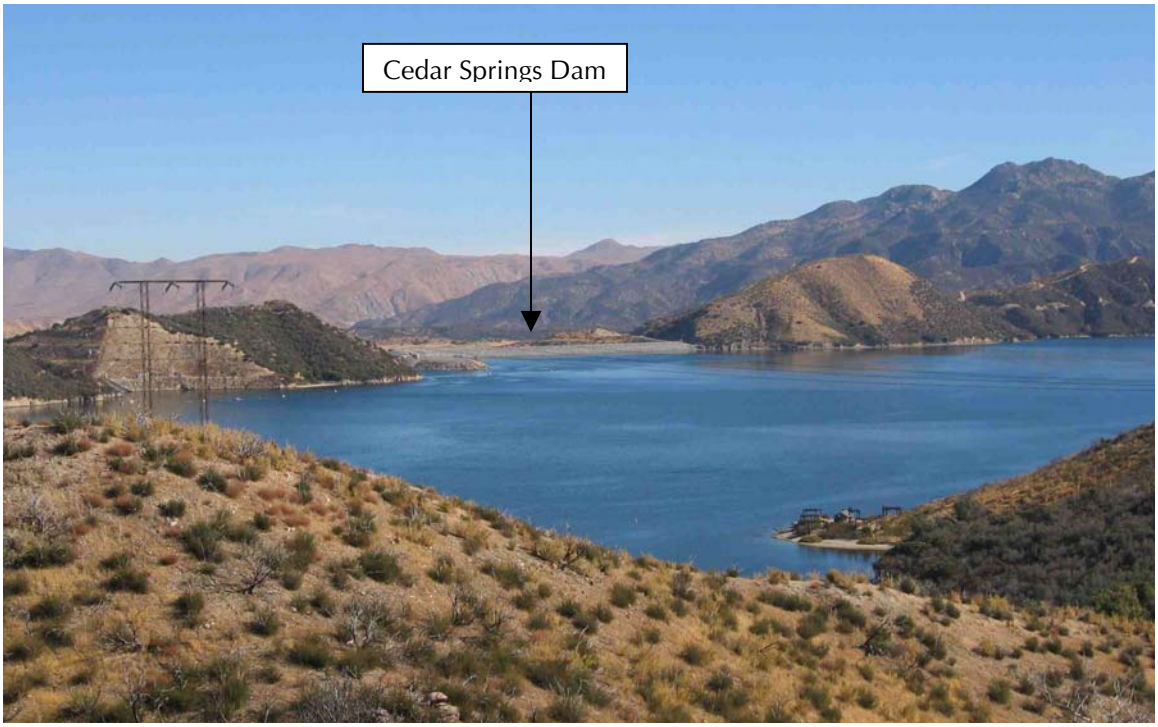
Source: US Army Corps of Engineers

Cedar Springs Dam is located in Summit Valley, at the southern edge of Hesperia. Constructed across the West Fork of the Mojave River, the dam impounds a large water supply reservoir (Silverwood Lake) that is also a popular recreation destination. The dam captures runoff from a 34-square mile drainage area and receives additional water from the California Aqueduct.

Specific Information for Cedar Springs Dam:

NPDP ID Number:	CA00049
State ID Number:	02426-03-01
Owner:	California Department of Water Resources
Type:	Earth Rockfill
Primary Purpose:	Water Supply
Secondary Purpose:	Hydroelectric
Drainage Basin Area:	34 square miles
Reservoir Surface Area:	976 acres
Dam Height:	226 feet
Crest Length:	2,230 feet
Freeboard:	23 feet
Storage Capacity:	75,000 acre-feet (normal and maximum)
Year Completed:	1971
NPDP Hazard Classification:	High

Figure 3-7: View of Silverwood Lake, with Cedar Springs Dam in the Background



Work began on ***Lake Arrowhead Dam*** in 1893, with the intention of building a reservoir to supply water to the San Bernardino Valley. Due to legal difficulties and changes in ownership, the project was not completed until 1922.

Specific Information for Lake Arrowhead Dam:

NPDP ID Number:	CA00759
State ID Number:	805-000
Owner:	Arrowhead Lake Association
Type:	Hydraulic Fill (Earth)
Primary Purpose:	Water Supply
Secondary Purpose:	Hydroelectric
Drainage Basin Area:	6.85 square miles
Reservoir Surface Area:	780 acres
Dam Height:	190 feet
Crest Length:	720 feet
Dam Width:	140 feet
Crest Elevation:	5,116 feet
Freeboard Height:	9 feet
Storage Capacity:	48,000 acre feet (normal), 56,400 acre feet (max)
Year Completed:	1922
NPDP Hazard Classification:	High

A worst-case scenario for Hesperia would be the failure of the Mojave Forks Dam (most likely during a severe earthquake) when it is near capacity. Plate 3-2 shows the inundation path the water would take. Water from failure of the Mojave Forks Dam would likely be confined to the existing Mojave River bed and the mouth of the Antelope Valley Wash channel, as well as several smaller tributary channels. Failure of the Cedar Springs Dam would flood a significant portion of eastern Summit Valley between Silverwood Lake and Mojave Forks Dam in less than 30 minutes; however, this area is presently undeveloped except for Highway 173 and a few ranch structures. If the Lake Arrowhead Dam failed, water would travel down the Deep Creek drainage, eventually reaching the Mojave Forks Dam. A flood from Lake Arrowhead would be contained within the Mojave Forks Reservoir area, unless the dam was near capacity. In this case, floodwaters would spill over into the river.

3.2.2 Inundation From Above-Ground Storage Tanks

Seismically induced inundation can also occur if strong ground shaking causes structural damage to aboveground water tanks. If a tank is not adequately braced and baffled, sloshing water can lift a water tank off its foundation, splitting the shell, damaging the roof, and bulging the bottom of the tank (causing what is referred to as "elephant's foot") (EERI, 1992). Movement can also shear off the pipes leading to the tank, releasing water through the broken pipes. These types of damages occurred during southern California's 1992 Landers, 1992 Big Bear, and 1994 Northridge earthquakes. The Northridge earthquake alone rendered about 40 steel tanks non-functional (EERI, 1995), including a tank in the Santa Clarita area that failed and inundated several houses below. As a result of lessons learned from recent earthquakes, new standards for design of steel water tanks were adopted in 1994 (Lund, 1994). The new tank design includes flexible joints at the inlet/outlet connections to accommodate movement in any direction.

All of the City's 17 water reservoirs are above-ground steel tanks. Most of the tanks have been constructed in recent years. The City has evaluated the water tanks under its jurisdiction and nine of the tanks have seismic connections. The remaining eight require retrofitting of the inlet connections in order to meet current standards. The connections will need to be flexible to withstand the effects of ground shaking and not break, thereby preventing the loss of critical water supplies at a time when the city may be isolated and must rely on its own resources for several days. The overflows will be air-gapped to permit movement of the tank while maintaining its function.

If there is the potential for a water tank to fail catastrophically during an earthquake, its inundation path should be identified to evaluate whether or not habitable structures are located within the floodway. The evaluation should also address whether a water reservoir is self-contained. In the event of a catastrophic breakage, will the water be contained within the site, or will it pose a hazard to properties downstream?

Water lost from tanks during an earthquake not only affects structures down slope from the tanks, but can also significantly reduce the water resources available to suppress earthquake-induced fires. Damaged tanks and water mains can also limit the amount of water available to residents. The California Aqueduct could suffer extensive damage if a major earthquake occurs on either the San Andreas or other nearby active faults.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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Mojave River Forks Dam

Arrowhead Dam is not shown

Cedar Springs Dam

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: Governor's Office of Emergency Services

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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

- Mojave River Forks Dam Failure Inundation Pathway
- Cedar Springs Dam Failure Inundation Pathway
- Lake Arrowhead Dam Failure Inundation Pathway
- Hesperia City Boundary
- Hesperia Sphere of Influence

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Project Number: 2617
Date: February 2010

Dam Inundation Map

Hesperia, California

Plate 3-2

Aqueduct repairs could take two weeks or longer (Toppozada et al., 1993). Similar damage can be expected to the groundwater wells in the region, also limiting the water available to the community after an earthquake. Therefore, it is of paramount importance that the water storage tanks in the area retain their structural integrity during an earthquake, so water demands after an earthquake can be met. In addition to evaluating and retrofitting water reservoirs to meet current standards, this also requires that the tanks be kept at or near full capacity at all times.

3.3 Summary of Issues, Planning Opportunities and Mitigation Measures

Hesperia is situated on gently sloping alluvial fans at the base of the San Bernardino Mountains. The pattern of alluvial fan flooding can be unpredictable, and floodwaters can travel at dangerously high speeds, be highly erosive, and often carry large amounts of sediment and other debris. Major sources of potential flooding are the Mojave River, Antelope Valley Wash, and the streams within Summit Valley. Development in the Hesperia area has occurred over the years in a piecemeal fashion, and although some structures have been installed since incorporation, the City and its Sphere of Influence lack a comprehensive storm drain system. Much of the developed area is rural to semi-rural, and has been built out with only minor alterations to the natural topography. As a result, existing facilities, such as underground pipelines, culverts, bridges, and basins are present, but are not common. This leads to localized flooding, road closures, erosion damage, and sedimentation during and following strong storms, particularly if the ground is already saturated.

Consequently, analyzing and mitigating floods can be challenging. Construction of the Mojave Forks Dam in 1971 greatly reduced the impact of flooding along the Mojave River, although a few parcels adjacent to the river are still at risk. Flood losses in other parts of the city are caused by structures that are inadequately protected, as well as the cumulative effect of obstructions in flood hazard areas that leads to increased flood heights and velocities. Maintenance of the numerous natural drainages is also challenging, since many channels meander through private properties. Improvements to the City's drainage infrastructure are planned, and the City should continue with street improvements and public education to help alleviate local flooding and its effects.

The National Flood Insurance Program makes federally subsidized flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. Owners of all structures within the FEMA-mapped Special Flood Hazard Areas (100-year flood) are required to purchase and maintain flood insurance as a condition of receiving a federally related mortgage or home equity loan on that structure. Estimates indicate that nation-wide, 75 percent of households located in the 100-year floodplain do not have insurance. In addition, between 20 and 25 percent of the National Flood Insurance Program claims come from structures located outside the designated 100-year flood zone, where insurance is not required. As a comparison, structures located in the 100-year flood zone have a 26 percent chance of being flooded over the course of a 30-year mortgage, and only a 4 percent chance of being impacted by fire during the same time frame. National Flood Insurance is available in the city of Hesperia; homeowners within the 100-year flood zones, and even outside these zones should be encouraged to buy flood insurance.

To ensure public participation in the National Flood Insurance Program and support of City-

funded mitigation measures, property owners need to be informed about the potential for flooding in their area, including flooding of access routes to and from their neighborhoods. This is especially true for wet years following wildfires in the local mountains, when runoff is greater and the canyons are likely to be choked with debris, compounding the potential for flooding. Community outreach and public information programs that not only identify the hazards but also provide potential solutions need to be prepared and made available. The Federal Emergency Management Agency (FEMA) has excellent materials that describe specific mitigation measures that can be implemented to reduce flood damage to residential structures. A community's success in responding to a natural disaster is also dependent on how well its government officials, residents, businesses, and institutions (schools, churches, social organizations) cooperate and coordinate together to make effective decisions. To accomplish this, the City can prepare and manage a list of businesses, organizations and individuals that can be called in to help during emergencies.

The City has joined the "Storm Ready" program through the National Weather Service. Elements of this program include monitoring of local weather, establishing storm warnings, creating an emergency operation center, and educating the public. For those portions of the city where flood zones have already been developed, the City should have evacuation plans in place. Critical facilities such as schools should also have evacuation plans that cover the possibility of flooding. Facilities using, storing, or otherwise involved with substantial quantities of onsite hazardous materials should not be permitted in the flood zones, unless all standards of elevation, anchoring, and flood proofing have been satisfied, and hazardous materials are stored in watertight containers that are not capable of floating.

Land use planning is the key to reducing future flood losses and protecting the environment. Flood risk mapping in areas of future development, along with flood zone overlays on zoning and land use maps will help the City and project applicants achieve a safer community that is more compatible with the natural environment. The City should continue to require that future planning for new developments consider the impact on flooding potential, as well as the impact of flood control structures on the environment, both locally and regionally. Flood control planning in undeveloped areas should consider leaving watercourses natural, wherever possible. Flood control should not be introduced in the undeveloped areas at the expense of environmental degradation. Land development planning should continue to consider leaving watercourses natural wherever possible, or continue to develop them as parks, nature trails, golf courses or other types of recreation areas that could withstand inundation.

Because many of the natural drainages cross backyards, driveways, and other parts of private yards, the citizens of Hesperia should make an effort to be educated about their drainage and flooding issues, and not rely entirely on the local agencies. Drainage channels need to be kept free of debris and should not be altered in such a way that the flow is obstructed or significantly changed.

CHAPTER 4: FIRE HAZARDS

4.1 Vegetation Fires

Wildfires are a significant hazard throughout the United States, and especially in the West, where they occur often and have been part of the natural environment for millennia. Large areas of southern California are particularly susceptible to wildfire due to the region's weather, topography and native vegetation. The typically mild, wet winters characteristic of our Mediterranean climate result in an annual growth of grasses and plants that dry out during the hot summer months. This dry vegetation provides fuel for wildfires in the autumn. Although wildfires are often considered highly disruptive and even dangerous, the fact is that wildland fires are a necessary part of the natural ecosystem of southern California. Many native plants require periodic burning to germinate and recycle nutrients that enrich the soils.

Wildfires become a hazard when they extend out of control into developed areas, with a resultant loss of property, and sometimes unfortunately, loss of life. The wildfire risk in the United States has increased in the last few decades with the increasing encroachment of residences and other structures into the wildland environment, and the increasing number of people living and playing in wildland areas. According to the National Interagency Fire Center, between 2001 and 2008, humans caused approximately 84 percent of the wildland fires (519,193 human-caused fires vs. 95,294 lightning-caused fires) in the U.S., however fires caused by lightning strikes burned nearly 1.7 times more land (approximately 35.3 million acres burned by lightning vs. 20.5 million acres burned by man) (http://www.nifc.gov/). The most common (human) causes of wildfires are arson, sparks from brush-clearing equipment and vehicles, improperly maintained campfires, improperly disposed cigarettes, and children playing with matches.

As the 2003, 2006, 2007 and 2009 fires in southern California have shown, the containment of wildfires that consume hundreds of thousands of acres of vegetated property require the participation of a multi-jurisdictional emergency response effort, with thousands of people at or near the fire lines combating the flames, clearing brush ahead of the fire to establish defensible zones, and assisting evacuees (Figures 4-1 and 4-2). Under the right wind conditions, multiple ignitions can develop as a result of the wind transport of burning cinders (called brands) over distances of a mile or more. Wildfires in those areas where the wildland approaches or interfaces with the urban environment (referred to as the urban-wildland interface area or UWI area) can be particularly dangerous and complex, posing a severe threat to public and firefighter safety, and potentially causing devastating losses of life and property. This is because when a wildland fire encroaches onto the built environment, ignited structures can then sustain and transmit the fire from one building to the next. It has become increasingly clear that continuous planning, preparedness, and education are required to reduce the fire hazard potential and limit the destruction caused by fires. These mitigation measures are discussed in detail in this document.

Fires usually last only a few hours or days, but their effects can last much longer, especially in the case of intense fires that develop in areas where large amounts of dry, combustible vegetation have been allowed to accumulate. If wildland fires are followed by a period of intense rainfall, debris flows off the recently burned hillsides can develop. Flood control

facilities may be severely taxed by the increased flow from the denuded hillsides and the resulting debris that washes down. If this debris overwhelms the flood control structures, widespread damage can ensue in areas down gradient from the failed structures. This happened in San Bernardino County during the 2004 storms that followed the 2003 fire season; 16 people lost their lives as a result of debris flows. During the January 2010 storms, thousands of people were evacuated from their homes in the foothills of the Los Angeles National Forest amid numerous mud and debris flows emanating from upstream canyons that burned in 2009.

Figure 4-1: View of the Cedar Fire of October 2003 Moving Down Oak Canyon, Toward the 52 Freeway, in San Diego County.
This fire burned more than 270,000 acres, destroyed 2,820 structures, damaged 63 others, and caused 14 fatalities. The fire was cased by a signal flare set off by a lost hunter.



Figure 4-2: View of One of the Many Fires that Ravaged the Southern California Area in the Fall of 2003, forcing the evacuation of entire neighborhoods, and the closing of roads.



The hazard of post-fire mudflows can be reduced significantly if remedial measures following a wildfire are taken in anticipation of the next winter. Studies (Cannon, 2001) suggest that in addition to rainfall and slope steepness, other factors that contribute to the formation of post-fire debris flows include the underlying rock or sediment type, the shape of the drainage basin, and the presence or absence of water-repellant soils (during a fire, the organic material in the soil may be burned away or decompose into water-repellent substances that prevent water from percolating into the soil.)

The impact of wildland fire on plant communities is generally beneficial, although it often takes time for plant communities to re-establish themselves. If a grassland area has been burned, it will re-sprout the following spring. Chaparral plant communities will take three to five years. Oak woodland, if it has had most of the seedlings and saplings destroyed by fire, will require at least five to ten years for a new crop to start. Native desert plants, on the other hand, typically take more than a decade to recover after a fire.

Other effects of wildfires are economical and social. Homeowners who lose their house to a wildfire may not be able to recover financially and emotionally for years to come. Recreational areas that have been affected may be forced to close or operate at a reduced scale. In addition, the buildings that are destroyed by fire are usually eligible for re-assessment, which reduces income to local governments from property taxes.

4.1.1 Wildfire Susceptibility and Historical Wildland Fires in the Hesperia Area

The fire hazard of an area is typically based on the combined input of several parameters. These conditions include:

- fuel loading (that is, the type of fuel or vegetation, and its density and continuity),
- topography (elevation and slope),
- weather,
- dwelling density,
- wildfire history, and
- existing local mitigation measures in place that help reduce the zone's fire rating (such as an extensive network of fire hydrants, fire-rated construction, fuel modification zones, etc.).

These conditions, as they pertain to the City of Hesperia, are discussed in more detail in the paragraphs and sections below.

Hesperia is located in the lower Mojave section of the Southeastern Deserts Bioregion, an area characterized by isolated, steep-sided mountain ranges separated by broad alluvial basins. The predominant natural vegetation assemblage in the lower elevation areas of the Mojave section is desert shrub, which may include alkali sink vegetation, creosote bush scrub, and succulent scrub (Brooks and Minnich, 2006). Other important vegetation types include Joshua Tree woodland (Figure 4-3), shad-scale scrub, creosote bush scrub, blackbrush scrub, and desert scrub-steppe. Importantly, about one-third of the desert floor

in the Mojave section is typically barren of vegetation (Figure 4-4). The limited amount of vegetation and low surface fuel loads typically hinder the spread of fire.

Figure 4-3: Undeveloped slopes along the Mojave River and Hesperia Lake Park, showing some of the vegetation common to the area. (Photograph from www.city-data.com.)



Figure 4-4: **Typical Fuel Loads in Hesperia**, consisting of scattered tree stands and scrubland separated by areas barren of vegetation.



Unlike the primary vegetation types common in other bioregions of southern California, desert plants do not need fire to reproduce, and many of the native plants common to this area are highly susceptible to fire. Furthermore, native desert plant communities may take a decade or more to re-establish after a fire, whereas non-native grasses are quick to invade burned areas, generally at the expense of the native plants. Researchers have argued that the introduction, in the early 20th century, of non-native annual grasses to the desert has resulted in a marked increase in the number and size of the fires reported in the region. This trend has been particularly noticeable since the mid 1970s: before about 1977, fires in the eastern deserts generally burned less than 300 acres; fires since then have typically burned thousands of acres.

In San Bernardino County, wildland fires have been common in the undeveloped or slightly developed portions of the hills and mountains that surround the more developed valleys. In comparison with the more developed valleys, in the undeveloped to slightly developed areas there is a greater diversity of surface fuel, higher fuel loads and more continuity of loads (less barren areas between vegetation stands). This, combined with the steep topographic gradients, results in a larger number of fires and a higher probability of fire spread. Fires starting in these highland areas can then easily spread into the developed foothills, especially if conditions are windy and dry. Even if the flames do not reach the urban area, the smoke, ashes, and soot generated by the fire can pose a health hazard, and a nuisance to motorists and residents.

The Hesperia area is predominantly arid due to the rain-shadow effect caused by the Peninsular Ranges. Average annual precipitation in Hesperia is about 5 to 6 inches, with nearly 70 percent of this precipitation measured in the winter months, between December and March. About 10 percent of the precipitation falls in the summer, between July and September, associated with thundershowers triggered by the North American monsoon that originates in the Gulfs of California and Mexico. Variations in the annual precipitation for this region are relatively high compared to other California regions, however, and as a result, there is a significant variation in the frequency and extent of wildland fires in the area. In years when rainfall is above average, an increased amount of fine fuels in the desert floor can result in an increase in fire spread. Long-term variations in rainfall rates have also been noted in this region, with alternating periods of high rainfall and drought, each lasting 20 to 30 years. For example, a mid-century drought was reported between 1946 and 1977, followed by a high-rainfall period between 1977 and 1998. More recently, below-average rainfall was recorded between 1999 and 2004, suggesting that the region has entered a new drought cycle. If this is the case, it may be that the region may see a reduction in frequency and size of wildland fires in the next several years (Brooks and Minnich, 2006).

The summer thunderstorms that come through the Mojave Desert often include lightning. In fact, lightning frequency is higher in the desert than in any other bioregion in California, with the Mojave section averaging 30 lightning strikes per 100 square kilometers per year (based on Bureau of Land Management detection data by van Wagtendonk and Cayan, 2008, as reported in Brooks and Minnich, 2006). As discussed in the opening paragraphs, lightning is responsible for a significant percentage of the acreage burned by wildfires in the United States, although human-caused fires are far more common: between 1980 and 2001, human-caused fires in the Mojave region were 3.6 times more common than

lightning-caused fires (Brooks and Minnich, 2006).

According to the California Department of Forestry and Fire Protection (CDF, also known as Cal FIRE; see http://frap.cdf.ca.gov/data/frapgisdata/select.asp), several large (greater than 300 acres) historical wildland fires between 1930 and 2008 have occurred in the city of Hesperia, its Sphere of Influence, and the areas to the south (Plate 4-1). Those wildland areas that have not burned in more than 30 years are at higher risk of burning again in the near future, due to the higher density and continuity of the fuel load.

Many smaller wildland fires have occurred in Hesperia that are not captured by the CDF database. Some of the most recent fires (both large and small) to have impacted Hesperia and adjacent areas are described further below, in Table 4-1. Although not all of these fires occurred in Hesperia, some are mentioned because they either impacted the major roadways that provide access in and out of Hesperia, or had an impact on the air quality in the General Plan area.

Table 4-1: Some Historical Wildland Fires Reported In and Around the Hesperia Region

Date	Location	Description
July 6, 1999	11 miles south of Hesperia	Fire burned 2,576 acres, destroyed one mobile home and two sheds. Residents from Summit Valley and Oak Hills were forced to evacuate. Highway 138 was closed. Caused about $100K in property damage.
Aug. 28 - Sept. 9, 1999	Lucerne and Apple Valleys, east and south of Hesperia	Fire consumed 63,486 acres starting 3 miles south of Lucerne Valley, and extending to within 4 miles northwest of Fawnskin. Thirteen firefighters sustained minor injuries. Property damage was estimated at $11.7 million.
May 11, 2001	Mojave River Bed, Apple Valley	Brush fire that started on the riverbed burned 25 acres. One nearby school was evacuated. One firefighter was treated for heat exhaustion. Although the fire came close to one house and another building, no structures were damaged.
June 19, 2001	Cajon Pass	The "Baldy Fire" started near the intersection of Interstate 5 and Highway 138. It burned 125 acres, and forced the closure of both roadways and the Union Pacific railroad tracks.
July 22, 2002	Hesperia	Strong winds and extremely dry conditions fanned a house fire in Hesperia. Five outbuildings were destroyed for an estimated $55K in property damages.
June 15, 2003	Hesperia	A brush fire burned 80 acres. One firefighter was injured when a boulder rolled down the hill and broke his leg.
July 27, 2003	Hesperia	Brush fire burned 10 acres before it was contained.
Sept. 17, 2003	Hesperia	Brush fire consumed 40 acres and briefly threatened several homes in the Oak Hills section of Hesperia. The fire was contained in a short period of time, in part because there were no winds to fan the flames and spread the fire.
Oct. 1, 2003	Mojave Riverbed, 3 miles E to SE of Victorville	Brush fire consumed 10 acres. No structures were damaged.

Date	Location	Description
Oct. 25 - Nov. 14, 2003	6 miles S of Hesperia to 7 miles N of Lake Arrowhead	The "Old Fire" was started by an arsonist on Oct. 25th and consumed 91,200 acres before it was fully contained on November 5. The fire destroyed 993 houses, 10 commercial buildings, 1,460 power poles, 220 electrical transformers, and several miles of highway and utility infrastructure. It also damaged another 35 houses. Six deaths and 12 injuries were directly attributed to the fire. An estimated 80,000 people were evacuated the first day from the San Bernardino Mountain range, causing a 28-mile traffic jam on Highway 18. Over the next few days the communities of Silverwood Lake, South Hesperia, Oak Hills, Summit Valley, Telephone Canyon, and Las Flores were also evacuated. On the second day, the fire merged with the east flank of the Grand Prix fire. On the third day it burned through Cajon Pass and onto the foothills toward Hesperia. Rain, sleet and snow that fell between 11/1 and 11/3 slowed fire growth. The fire caused an estimated $975 million in property damage; the cost of fighting the fire was estimated at more than $42.3 million.
Sept. 7, 2004	Cajon Pass to Baldy Mesa	The "Runway Fire was started by a car accident, and eventually burned 1,007 acres of brush in the San Bernardino National Forest. The fire forced the closure of 7 miles of Highway 138. One home in the Baldy Mesa area was damaged slightly by the heat, causing about $1K in property damage.
April 1, 2007	Hesperia	The fire burned more than 1,400 acres and forced the evacuation of more than 500 residents. Damage was limited to the roof of one residential structure, and the destruction of one outbuilding.

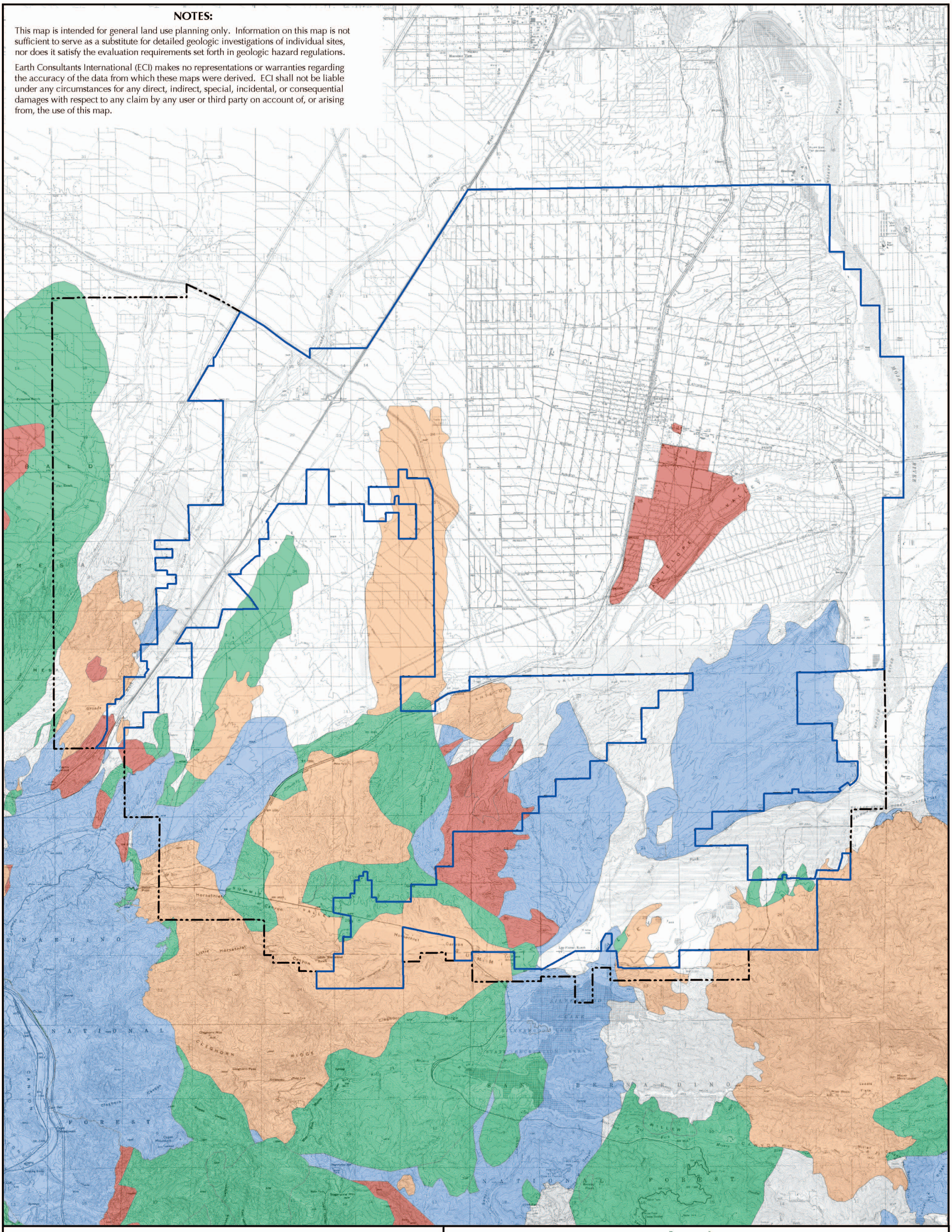
Sources: National Environmental Satellite, Data and Information Service (NESDIS) at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storm; Los Angeles Times, April 1, 2007 at http://articles.latimes.com/2007/apr/01/local/me-hesperia1

Many much smaller wildland fires occur in Hesperia annually, as indicated by the National Fire Incident Reporting System (NFIRS), and the San Bernardino County Fire Department. Specifically, according to the NFIRS, in 2006 there were 16 brush or vegetation fires in Hesperia that the Fire Department responded to. All of these fires burned less than 1 acre of land (http://www.city-data.com/fire/fire-Hesperia-California.html). Statistics provided by the San Bernardino County Fire Department show that there were 104 vegetation fires reported in the city of Hesperia in 2007, and 58 in 2008. Therefore, the fires included in Table 4-1 represent a small population of the overall fire record in the area.

NOTES:

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0 2000 4000 Meters

Scale: 1:84,000

Explanation

Year of Last Burn

- 1990-2008
- 1970-1989
- 1950-1969
- 1930-1949

- Hesperia City Limit
- Hesperia Sphere of Influence

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: California Fire and Resource Assessment Program (FRAP) @ http://frap.cdf.ca.gov/data/frapgisdata/select.asp

Earth Consultants International

Project Number: 2617
Date: February 2010

Historical Wildland Fires

in and near Hesperia, California

Plate 4-1

4.1.2 Regulatory Context and Fire Risk Areas

Since the early 1970s, several fire hazard assessment systems have been developed for the purpose of quantifying the severity of the hazard in a given area. Many of these are regulatory in that they were implemented as a result of legislation enacted either at the State or Federal level. Early systems characterized the fire hazard of an area based on a weighted factor that typically considered fuel, weather and topography. More recent systems rely on the use of Geographic Information System (GIS) technology to integrate the factors listed above to map the hazards, and to predict fire behavior and the impact on watersheds.

HUD Study System: In April 1973, the California Department of Forestry (CDF – now the California Department of Forestry and Fire Protection or Cal FIRE) published a study funded by the Department of Housing and Urban Development (HUD) under an agreement with the Governor's Office of Planning and Research (Helm et al., 1973). As is the case with several other more recent programs, the study was conducted in response to a disaster: during September and October 1970, 773 wildfires burned more than 580,000 acres of California land. The HUD mapping process relied on information obtained from U.S. Geological Survey (USGS) 15- and 7.5-minute quadrangle maps on fuel loading (vegetation type and density) and slope, and combined it with fire weather information (now available in real-time at http://gacc.nifc.gov/oscc/predictive/fuels_fire-danger/index.htm) to determine the **Fire Hazard Severity** of an area. This system was the basis for several subsequent studies and programs that have been conducted as a result of more recent legislation, as described further below.

California Department of Forestry and Fire Protection – State Responsibility Areas System: Legislative mandates passed in 1981 (Senate Bill 81, Ayala, 1981) and 1982 (Senate Bill 1916, Ayala, 1982) that became effective on July 1, 1986, required the California Department of Forestry and Fire Protection (CDF) to develop and implement a system to rank fire hazards in California. Areas were rated as moderate, high or very high based primarily on fuel types. Thirteen different fuel types were considered using the 7.5-minute quadrangle maps by the USGS as base maps (Phillips, 1983). Areas identified as having a fire hazard were referred to as **State Responsibility Areas** (SRAs) (Public Resources Code Section 4125). These are non-federal lands covered wholly or in part by timber, brush, undergrowth or grass, for which the State has the primary financial responsibility of preventing and suppressing fires. SRAs in and around the city of Hesperia and its Sphere of Influence are shown on Plate 4-2.

Bates Bill Process: The Bates Bill (Assembly Bill 337, September 29, 1992) was a direct result of the great loss of lives and homes in the Oakland Hills Tunnel Fire of 1991. Briefly, the CDF, in cooperation with local fire authorities was tasked to identify **Very High Fire Hazard Severity Zones (VHFHSZs)** in **Local Responsibility Areas (LRAs).** To accomplish this, the CDF formed a working group comprised of state and local representatives that devised a point system that considers subjective criteria for fuels, fire history, terrain influences, housing density, and occurrence of severe fire weather. To qualify as a VHFHSZ, an area has to score ten or more points in the grading scale. The original VHFHSZ maps that were prepared as a result of the Bates Bill are now more than ten years old and outdated. In the last three years or so, however, the CDF has been re-mapping both SRAs and LRAs using GIS technology and new data and science to better

NOTES:

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FIRE STATION #22
12550 Jacaranda Ave

FIRE STATION #304
15660 Eucalyptus St

FIRE STATION #301
9430 11TH Ave

FIRE STATION #302
17288 Olive St

FIRE STATION #305
8331 Caliente Rd

FIRE STATION #306
Ranchero Rd and I Ave

FIRE STATION #48
4691 Summit Valley Rd

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: Fire and Resource Assesment Program, California Department of Forestry and Fire Protection (2008)

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W E
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0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

Local Responsibility Area
- Very High Fire Hazard Severity Zone
- High Fire Hazard Severity Zone
- Moderate Fire Hazard Severity Zone

Federal Responsibility Area
- Very High Fire Hazard Severity Zone
- High Fire Hazard Severity Zone
- Moderate Fire Hazard Severity Zone

State Responsibility Area
- Very High Fire Hazard Severity Zone
- High Fire Hazard Severity Zone
- Moderate Fire Hazard Severity Zone

- Fire Station (existing and proposed)
- Hesperia City Limit
- Hesperia Sphere of Influence

Earth Consultants International

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High Fire Hazard Areas

Hesperia, California

Plate 4-2

describe the potential fire behavior and fire probability for a give area. Areas are being mapped in the Moderate, High and Very High categories. Typically, once the CDF delineates the boundaries of a VHFHSZ, it notifies the local fire authorities. Since the State is not financially responsible for Local Responsibility Areas, local jurisdictions have final say regarding whether or not an area should be included in a VHFHSZ (Government Code Section 50022; http://frap.cdf.ca.gov/projects/hazard/hazard.html#VHFHSZupdate).

The LRAs identified in the city of Hesperia by the CDF (2008) are shown on Plate 4-2. On November 13, 2008, the City Council of Hesperia adopted Ordinance No. 2009-01 defining (and therefore agreeing with) the location of the Very High Fire Hazard Severity Zones (VHFHSZs) in LRAs recommended by the California Department of Forestry and Fire Prevention within the City. These are the areas that the City is responsible for in terms of fire prevention and fire suppression.

Areas near Hesperia specifically known for their high to very high wildland fire susceptibility include the mountainous region of the San Bernardino National Forest to the south, and the foothills, which encroach from the south onto the city and its Sphere of Influence. In the developed, relatively flat areas of the city, vegetation fires are not considered a hazard, as the topography, lack of fuel loading (either as a result of no vegetation, or due to carefully maintained and regularly watered landscaping), and effective fire suppression services combine to mitigate the potential for wildland fires. Undeveloped portions of the city or its Sphere of Influence, especially along the Mojave River, Summit Valley, the area north and west of Summit Valley, and the undeveloped areas west of the I-15, are the most susceptible to wildland fire (see Figure 4-2). However, the conditions along the Interstate are deemed temporary as urban development spreads westward, with a resultant increase in landscaping that is maintained and watered regularly, reducing the possibility for vegetation fires to ignite and spread. This is not to say that vegetation fires do not occur in developed areas, but these tend to be smaller and less intense in heat. Furthermore, there are specific mitigation measures that homeowners can implement in their properties to reduce the hazard of vegetation fires. These measures are discussed in Section 4.1.3.

California Fire Plan: The 1996 California Fire Plan is a cooperative effort between the State Board of Forestry and Fire Protection and the CDF (California Board of Forestry, 1996). This system ranks the fire hazard of all wildland areas of the State using four main criteria: fuels, weather, assets at risk, and level of service (which is a measure of the Fire Department's success in initial-attack fire suppression). The main objective of the California Fire Plan is to reduce total costs and losses from wildland fire in the State by protecting assets at risk before a fire occurs. To do so, the plan identifies prefire management prescriptions that can be implemented to reduce the risk, and analyzes policy issues and develops recommendations for changes in public policy. The 1996 plan is now undergoing review by the CDF. For more information refer to http://cdfdata.fire.ca.gov/fire_er/fpp_planning_cafireplan.

As part of the Fire Plan program, the CDF developed a fuel ranking methodology that evaluates the fire behavior expected for a region, given the topography and vegetative fuels available. This allows the CDF to identify and prioritize pre-fire projects designed to minimize the costs of fire suppression and losses from wildfire. Most of Hesperia is

mapped as having a **moderate** potential fire behavior, with areas near the San Bernardino National Forest to the south mapped as having a high to very high potential fire behavior (http://frap.cdf.ca.gov/webdata/maps/statewide/frnk_map.pdf; map dated July 7, 2005).

National Fire Plan: During the 2000 fire season, wildfires burned millions of acres of land throughout the United States, prompting politicians, fire managers and government agencies to re-think their approach to fire management. Under Presidential Executive Order, the Secretaries of Agriculture and the Interior were tasked with preparing a report that outlined recommendations to minimize both the long- and short-term impacts of wildfires with a broader effort and closer cooperation between agencies and fire programs. The resultant report, entitled the "National Fire Plan," has as its main purposes to protect communities and restore ecological health on Federal lands (http://www.fireplan.gov/). The Plan outlines five key points: 1) firefighting, 2) rehabilitation and restoration, 3) hazardous fuel reduction, 4) community assistance, and 5) accountability. The Plan, which was first funded in 2001, commits to funding for a continued level of "Hazardous Fuel Reduction" and new funding for a "Community Assistance/Community Protection Initiative." The intent of the Community Assistance initiative is to provide communities that interface with federal lands an opportunity to get technical assistance and funding to reduce their threat of wildfires.

As part of the Community Assistance/Community Protection Initiative, the National Fire Plan funded a study to identify areas that are at high risk of damage from wildfire. Under this program, Federal fire managers authorized State foresters to determine which communities are at significant risk from wildland fire on Federal lands. In California, this task was undertaken by the ***California Fire Alliance*** (CFA), a cooperative group of State, Federal and local agencies, who generated a list of communities at risk. Given California's extensive Urban-Wildland Interface (UWI), the list of communities extends beyond just those on Federal lands. In fact, the CFA identified 1,264 fire-threatened communities in California, and the city of Hesperia is included in the list (http://www.cafirealliance.org/communities_at_risk/).

Under the auspices of the National Fire Plan, the CDF also produced a Wildland Fire Threat Map, released on October 20, 2005, that takes into account the combined effects of potential fire behavior (fuel rank; see section above on the California Fire Plan) and expected fire frequency (fire rotation) from the past 50 years to create four threat classes for risk assessment. These threat classes are extreme, very high, high and moderate. Areas that do not support wildland fuels (such as open water, and agricultural lands) were not considered in the analysis. Most large urbanized areas receive a moderate fire threat classification to account for fires carried by ornamental vegetation and flammable structures. The Fire Threat Map (available at http://frap.cdf.ca.gov/data/frapgismaps/accept.asp) shows that most of Hesperia is delineated with a **moderate** threat, with only those areas of the city near the San Bernardino National Forest to the south mapped as **high** to **very high**. Any wildland fires in these undeveloped, upland areas could spread into the Hesperia area if fire fighters were to lose control of them. More information on the National Fire Plan is available at http://frap.cdf.ca.gov/projects/fire_threat/.

California Fire Alliance (CFA): In addition to generating and updating the Communities at Risk list described above, the CFA funds a variety of projects designed to reduce the threat of wildfire before it happens. As part of this effort, the CFA encourages the development of Community Wildfire Protection Plans (CWPP), as defined by the Healthy Forest Restoration Act (HFRA). CWPPs enable a community to plan how it will reduce its risk of wildfire by identifying strategic sites and methods for fuel reduction projects across the landscape and jurisdictional boundaries. Benefits of having a CWPP include National Fire Plan funding priority for projects identified in a CWPP. The USDA Forest Service and Bureau of Land Management can expedite the implementation of fuel treatments, identified in a CWPP, through alternative environmental compliance options offered under the HFRA. The CWPP must be agreed to by three entities: the local government, the local Fire Department, and the CDF. Communities developing CWPPs are encouraged to integrate their CWPP planning process into other planning processes, including the Safety Element of the General Plan (i.e., this document), Local Hazard Mitigation Plans, Flood Mitigation Plans, and other local hazard, evacuation and emergency plans.

FireLine System: The Insurance Services Office (ISO) developed a program used by the insurance industry to identify those areas where the potential loss due to wildfire is greatest (ISO, 1997). ISO retained Pacific Meridian Resources of Emeryville, California to develop the FireLine software, which uses satellite-imagery interpretation to evaluate the factors of fuel types, slope and roads (access) to develop the risk rating. Most insurance companies that provide insurance services to homeowners in California now use this system. This software is only available through ISO. Updated versions of this system are being developed that include the factors of elevation, aspect, and relative slope position.

FARSITE, BehavePlus and FlamMap: These are PC-based computer programs that can be used by local fire managers to calculate potential fire behavior in a given area using GIS data inputs for terrain and fuels. The purpose of these models is to predict fire behavior. Data inputs that can be used in the analyses include elevation, slope, aspect, surface fuel, canopy cover, stand height, crown base height and crown bulk density.

The oldest of these models is the BEHAVE Fire Behavior Prediction and Fuel Modeling System (Burgan and Rothermel, 1984; Burgan, 1987; Andrews, 1986; Andrews and Chase, 1989; Andrews and Bradshaw, 1990) that has been used since 1984. A newer version of it is referred to as the BehavePlus Fire Modeling System (Andrews and Bevins, 1999). This software has been updated on a regular basis to make it more user-friendly and provide additional fire modeling capabilities. FARSITE (Finney, 1995, 1998) "simulates the growth and behavior of a fire as it spreads through variable fuel and terrain under changing weather conditions" (http://fire.org/). This software can be used to project the growth of ongoing wildfires and prescribed fires, and can be used as a planning tool for fire suppression and prevention, and fuel assessment. FlamMap, whose continued development is funded by the Bureau of Land Management, combines elements of the two older models, BEHAVE and FARSITE. As of writing of this document, FlamMap was available only in Beta format – the software has not been formally released yet.

Brian Barrette's Structural Vulnerability System: This system starts with the State Responsibility Area fire hazard severity rating described above, but also includes structural elements as rating factors (Barrette, 1999). The structural elements considered include

roofing, siding, vegetation clearance, roads and signage, chimneys, structural accessories, water supply, and the location of the structure in relation to the surrounding conditions. This system is intended for use in assessing individual parcels, and is therefore not likely to be used by agencies, as it is time- and personnel-intensive. However, the system is easy to use and can therefore be used by individual homeowners or insurance companies to determine whether or not a specific property has a high fire hazard and is therefore a good candidate for specific fire hazard mitigation measures.

4.1.3 Wildland Fire Protection Strategies

4.1.3.1 Vegetation Management

Experience and research have shown that vegetation management is an effective means of reducing the wildland fire hazard. Therefore, in those areas identified as susceptible to wildland fire, land development is governed by special State, county and local codes, and property owners are required to follow maintenance guidelines aimed at reducing the amount and continuity of the fuel (vegetation) available.

Requirements for vegetation management at the urban-wildland interface (UWI) in California were revisited following the 1993 wildland fires that impacted large areas of Orange, Los Angeles and Ventura counties. The International Fire Code Institute formed a committee to develop an Urban-Wildland Interface Code under the direction of the California State Fire Marshal. The first draft of this code was published in October 1995. Then, in 2003, the International Fire Code Institute consolidated into the International Code Council. The most recent Wildland-Urban Interface Code was issued by the International Code Council in 2009. The code contains provisions addressing fire spread, accessibility, defensible space, and water supply for buildings constructed near wildland areas.

Hazard reduction and ***fuel modification*** are the two methods that communities most often employ to reduce the risk of fire at the UWI. Both methodologies use the principle of reducing the amount of combustible fuel available, which reduces the amount of heat, associated flame lengths, and the intensity of the fire that would threaten adjacent structures. The purpose of these methods is to reduce the hazard of wildfire by establishing a defensible space around buildings or structures in the area. Defensible space is defined as an area, either natural or man-made, where plant materials and natural fuels have been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire, and to create an area for firefighters to suppress the fire and save the structure. These standards require property owners in the UWI to conduct maintenance, modifying or removing non-fire-resistive vegetation around their structures to reduce the fire danger. This affects any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining the UWI.

Fuel or vegetation treatments often used include mechanical, chemical, biological and other forms of biomass removal (Greenlee and Sapsis, 1996) within a given distance from habitable structures. The intent of this hazard-reduction technique is to create a ***defensible space*** that slows the rate and intensity of the advancing fire, and provides an area at the urban-wildland interface where firefighters can set up to suppress the fire and save the threatened structures. Hazard reduction includes requirements for the maintenance of

existing trees, shrubs, and ground cover within a 100-foot wide setback zone, to reduce the amount of fuel on those sides of any structure that face the UWI. These requirements include: clearing all dead or dying foliage; planting fire-resistive vegetation; keeping clearances between tree stands, bushes and shrubs, and between trees and structures; irrigating ground covers, storing firewood and combustible materials away from habitable structures; using fire-resistant roofing and construction materials; cleaning vegetation debris from roofs and rain gutters; and using spark arresters on chimneys.

In some new communities or developments proposed adjacent to a wildland area, residents are required to comply with **fuel modification** requirements. A **fuel modification zone** is a ribbon of land surrounding a development within a fire hazardous area that is designed to diminish the intensity of a wildfire as it approaches the structures. Fuel modification includes both the thinning (reducing the amount) of combustible vegetation, and the removal and replacement of native vegetation with fire-resistive plant species. These modification zones may be owned by individual property owners or by homeowners' associations. Emphasis is placed on the space near structures that provides natural landscape compatibility with wildlife, water conservation and ecosystem health. Immediate benefits of this approach include improved aesthetics, increased health of large remaining trees and other valued plants, and enhanced wildlife habitat.

In Hesperia, proposals for fuel modification treatments are being developed for the Rancho Las Flores area, given its extensive fuel modification zones. Other areas in the city at this time do not have fuel modification or defensible space requirements. However, the San Bernardino County Fire Department recommends homeowners to maintain a 30-foot defensible space around their residences. Also, the Fire Department recommends planting fire-retardant plants within this 30-foot critical zone, and in extremely hazardous areas, a clearance of flammable vegetation for a minimum distance of 30 to 100 feet from structures is recommended. For more information please contact the San Bernardino County Fire Department at **(760) 244-2138**, or http://www.sbcfire.org/phone_directory.asp#Hesperia_-_Station_301_.

4.1.3.2 Notification and Abatement

Typically, city codes specify that property owners are required to mitigate the fire hazard in their properties by implementing vegetation management practices. The City of Hesperia contracts with the San Bernardino County Land Use Services Department for assistance in weed abatement. If uncontrolled or high weeds, brush, plant material, or other prohibited items are present on a property, the Fire Marshal of the County's Code Enforcement Division has the authority to give the property owner of record a notice to abate the hazard. If the owner does not abate the hazard during the time period specified in the notice, the City may take further action to reduce the fire hazard. Enforcement options may include notices of violation, correction or inspection; citations for criminal infraction or misdemeanor; temporary restraining orders; civil litigation; or the use of an Administrative Appeals Process. Property owners are given 30 days from when the notice to abate was issued to clear the overgrown vegetation on their property in accordance with Chapter l.12.130(B)(7) and Section 23.038 of the City and County Municipal Codes, respectively. If the property owner does not comply, the City has the ability to abate the fire hazard by mowing the weeds, and charging the property owner for the cots. This in fact occurs often.

For additional information refer to http://municipalcodes.lexisnexis.com/codes/hesperia/ (Hesperia's Municipal Code) and www.sbcounty.gov/countycodes (County Code).

4.1.3.3 Building to Reduce the Fire Hazard

Building construction standards for such items as roof coverings, fire doors, and fire resistant materials help protect structures from external fires *and* contain internal fires for longer periods. The portion of a structure most susceptible to ignition from a wildland fire is its **roof**, which is exposed to burning cinders (or brands) generally carried by winds far in advance of the actual fire. Roofs can also be ignited by direct contact with burning trees and large shrubs (Fisher, 1995). The danger of combustible wood roofs, such as wooden shingles and shakes, has been known to fire fighting professionals since 1923, when California's first major urban fire disaster occurred in Berkeley. It was not until 1988, however, that California was able to pass legislation calling for, at a minimum, Class C roofing in fire hazard areas. Then, in the early 1990s, there were several other major fires, including the Paint fire of 1990 in Santa Barbara, the 1991 Tunnel fire in Oakland/Berkeley, and the 1993 Laguna Beach fire, whose severe losses were attributed in great measure to the large percentage of combustible roofs in the affected areas. In 1994-1996, new roofing materials standards were approved by California for Very High Fire Hazard Severity Zones.

To help consumers determine the fire resistance of the roofing materials they may be considering, roofing materials are rated as to their fire resistance into three categories that are based on the results of test fire conditions that these materials are subjected to under rigorous laboratory conditions, in accordance with test method ASTM-E-108 developed by the American Society of Testing Materials. The rating classification provides information regarding the capacity of the roofing material to resist a fire that develops outside the building on which the roofing material is installed (The Institute for Local Self Government, 1992). The ratings are as follows:

- **Class A**: Roof coverings that are effective against **severe** fire exposures. Under such exposures, roof coverings of this class are not readily flammable, afford a high degree of fire protection to the roof deck, do not slip from position; and do not produce flying brands.

- **Class B**: Roof coverings that are effective against moderate fire exposures. Under such exposures, roof coverings of this class are not readily flammable, afford a moderate degree of fire protection to the roof deck, do not slip from position, and do not produce flying brands.

- **Class C**: Roof coverings that are effective against light fire exposures. Under such exposures, roof coverings of this class: are not readily flammable, afford a measurable degree of fire protection to the roof deck, do not slip from position, and do not produce flying brands.

Roofing materials can also be:

- **Non-Combustible**: Roof made of non-combustible materials like metal. Although metal roofs don't burn, they are excellent heat conducts, and during an intense fire, heat can be conducted through the metal to the underlying, combustible materials.

- **Non-Rated**: Roof coverings have not been tested for protection against fire exposure. Under such exposures, non-rated roof coverings may be readily flammable; may offer little or no protection to the roof deck, allowing fire to penetrate into attic space and the entire building; and may pose a serious fire brand hazard, producing brands that could ignite other structures a considerable distance away.

The City of Hesperia has adopted code that requires, at a minimum, Class C roofing materials. The City also requires that roofing be made of materials customarily used in the area and all roofing materials used in the city need to be approved by the Building Official. The roofing materials need to be durable and fire resistant. Generally acceptable roofing materials include metal standing seam, concrete tile, ceramic tile, and slate or slate-like materials.

Attic ventilation openings are also a concern regarding the fire survivability of a structure. Attics require significant amounts of cross-ventilation to prevent the degradation of wood rafters and ceiling joists. This ventilation is typically provided by openings to the outside of the structure, but these opening can provide pathways for burning brands and flames to be deposited within the attic. To prevent this, it is important that all ventilation openings be properly screened. Additional prevention measures that can be taken to reduce the potential for ignition of attic spaces is to "use non-combustible exterior siding materials and to site trees and shrubs far enough away from the walls of the house to prevent flame travel into the attic even if a tree or shrub does torch" (Fisher, 1995).

The type of **exterior wall construction** used can also help a structure survive a fire. Ideally, exterior walls should be made of non-combustible materials such as stucco or masonry. During a wildfire, the dangerous active burning at a given location typically lasts about 5 to 10 minutes (Fisher, 1995), so if the exterior walls are made of non-combustible or fire-resistant materials, the structure has a better chance of surviving. For the same reason, the type of **windows** used in a structure can also help reduce the potential for fire to impact a structure. Single-pane, annealed glass windows are known for not performing well during fires; thermal radiation and direct contact with flames cause these windows to break because the glass under the window frame is protected and remains cooler than the glass in the center of the window. This differential thermal expansion of the glass causes the window to break. Larger windows are more susceptible to fracturing when exposed to high heat than smaller windows. Multiple-pane windows, and tempered glass windows perform much better than single-pane windows, although they do cost more. Fisher (1995) indicates that in Australia, researchers have noticed that the use of metal screens helps protect windows from thermal radiation.

The City of Hesperia does not have specific requirements regarding attic ventilation openings or windows. However, exterior wall construction shall consist of stucco, wood,

brick, stone, or decorative concrete block. Synthetic products of a similar appearance, equivalent durability and providing equivalent fire resistance may be permitted. Metal siding, if utilized, shall be non-reflective and horizontally lapping. The exterior covering material shall extend to a point at or near grade except if an approved solid wood, metal, concrete or masonry perimeter foundation is used; the exterior covering material need not extend below the top of the foundation. Every proposed construction project in the city is reviewed by the San Bernardino County Fire Department for compliance with the most recent California Fire Code adopted by the City, including City-amendments to the Code (referred to as the Hesperia Fire Code). For information regarding the most recent California Fire Code and City-specific requirements, contact the City's Building and Safety Department.

4.1.3.4 Restricted Public Access

In addition to the fire-susceptibility conditions described before, the wildfire susceptibility of an area changes throughout the year, and from year to year in response to local variations in precipitation, temperature, vegetation growth, and other conditions. To map these changes, the EROS Data Center (EDC) in Sioux Falls, South Dakota, has produced since the early 1990s weekly and biweekly maps for the 48 contiguous states and Alaska (available at http://edc.usgs.gov/). These maps, prepared under the Greenness Mapping Project, display plant growth and vigor, vegetation cover, and biomass production, using multi-spectral data from satellites of the National Oceanic and Atmospheric Administration (NOAA). The EDC also produces maps that relate vegetation conditions for the current two weeks to the average (normal) two-week conditions during the past seven years. EDC maps provide comprehensive growing season profiles for woodlands, rangelands, grasslands, and agricultural areas. With these maps, fire departments and land managers can assess the condition of all vegetation throughout the growing season, which improves planning for fire suppression, scheduling of prescribed burns, and study of long-term vegetation changes resulting from human or natural factors.

Another valuable fire management tool developed jointly by the U.S. Geological Survey and the U.S. Forest Service is the Fire Potential Index (FPI). The FPI characterizes relative fire potential for woodlands, rangelands, and grasslands, both at the regional and local scale. The index combines multi-spectral satellite data from NOAA with geographic information system (GIS) technology to generate 1-km resolution fire potential maps. Input data include the total amount of burnable plant material (fuel load) derived from vegetation maps, the water content of the dead vegetation, and the fraction of the total fuel load that is live vegetation. The proportion of living plants is derived from the greenness maps described above. Water content of dead vegetation is calculated from temperature, relative humidity, cloud cover, and precipitation. The FPI is updated daily to reflect changing weather conditions.

Local fire authorities can obtain data from either of the two sources above to better prepare for the fire season. When the fire danger is deemed to be of special concern, local authorities can rely on increased media coverage and public announcements to educate the local population about being fire safe. For example, to reduce the potential for wildfires during fire season, hazardous fire areas can be closed to public access during at least part of the year. Typically, the fire season in southern California begins in May and lasts until the first rains in November, but different counties or jurisdictions can opt to start

the fire season earlier and end it later. With more site-specific data obtained from the FPI or Greenness Mapping Project, however, the fire hazard of an area can be assessed on a weekly or bi-weekly basis (for more information see http://edc.usgs.gov/greenness/index.html). These data can also be used to establish regional prevention priorities that can help reduce the risk of wildland fire ignition and spread, and help improve the allocation of suppression forces and resources, which can lead to faster control of fires in areas of high concern.

4.1.3.5 Real-Estate Disclosure Requirements

California state law [Assembly Bill 6; Civil Code Section 1103(c)(6)] requires that fire hazard areas be disclosed in real estate transactions; that is, real-estate sellers are required to inform prospective buyers whether or not a property is located within a wildland area that could contain substantial fire risks and hazards, such as a State Responsibility Area.

Real-estate disclosure requirements are important because in California the average period of ownership for residences is only five years (Coleman, 1994). This turnover creates an information gap between the several generations of homeowners in fire hazard areas. Uninformed homeowners may attempt landscaping or structural modifications that could be a detriment to the fire-resistant qualities of the structure, with potentially negative consequences.

4.1.3.6 Fire Safety Education

Individuals can make an enormous contribution to fire hazard reduction if provided with the information and tools to do so. In addition to the specific code requirements and guidelines mentioned in the sections above regarding defensible space and appropriate landscaping and construction materials, homeowners can take on several measures to reduce their fire risk. Some of these tasks are listed below:

- Mow and irrigate your lawn regularly, but do not mow during the hottest time of the day.
- Dispose of cuttings and debris promptly, according to local regulations.
- Store firewood away from the house.
- Be sure the irrigation system is well maintained.
- Use care when refueling garden equipment and maintain it regularly.
- Store and use flammable liquids properly.
- Dispose of smoking materials carefully.
- Do not light fireworks.
- Become familiar with local regulations regarding vegetation clearings, disposal of debris, and fire safety requirements for equipment.
- Follow manufacturers' instructions when using fertilizers and pesticides.
- When building, selecting or maintaining a home, consider the slope of the terrain. Be sure to build on the most level portion of the lot since fire spreads rapidly on slopes, even minor ones.
- Watch out for construction on ridges, cliffs, or drainage embankments. Keep a single-

story structure at least 30 feet away from the edge of a cliff or ridge; increase this distance if the structure exceeds one story.

- Use construction materials that are fire-resistant or non-combustible whenever possible.
- For roof construction, the City of Hesperia requires roofing materials to be approved by the Building Official, however, Class-A asphalt shingles, slate or clay tile, metal, cement and concrete products, or terra-cotta tiles are preferred and are recommended by the City.
- Constructing a fire-resistant sub-roof can add protection.
- On exterior wall cladding, fire-resistive materials such as stucco or masonry are much better than vinyl, which can soften and melt.
- Install an approved automatic fire sprinkler system. The City of Hesperia has specific sprinkler requirements, as discussed further later in this chapter.
- Driveways should provide easy access for fire engines. Driveways and access roads should be well maintained, clearly marked, and include ample turnaround space near houses. The City of Hesperia has specific requirements regarding roadway widths for fire engine access that are discussed further later in this chapter.
- So that everyone has a way out, provide at least two ground level doors for safety exits and at least two means of escape (doors or windows) in each room.
- Keep gutters, eaves, and roofs clear of leaves and other debris.
- Occasionally inspect your home, looking for deterioration, such as breaks and spaces between roof tiles, warping wood, or cracks and crevices in the structure.
- If an all-wood fence is attached to your home, a masonry or metal protective barrier between the fence and house is recommended.
- Use non-flammable metal when constructing a trellis and cover it with high-moisture, non-flammable vegetation.
- Prevent combustible materials and debris from accumulating beneath patio decks or elevated porches. Screen, or box in, areas that lie below ground level with wire mesh.
- Make sure an elevated wooden deck is not located at the top of a hill where it will be in the direct line of a fire moving up slope.
- Install automatic seismic shut-off valves for the main gas line to your house. Information for approved devices, as well as installation procedures, is available from the Southern California Gas Company.

4.1.3.7 Other Fire Hazard Reduction Techniques

Before European settlers arrived, many areas of the United States experienced small but frequent wildfires that impacted primarily the grasses and low-lying bushes, without severely damaging the tree stands. Native Americans in California reportedly used fire to reduce fuel load; the increased visibility and access this provided helped them hunt and forage. It is thought that as much as 12 percent of the State was burned every year by various tribes (Coleman, 1994). European settlers, on the other hand, considered wildfires unacceptable, and in the early 20th century, as development started to encroach onto the foothills, the Fire Service began campaigns to prevent wildfires from occurring. Over time

this has led to an increase in fuel loads, with a resultant increase in fire risk – wildfires that impact areas with fuel buildup are more intense and significantly more damaging to the ecosystem than periodic, low-intensity fires.

To summarize, fire suppression and increasing populations have produced these results:

- Increased losses of life, property, and resources;
- Increased difficulty in suppressing fires, increased safety problems for firefighters, and reduced productivity by fire crews on perimeter lines;
- Longer periods between recurring fires;
- Increased volume of fuel per acre; and
- Increased taxpayer costs and property losses.

Recognition of these problems has led to vegetation management programs such as those described above, and in some areas, prescribed fires. A prescribed fire is deliberately set under carefully controlled and monitored conditions. The purpose is to remove brush and other undergrowth that can fuel uncontrolled fires. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life and property that would be degraded by wildland fire. Prescribed fire is only accomplished through managed ignition and should be supported by planning documents and appropriate environmental analyses.

Since 1981, prescribed fire has been the primary means of fuel management in Federal- and State-owned lands. Approximately 500,000 acres — an average of 30,000 acres a year — have been treated with prescribed fire under the vegetation management program throughout California alone. In the past, the typical vegetation management project targeted large wildland areas. Now, increasing development pressures (with increased populations) at the urban-wildland interface often preclude the use of large prescribed fires. Nevertheless, many still find the notion of "prescribed fire" difficult to accept given that it goes against nearly 100 years of common practice and beliefs. Prescribed fire does carry a risk, as recent experiences in New Mexico, Arizona, and Orange County have shown. In Orange County, the U.S. Forest Service lost control of a prescribed burn in the Santa Ana Mountains. The Sierra Fire burned for about 10 days in February 2006 causing road and highway closures and resident evacuations, but no damaged structures. In all, the Sierra Fire burned 10,584 acres of land and cost about $6.9 million. In 2000, in Los Alamos, New Mexico, the Cerro Grande fire began when a prescribed burn escaped, destroying several hundred homes and burning more than 50,000 acres. This fire triggered revisions in the guidelines for performing prescribed burns. Furthermore, a recent program review by the CDF has identified needed changes, with focus on citizen and firefighter safety, and the creation of wildfire safety and protection zones.

4.2 Structure Fires

Hesperia's permanent residential population as of 2009 was 88,184, with more than 28,500 housing units (Mr. Dave Reno, City of Hesperia Principal Planner, 2009, written communication). A large percentage of the housing stock in Hesperia consists of single-family, detached structures. When a structure fire develops in this type of occupancy, the fire is generally contained in the building of origin. There are some areas of the city, however, where high-density residential structures, such as apartments, are also present. Fire can spread from one structure or unit to the next more easily in this type of occupancy. Therefore, multiple-family units have special fire protection needs, including the requirement to have fire and life-safety systems in place, such as automatic fire sprinklers and smoke detectors, in conformance with the City's Building and Fire Codes.

In order to quantify the structural fire risk in a community, it is necessary for local fire departments to evaluate all occupancies based upon their type, size, construction type, built-in protection (such as internal fire sprinkler systems) and risk (high-occupancy versus low-occupancy) to assess whether or not they are capable of controlling a fire in the occupancy types identified. Simply developing an inventory of the number of structures present within a fire station's response area is not sufficient, as those numbers do not convey all the information necessary to address the community's fire survivability. In newer residential areas where construction includes fire-resistant materials, most structural fires can be confined to the building or property of origin. In older residential areas where the building materials may not be fire-rated, there is a higher probability of a structural fire impacting adjacent structures, unless there is ample distance between structures, there are no strong winds, and the Fire Department is able to respond in a timely manner. As discussed in detail below, in some areas of Hesperia older structures are relatively close to each other, increasing the probability of a structural fire not being confined to its building of origin only.

The previous section described in detail the wildfire risk in the city. Review of the maps provided show that a large portion of Hesperia has a moderate to high (wildland) fire hazard, whereas its northwestern portion is mapped as not having a wildfire hazard. In this area, however, as anywhere else in the developed portions of the city, there is the potential for structure fires to occur. Building fires, although only a small percentage of the incidents that the Fire Department responds to on an annual basis (between 0.5% and 2% of all emergency calls between 2007 and 2009 were for structure fires), account for a high percentage of the yearly losses in the city. The following sections discuss the potential fire targets in the city (Section 4.2.1), and the City's fire suppression capabilities (Section 4.3).

There is also a potential for chemical fires to occur in some areas of the city, where industrial and commercial occupancies are present, with the potential to impact nearby residential areas and critical facilities. Issues associated with the storage, use and disposal of hazardous materials are discussed in more detail in Chapter 5, whereas a discussion of chemical fires is provided in Section 4.4. Finally, fires after earthquakes are a real concern in southern California, given the region's seismic potential. This is discussed further in Section 4.5.

4.2.1 Structural Target Fire Hazards and Standards of Coverage

Fire departments quantify and classify structural fire risks to determine where a fire resulting in large losses of life or property is more likely to occur. The structures at risk are catalogued utilizing the following criteria:

- Their size, height, location and type of occupancy;
- The risk presented by the occupancy (probability of a fire and the consequence if one occurs);
- The unique hazards presented by the occupancy (such as the occupant load, the types of combustibles therein and any hazardous materials);
- Potential for loss of life;
- The presence of fire sprinklers and use of fire-resistant construction materials;
- Proximity to exposures;
- The estimated dollar value of the occupancy;
- The needed fire flow versus available fire flow; and
- The ability of the on-duty forces to control a fire therein.

These occupancies are called "Target Hazards." Target Hazards encompass all significant community structural fire risk inventories. Typically, fire departments identify the major target hazards and then perform intensive pre-fire planning, inspections and training to address the specific fire problems in that particular type of occupancy (for example, training to respond to fires in facilities that handle hazardous materials is significantly different than training to respond to a fire in a high-occupancy facility such as a mall, auditorium or night club). Typically, the most common target hazard due to its life-loss potential, 24-hour occupancy, risk, and frequency of events, is the residential occupancy. However, the consequences of residential fires can be high or low, depending on the age of the structure, location, size, and occupancy load, among other factors. Four classifications of risk are considered, as follows:

- **High Probability/High Consequences** (Example: multi-family dwellings and residential buildings (i.e., condominiums and apartments), older attached residential homes, high-occupancy facilities like theatres, hazardous materials occupancies (see Chapter 5), and large shopping centers.
- **Low Probability/High Consequences** (Example: medical facilities, mid-size shopping malls, industrial occupancies, and large office complexes).
- **High Probability/Low Consequences** (Example: older, detached single-family dwellings).
- **Low Probability/Low Consequences** (Example: newer, detached single-family dwellings and small office buildings).

In order to address the Fire Department's capability to respond effectively to the structural fire risk in Hesperia, "Standards of Coverage" need to be determined based upon the various risks. Those risks are: Single-family detached residential, multi-family attached residential, commercial and industrial. Some of these risks exist in various areas throughout the city. For example, residential areas adjoining, and intermixed with commercial areas occur both east and west of Hesperia Road, between Orange Street to

the south, and Bear Valley Road to the north. High-density developments occur on the north side of Sequoia Street, and medium-density developments are present south of Eucalyptus Street and west of Maple Avenue. For the location and distribution of fire stations in the city of Hesperia, refer to Plate 4-2.

Some of the high probability/high consequence risks that fire departments worry the most are high-rise buildings due to the specialized fire-fighting equipment needed, the limited routes of access into and out of a building, and the potential for great loss of life. Fire departments typically define a high-rise as a building with floors for human occupancy located 75 feet or more above the lowest level of fire department access, as provided by their truck-mounted ladders. High-rise buildings are required to have several redundant fire and life safety systems in place, including automatic fire sprinklers, fire alarms and smoke and carbon monoxide detectors.

4.2.2 Model Ordinances and Fire Codes

Effective fire protection cannot be accomplished solely through the acquisition of equipment, personnel and training. The area's infrastructure also must be considered, including adequacy of nearby water supplies, transport routes and ease of accessibility by fire equipment, and proper signage of streets and individual addresses. The City of Hesperia currently enforces the 2007 California Fire Code. (The 2010 California Fire Code has been adopted by the State and Cal FIRE and is expected to become effective in all jurisdictions by January of 2011.) The Fire Chief is authorized and directed to enforce the provisions of the California Fire Code throughout the city.

These provisions include constructions standards and sprinkler and fire hydrant requirements in new structures and remodels, road widths and configurations designed to accommodate the passage of fire trucks and engines, and requirements for minimum fire flow rates for water mains. The construction requirements are a function of building size, purpose, type, material, location, proximity to other structures, and the type of fire suppression systems installed. Given the detailed fire prevention requirements that the City of Hesperia has for building construction standards, it is best to refer to the City's most current Fire and Building Codes, available from the Hesperia Building and Safety Department. Information on the latest codes enforced by the City is also available from the City's website at http://www.cityofhesperia.us.

Some of the more significant Fire Code items that help reduce the hazard of structural fire in the city include requirements regarding fire-extinguishing systems such as automatic fire sprinklers. Fire sprinklers can help contain a fire that starts inside a structure from spreading to other nearby structures, and also help prevent total destruction of a building. The City of Hesperia has very specific requirements regarding the installation of automatic fire-sprinklers depending on the type of occupancy and floor area. For more information regarding your specific needs, visit the City's Building and Safety Department. Code information is also available in the City's web site at http://www.cityofhesperia.us.

Fire Flow is the flow rate of water supply (measured in gallons per minute – gpm) available for fire fighting measured at 20 pounds per square inch (psi) residual pressure. Available fire flow is the total water flow available at the fire hydrants, also measured in gallons per minute. As of the writing of this report, Hesperia had adopted the section of the 2007

California Fire Code (Appendix B) that lists the minimum required fire-flow and flow duration for buildings of different floor areas and construction types, except that a reduction in required fire flow of up to 50 percent may be allowed when the building is provided with an approved automatic sprinkler system. The resulting fire flow cannot be less than 1,500 gallons per minute. Local water districts are required to test their fire protection capability for various land-uses per the flow requirements of the California Fire Code. The Hesperia Water Department conducts inspections of all public fire hydrants in the city to make sure that they are working properly at the appropriate flows for the area. The Water Department also maintains the test records performed on private hydrants (which are to be tested annually). For additional information regarding the required fire-flow for your building, contact the Hesperia Water Department.

Emergency water storage is critical, especially when battling large structural fires or fires after earthquakes. During the 1993 Laguna Beach fire, water streams sprayed on burning houses sometimes fell to a trickle (Platte and Brazil, Los Angeles Times, 1993), primarily because of dwindling water pressure, inadequate pipeline connections and insufficient pumping capacity: most water reservoirs in Laguna Beach were located at lower elevations than the fire, and the water district could not supply water to the higher elevations as fast as the fire engines were using it.

Existing water tanks in Hesperia are located to the south and southwest, and therefore at relatively higher surface elevations than most development in the city. This allows for a gravity-fed mechanism for water distribution. However, as the city grows to the south and west, and into higher elevations, these water tanks will not be able to provide water to those regions, unless the water is pumped. During and after an earthquake, if there is loss of electric power with a resultant failure of the water pumps, and there are substantial breaks in the water mains due to ground shaking and surface deformation, the city may find itself with a limited water supply (see Section 1.8.4.6 in Chapter 1). Leaking irrigation lines and open valves in destroyed homes can also reduce the amount of water available to fire fighters. Although most water districts consider a three-day supply of water to be good to excellent, a seven-day emergency storage supply is recommended, especially in areas likely to be impacted by fires after earthquakes, due to the anticipated damage to the main water distribution system as a result of ground failure and/or weaknesses in the pipes due to corrosion or age.

4.3 Fire Suppression Responsibilities

The City of Hesperia is a contract city with the San Bernardino County Fire Department, which provides all fire services including prevention, disaster preparedness and education in Hesperia. The County Fire Department also provides ambulance services to the three local High Desert hospitals. Fire-fighting resources in and near Hesperia include six fire stations; these are listed in Table 4-2 below. One of these facilities, #302, will be replaced with #306, as indicated. The locations of these fire stations are shown on Plate 4-2. The general telephone number for the Hesperia Fire Department is (**760) 947-1601. For emergencies, dial 911.**

Table 4-2: Fire Stations Serving the City of Hesperia

Station	Address	Equipment, Personnel
#301	9430 11th Avenue	1 type-one engine (4 firefighters) and 2 ambulances (2 paramedics)
#302 (Headquarters)	17288 Olive Street (to be moved to Willow and I Avenue)	1 type-one engine (4 firefighters) and 2 ambulances (2 paramedics)
#304	15660 Eucalyptus Street	1 type-one engine (4 firefighters) and 2 ambulances (2 paramedics)
#305	8331 Caliente	1 type-one engine (4 firefighters), 1 fire truck (5 firefighters), and 1 ambulance (2 paramedics)
#48	4545 Summit Valley Road (currently a paid call station, but to be upgraded to a full-time engine station sometime in the future, no timeframe for this upgrade has been established)	1 type-three brush engine (2 firefighters) and 1 water tender (2 firefighters)
#22	12550 Jacaranda, in Victorville (but serving northeast Hesperia)	1 type-one engine (4 firefighters) and 2 ambulances (2 paramedics)
#306 (future)	Ranchero Road and I Avenue, in Rancho Las Flores	1 type-one engine (4 firefighters) and two ambulances (2 paramedics)
#303	17443 Lemon Street "on-call station," and Household Hazardous Waste Drop-Off Facility	

With the High Desert's rapid increase in population, and associated rise in traffic over the past few years, emergency calls to the Fire Department have steadily risen by about 3% to 5% each year. In 2003, the Department received 7,695 calls for service, whereas in 2005 they received 8,179 calls. By 2008, there were 9,382 calls. The calls include fires (structure, vegetation and others), ruptures/explosions, emergency management services (EMS)/rescue, traffic collisions, hazardous conditions, service calls, good intent calls, and false calls.

The National Fire Protection Association (NFPA Standard 1710, 2001) recommends the following objectives for fire departments:

- An alarm answering time of not more than 15 seconds for at least 95% of the alarms received, and not more than 40 seconds for at least 99% of the alarms received;
- When the alarm is received at a public safety answering point (PSAP) and transferred to a secondary answering point (or communication center), the agency responsible for the PSAP should have an alarm transfer time of not more than 30 seconds for at least 95% of all alarms processed;
- The responding fire department should have an alarm processing time (the time interval

from when the alarm is acknowledged at the communication center until response information begins to be transmitted via voice or electronic means to emergency response facilities and emergency response units) of not more than 60 seconds for at least 90% of the alarms, and not more than 90 seconds for at least 99% of the alarms;

- Turnout time for fire and special operations of 80 seconds, and turnout time for EMS response of 60 seconds;
- Travel time of 240 seconds or less for the arrival of the first arriving engine company at a fire suppression incident and 480 seconds or less travel time for the deployment of an initial full alarm assignment at a fire suppression incident;
- Travel time of 240 seconds or less for the arrival of a unit with first responder with automatic external defibrillator (AED) or higher level capability at an emergency medical incident;
- Travel time of 480 seconds or less for the arrival of an advanced life support unit at an emergency medical incident, where this service is provided by the fire department, provided that a first responder with AED or basic life support unit arrived in 240 seconds or less travel time.

These time recommendations for fire suppression incidents are based on the demands created by a structure fire: It is critical to attempt to arrive and intervene at a fire scene prior to the fire spreading beyond the room of origin, which can result in total destruction, and this typically occurs within 8 to 10 minutes after ignition. Based on data provided by the City, average fire department response time in Hesperia was 7 minutes, 16 seconds in 2007; 7 minutes, 5 seconds in 2008; and 7 minutes, 27 seconds in 2009.

Actual response times are generally a function of traffic congestion and emergency unit availability. Other factors that may affect response time include access obstructions, traffic calming devices and median strips on major roadways, weather, multiple alarms, winding access roads in hillside developments, road grades, and gated communities. In Hesperia, fire department response times are primarily controlled by distance from the responding fire station to the site, and obstructions provided locally by the aqueduct and the railroad lines.

In addition to the response time, there is another component called "set up" time. This is the time it takes firefighters to get to the source of a fire and get ready to fight the fire. This may range from 2 minutes at a small house fire to 15 minutes or more at a large or multi-story occupancy, such as a large apartment complex. Structure fire response requires numerous critical tasks to be performed simultaneously, and the number of firefighters required to perform the tasks varies based upon the risk.

Obviously, the number of firefighters needed at a maximum high-risk occupancy, such as a shopping mall or large industrial occupancy would be significantly higher than for a fire in a lower-risk occupancy. Given the large number of firefighters that are required to respond to a high-risk, high-consequence fire, Fire Departments routinely rely on automatic and mutual aid agreements to address the fires suppression needs of their community. If additional resources are needed due to the intensity or size of the fire, a second alarm may be requested. The second alarm results in the response of at least another two engine

companies, and a ladder truck. Beyond this response, additional fire units are requested via the automatic or mutual aid agreements. These agreements are discussed further below.

4.3.1 Automatic and Mutual Aid Agreements

Although the San Bernardino County Fire Department is tasked with the responsibility of fire prevention and fire suppression in Hesperia, in reality, fire-fighting agencies team up and work together during emergencies. These teaming arrangements are handled through automatic and mutual aid agreements, which obligate fire departments to help each other under pre-defined circumstances. **Automatic aid** agreements obligate the nearest fire company to respond to a fire regardless of the jurisdiction. **Mutual aid** agreements obligate fire department resources to respond outside of their district upon request for assistance.

The California Disaster and Civil Defense Master Mutual Aid Agreement (California Government Code Section 8555-8561) states: "Each party that is signatory to the agreement shall prepare operational plans to use within their jurisdiction, and outside their area." These plans include fire and non-fire emergencies related to natural, technological, and war contingencies. The State of California, all State agencies, all political subdivisions, and all fire districts signed this agreement in 1950.

Section 8568 of the California Emergency Services Act, (California Government Code, Chapter 7 of Division 1 of Part 2) states that "the State Emergency Plan shall be in effect in each political subdivision of the State, and the governing body of each political subdivision shall take such action as may be necessary to carry out the provisions thereof." The Act provides the basic authorities for conducting emergency operations following the proclamations of emergencies by the Governor or appropriate local authority, such as a City Manager. The provisions of the act are further reflected and expanded on by appropriate local emergency ordinances. The act further describes the function and operations of government at all levels during extraordinary emergencies, including war (www.scesa.org/cal_govcode.htm). Therefore, local emergency plans are considered extensions of the California Emergency Plan.

The City of Hesperia is one of 24 cities and towns that make up the San Bernardino County Operational area. The Operational Area is part of the Standardized Emergency Management System (SEMS), further described below, in Section 4.3.2, which promotes effective disaster management, response and cooperation across jurisdictional boundaries. As a result of being part of an Operational Area group, all of the jurisdictions have mutual aid agreements that allow them to obtain additional emergency resources, as needed, from non-affected members in the group. Given their geographic location, fire stations in Victorville (which also contracts with the County for emergency response) are the first responders to requests for additional assistance with incidents in Hesperia.

Numerous other agencies are available to assist the San Bernardino County Fire Department if needed. These include the County's Sheriff Department and California Highway Patrol, who, depending on the location of the incident, would provide support during evacuations and to discourage people from traveling to the incident area to observe Fire Department operations, as this can hinder fire suppression and emergency response efforts. Several State and Federal agencies have roles in fire hazard mitigation, response

and recovery, depending on the type of incident and its location. These agencies include the Office of Emergency Services, Office of Aviation Services, National Weather Service, the Department of the Interior, and, in extreme cases, the Department of Defense. In forest and open areas, agencies that often assist with fire suppression include the National Park Service, US Forest Service, National Association of State Foresters, Fish and Wildlife Service, and the Department of Agriculture. Private companies and individuals may also be asked to provide assistance in some cases.

4.3.2 Standardized Emergency Management System (SEMS) and National Incident Management System (NIMS)

The SEMS law refers to the Standardized Emergency Management System described by the Petris Bill (Senate Bill 1841; California Government Code Section 8607, made effective January 1, 1993) that was introduced by Senator Petris following the 1991 Oakland fires. The intent of the SEMS law is to improve the coordination of State and local emergency response in California. It requires all jurisdictions in California to participate in the establishment of a standardized statewide emergency management system.

When a major incident occurs, the first few moments are absolutely critical in terms of reducing loss of life and property. First responders must be sufficiently trained to understand the nature and the gravity of the event to minimize the confusion that inevitably follows catastrophic situations. The first responder must then put into motion relevant mitigation plans to further reduce the potential for loss of lives and property damage, and to communicate with the public. According to the State's Standardized Emergency Management System, local agencies have primary authority regarding rescue and treatment of casualties, and making decisions regarding protective actions for the community. This on-scene authority rests with the local emergency services organization and the incident commander.

Depending on the type of incident, several different agencies and disciplines may be called in to assist with emergency response. Agencies and disciplines that can be expected to be part of an emergency response team include medical, health, fire and rescue, police, public works, and coroner. The challenge is to accomplish the work at hand in the most effective manner, maintaining open lines of communication between the different responding agencies to share and disseminate information, and to coordinate efforts.

Emergency response in every jurisdiction in the State of California is handled in accordance with SEMS, with individual City agencies and personnel taking on their responsibilities as defined by the City's Emergency Plan. This document describes the different levels of emergencies, the local emergency management organization, and the specific responsibilities of each participating agency, government office, and City staff.

The framework of the SEMS system is the following:

- Incident Command System – a standard response system for all hazards that is based on a concept originally developed in the 1970s for response to wildland fires;
- Multi-Agency Coordination System – coordinated effort between various agencies

and disciplines, allowing for effective decision-making, sharing of resources, and prioritizing of incidents;

- Master Mutual Aid Agreement and related systems – agreement between cities, counties and the State to provide services, personnel and facilities when local resources are inadequate to handle and emergency;
- Operational Area Concept – coordination of resources and information at the county level, including political subdivisions within the county; and
- Operational Area Satellite Information System – a satellite-based communications system with a high-frequency radio backup that permits the transfer of information between agencies using the system.

The SEMS law requires the following:

- Jurisdictions must attend training sessions for the emergency management system;
- All agencies must use the system to be eligible for funding for response costs under disaster assistance programs; and
- All agencies must complete after-action reports within 120 days of each declared disaster.

The September 11, 2001 terrorist attacks, and later, the 2004 and 2005 hurricane seasons demonstrated the need to improve the country's emergency management, incident response capabilities and coordination processes. On February 28, 2003, the President issued Homeland Security Presidential Directive 5 (HSPD-5), and in response, on March 1, 2004, the Department of Homeland Security unveiled the basic framework guiding the development and administration of the **National Incident Management System** (**NIMS**). NIMS provides a nationwide template that is meant to enable Federal, State, tribal, and local governments, in addition to non-governmental organizations and the private sector, to work together to "prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity." NIMS is a core set of doctrines, concepts, principles, terminology and organizational processes that enable effective, efficient and collaborative incident management. NIMS works hand in hand with the National Response Framework (NRF), which provides the structure and mechanisms for national-level policy for incident management.

NIMS is the following:

- A comprehensive, nationwide systematic approach to incident management, including the Incident Command System, Multiagency Coordination Systems, and Public Information;
- A set of preparedness concepts and principles for all hazards;
- Essential principles for a common operating picture and interoperability of communications and information management;
- Standardized resource management procedures that enable coordination among different jurisdictions and organizations;

- Scalable, so that it may be used for all incidents (from day-to-day to large-scale); and
- A dynamic system that promotes ongoing management and maintenance.

NIMS components include:

- Preparedness;
- Communications and Information Management;
- Resource Management;
- Command and Management; and
- Ongoing Management and Maintenance.

HSPD-5 requires all Federal departments and agencies to adopt NIMS and use it in all their individual incident management and activities. *Furthermore, the directive requires Federal departments and agencies to make adoption of NIMS by State, tribal and local (i.e., cities) organizations a condition for receiving Federal preparedness assistance*. Given that the basic framework for NIMS was put together in short order, it was understood that it would be a work in progress. In the years since 2004, the NIMS process has been reviewed continuously to incorporate best practices and lessons learned from recent incidents. In 2005, all state, local and tribal jurisdictions were to adopt NIMS for all Departments/Agencies, and were to revise and update their emergency operations plans, standard operating procedures, and standard operating guidelines to incorporate NIMS and National Response Framework components, principles and policies. In 2008, local jurisdictions were to use existing resources, such as programs, personnel and training facilities to coordinate and deliver NIMS training requirements. These training requirements are based on a group of training courses at different levels have been developed and that all appropriate emergency response personnel at all levels of government are required to take to satisfy the NIMS objectives. The most recently published NIMS compliance metrics for Fiscal Year 2009 are available from http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/E869AEBEE9DE3EF888257560007FDEA2?OpenDocument.

4.3.3 ISO Rating for the City of Hesperia

The Insurance Services Office (ISO) provides rating and statistical information for the insurance industry in the United States. To do so, ISO evaluates a community's fire protection needs and services, and assigns each community evaluated a Public Protection Classification (PPC) rating. The rating is developed as a cumulative point system, based on the community's fire-suppression delivery system, including fire dispatch (operators, alarm dispatch circuits, telephone lines available), fire department (equipment available, personnel, training, distribution of companies, etc.), and water supply (adequacy, condition, number and installation of fire hydrants). Insurance rates are based upon this rating. The worst rating is a Class 10. The best is a Class 1. Hesperia currently has a Class 5 ISO rating in the developed portions of the city, and a rating of 9 in its outlying areas (in the Summit Valley area). These numbers reflect, in part, the lack of permanent fire stations in the southern, higher fire hazard areas of the city. Establishment of Fire Station #48 as a full-time station should help improve the City's ISO rating for the Summit Valley area.

However, as development in the area increases, additional fire stations will be required to serve the increasing population in a timely manner. Currently, the Fire Protection District staffing levels equal 0.57 per 1,000 of the population. The long-term goal is to increase staff to 0.75 per 1,000 population (Mr. Dave Reno, City of Hesperia Principal Planner, 2010, written communication).

4.4 Chemical Fires

Chemical substances are often unstable under high temperatures. Other chemicals react to water or oxygen, and can self-ignite if exposed to water or air. For example, sulfuric acid, one of the most abundant and widely distributed chemicals produced in the U.S., is highly reactive when exposed in its concentrated form to water. Other substances if mixed together can also generate a fire. Therefore, when dealing with chemical fires it is important to know what type of chemicals are present in the area and where they are held. It is also important to note that when dealing with chemical fires, time is critical: the longer chemicals are exposed to extreme heat, the more likely they are to react violently, increasing the severity of the fire. Fire fighters can better respond to a situation with the appropriate equipment if they have the information needed to make these decisions immediately available to them. This is what the business plans and the Material Safety Data Sheets (MSDS) discussed in Section 5.2.5 (see Chapter 5 – Hazardous Materials Management) are intended to provide.

Firefighters recognize four main different types of fires:

- **Class A** fires involve ordinary materials like paper, lumber, cardboard, and some types of plastics.
- **Class B** fires involve flammable or combustible liquids such as gasoline, kerosene, and common organic solvents.
- **Class C** fires involve energized electrical equipment, such as appliances, switches, panel boxes, power tools, and hot plates. Water is a particularly dangerous extinguishing medium for class C fires because of the risk of electrical shock.
- **Class D** fires involve combustible metals, such as magnesium, titanium, potassium and sodium, as well as pyrophoric organometallic reagents such as alkyllithiums, Grignards and diethylzinc. These materials burn at high temperatures and will react violently with water, air, and/or other chemicals.

It is not uncommon for fires to be a combination of the types discussed above. Therefore, it is typically recommended that fire extinguishers obtained for household and office use have an ABC rating, which means that they have the capacity to fight Class A, B and C fires.

Common types of extinguishers include:

- **Water extinguishers**, which are suitable for class A (paper, etc.) fires, but not for class B, C and D fires, because the water can make the flames spread.
- **Dry chemical extinguishers**, which are useful for class ABC fires and are the best all-around choice. They have an advantage over CO_2 extinguishers because they

leave a blanket of non-flammable material on the extinguished material that reduces the likelihood of re-ignition. There are two kinds of dry chemical extinguishers:

  - Type BC fire extinguishers contain sodium or potassium bicarbonate, and
  - Type ABC fire extinguishers that contain ammonium phosphate.

- **CO_2 (carbon dioxide) extinguishers** are for class B and C fires. They do not work very well on class A fires because the material usually re-ignites. CO_2 extinguishers have an advantage over dry chemical extinguishers in that they leave behind no harmful residue – a good choice for an electrical fire on a computer or other delicate instrument. Note that CO_2 is a bad choice for flammable metal fires such as Grignard reagents, alkyllithiums and sodium metal because CO_2 reacts with these materials. CO_2 extinguishers are not approved for class D fires.
- **Metal/Sand Extinguishers** are for flammable metals (class D fires) and work by simply smothering the fire.

Not only is it imperative to control chemical fires as soon as possible, but two main "by-products" of these types of fires require special attention, including special handling and evacuation procedures. These by-products include the "smoke plume" and water run-off from the fire-extinguishing process. The smoke plume has the potential to pose a severe hazard to those exposed to it: chemicals in the vapor phase can be mildly to extremely toxic if inhaled, depending on the chemicals involved. Smoke inhalation is a hazard in itself, but when chemicals are part of the smoke, it can have severe negative impacts on the health of those nearby, including fire-fighting personnel and individuals not evacuated in time to prevent them from inhaling the smoke. Soot from some types of fires can also cause chemical burns on skin. Therefore, depending on the types of chemicals involved in the fire, an evacuation of the immediate area and especially of those areas down-wind should be conducted.

If water is used to fight a fire, the runoff could include chemicals or substances that pose a hazard to the environment. Therefore, the runoff should be contained to prevent it from flowing into the storm drains. Containing the water runoff from a fire is difficult but possible, especially if the special equipment to do so is available.

4.5 Earthquake-Induced Fires

Although wildland fires can be devastating, earthquake-induced fires have the potential to be the worst-case fire-suppression scenarios for a community because an earthquake typically causes multiple ignitions distributed over a broad geographic area. In addition, if fire fighters are involved with search and rescue operations, they are less available to fight fires, and the water distribution system could be impaired, limiting even further the fire suppression efforts. If earthquake-induced fires occur during strong wind conditions, the results can be far worse.

The major urban conflagrations of yesteryear in major cities were often the result of closely built, congested areas of attached buildings with no fire sprinklers, no adequate fire separations, no Fire Code enforcement, and narrow streets. In the past, fire apparatus and

water supplies were also inadequate in many large cities, and many fire departments were comprised of volunteers. Many of these conditions no longer apply to the cities of today.

Nevertheless, major earthquakes can result in fires and the loss of water supply, as it occurred in San Francisco in 1906, and more recently in Kobe, Japan in 1995. A large portion of the structural damage caused by the great San Francisco earthquake of 1906 was the result of fires rather than ground shaking. The moderately sized, M6.7 Northridge earthquake of 1994 caused 15,021 natural gas leaks that resulted in three street fires, 51 structure fires (23 of these caused total ruin) and the destruction, by fire, of 172 mobile homes. In one incident, the earthquake severed a 22-inch gas transmission line and a motorist ignited the gas while attempting to restart his stalled vehicle. Response to this fire was impeded by the earthquake's rupture of a water main; five nearby homes were destroyed. Elsewhere, one mobile home fire started when a ruptured transmission line was ignited by a downed power line. In many of the destroyed mobile homes, fires erupted when inadequate bracing allowed the houses to slip off their foundations, severing gas lines and igniting fires.

As discussed in the Seismic Hazards section of this report (Chapter 1), there are several major earthquake-generating faults that could affect the Hesperia area. Some of the faults that could cause significant ground shaking in Hesperia include the San Andreas, North Frontal, Cleghorn, Cucamonga, San Jacinto, and Helendale faults. A strong earthquake on any of these faults could trigger multiple fires and disrupt lifelines services (such as the water supply) in Hesperia. In Hesperia and in the San Bernardino National Forest to the south, an earthquake on any of these sources could also trigger other geologic hazards, such as surface fault rupture, liquefaction and landslides, that could disrupt regional water and communication services, block roads, dam drainage channels and hinder disaster response. Specifics about the estimated losses to lifelines and other services in Hesperia in the event of an earthquake are discussed further in Chapter 1.

These losses mirror the results of a study published by the California Division of Mines and Geology in 1988 (now the California Geological Survey; Toppozada and others, 1988) that identified projected damages in the Los Angeles area as a result of an earthquake on the Newport-Inglewood fault. The earthquake scenario estimated that thousands of gas leaks would result from damage to pipelines, valves and service connections. This study prompted the Southern California Gas Company to start replacing their distribution pipelines with flexible plastic polyethylene pipe, and to develop ways to isolate and shut off sections of supply lines when breaks are severe. Nevertheless, as a result of the 1994 Northridge earthquake, the Southern California Gas Company reported 35 breaks in its natural gas transmission lines and 717 breaks in distribution lines. About 74 percent of the leaks were corrosion related. Furthermore, in the aftermath of the earthquake, 122,886 gas meters were closed by customers or emergency personnel. The majority of the leaks were small and could be repaired at the time of service restoration.

History indicates that fires following an earthquake have the potential to severely tax the local fire suppression agencies, and develop into a worst-case scenario. Many factors affect the severity of fires following an earthquake, including ignition sources, types and density of fuel, weather conditions, functionality of the water systems, and the ability of firefighters to suppress the fires. Earthquake-induced fires can place extraordinary demands on fire

suppression resources because of multiple ignitions. The principal causes of earthquake-related fires are open flames, electrical malfunctions, gas leaks, and chemical spills. Downed power lines may ignite fires if the lines do not automatically de-energize. Unanchored gas heaters and water heaters are common problems, as these readily tip over during strong ground shaking (State law now requires new and replaced gas-fired water heaters to be attached to a wall or other support). Water availability in Hesperia following a major earthquake will most likely be reduced due to damage to the water distribution system — damage to the water reservoirs, damaged groundwater pumping stations, and broken water mains (see Chapter 1 – Seismic Hazards). Casualties, debris and poor access can also limit fire-fighting effectiveness. Losses resulting from two fire-after-earthquake scenarios were estimated for this report. The results of these analyses are presented in Section 1.8.4 of Chapter 1.

4.6 Summary and Recommended Programs

The San Bernardino County Department manages the fire hazard in the city of Hesperia by providing fire prevention, suppression and public education programs. The City and the County have also invested and continue to invest on infrastructure and equipment that help the Fire Department be as responsive as possible. However, the coverage area is very large, at times hindering the Fire Department's response time to emergency calls. Hesperia's ISO ratings of 5 for the city and 9 for the outlying (Summit Valley) areas reflect the Insurance Services Office's assessment that fire suppression capabilities in the city are still in need of improvement.

The southern approximately two-thirds of the city and its Sphere of Influence are mapped as having a high fire hazard. The southernmost portion of the city and its Sphere of Influence are mapped as having a very high fire hazard, whereas the northern one-third has a moderate to low fire hazard (see Plate 4-2). Different areas of the city and its Sphere are classified as Federal, State or Local Responsibility Areas. The boundaries of these regions are shown on Plate 4-2. The City of Hesperia has adopted Ordinance 2009-01 recognizing the Very High Fire Hazard Severity Zones in the Local Responsibility Area (LRA) mapped and recommended by the CDF.

Residents of and near these high and very high fire hazard areas should be encouraged to practice fire-safe procedure, including maintaining a fire-safe landscape, and keeping combustibles (such as fire wood) a safe distance away from all structures. Similarly, the City and the County should continue to enforce the weed abatement and notification program, to reduce the potential for vegetation fires to occur in vacant or poorly maintained lots.

Structure fires in the city of Hesperia represent a very small percentage of the annual emergency calls that the Fire Department receives and responds to. However, the fires that do occur in the city represent a large percent of the total annual fire losses. Therefore, programs that can be continued or implemented to reduce these losses should be encouraged.

Specifically the City and County:

- Should continue to regularly reevaluate specific fire hazard areas and adopt reasonable safety standards, covering such elements as adequacy of nearby water supplies, routes or throughways for fire equipment, clarity of addresses and street signs, and maintenance.
- Should consider encouraging owners of non-sprinklered properties, especially high-occupancy structures, to retrofit their buildings and include internal fire sprinklers. The City may consider some form of financial assistance (such as low-interest or no-interest loans) to encourage property owners to do this as soon as possible.
- Should continue to conduct emergency response exercises, including mock earthquake-induced fire-scenario exercises to prepare for the multiple ignitions that an earthquake is expected to generate. Civilians should be encouraged to participate in these exercises as much as possible also, to empower neighborhoods to be self-reliant in the face of a natural or man-made disaster. These training sessions should use the adopted emergency management systems (SEMS and NIMS).
- Should improve the adequacy of the city's water storage capacity and distribution network in the event of an earthquake. Redundant systems should be considered and implemented in those areas of the city where ground failure (as a result of liquefaction, or seismically induced settlement or slope failure) could result in breaks to both the water and gas mains, with the potential for significant conflagrations. This includes considering alternate sources of water, such as swimming pools.
- Should encourage the local gas and water purveyors to continue reviewing and retrofitting, as needed, their main distribution pipes, with priority given first to older lines, and lines located across areas susceptible to liquefaction, slope instability or other types of ground failure that may therefore be more susceptible to breakage during an earthquake.
- Conduct regular assessments of the Fire Department's response objectives, to identify those areas that, because of increasing population, will require an increase in fire department presence. Specifically, as the city's population increases, additional fire stations may be required, their locations to be selected based on population demands. Funding for the construction of these new fire stations could be supported in part by the developers of the proposed large-scale master-planned communities.

CHAPTER 5: HAZARDOUS MATERIALS MANAGEMENT

5.1 Introduction

A high standard of living has driven our increasing dependence on chemicals. Chemicals like hydrocarbon fuels that power our cars, chlorine that disinfects our drinking water, and pesticides and herbicides that help yield larger food crops are used on a daily basis and in large quantities. Because of the high demand for these types of chemicals, their storage and transportation is necessary. Within the last decades, however, scientist have discovered that exposure to many of these chemical is hazardous to human health and to the environment. In response to these concerns, which began in the late 1960s, Federal, State, and local regulations have been implemented to dictate the safe use, storage, transportation, and handling of hazardous materials and wastes. These regulations help to minimize the risk of exposure to hazardous materials by the general public.

The United States Environmental Protection Agency (herein referred to as the EPA) has defined hazardous waste as substances that may cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; that pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed; and whose characteristics can be measured by a standardized test or reasonably detected by generators of solid waste through their knowledge of their waste. Hazardous waste is also ignitable, corrosive, or reactive (explosive) (EPA 40 CFR 260.10). A material may also be classified as hazardous if it contains defined amounts of toxic chemicals. The EPA has developed a list of specific hazardous wastes that are in the forms of solids, semi-solids, liquids, and gases. Producers of such wastes include private businesses, and federal, state, and local government agencies.

The State of California defines hazardous materials as substances that are toxic, ignitable or flammable, reactive, and/or corrosive. The State also defines an extremely hazardous material as a substance that shows high acute or chronic toxicity, carcinogenity, bioaccumulative properties, is persistent in the environment, or is water reactive (California Code of Regulations, Title 22).

This chapter will address hazards associated with the presence of hazardous materials and wastes in the city of Hesperia. Various Federal and State programs that regulate the use, storage, and transportation of hazardous materials are also discussed in this chapter.

5.1.1 Hazardous Materials Releases as a Result of a Natural Disaster

Isolated unauthorized releases of hazardous materials can occur at any time, but natural disasters, such as an earthquake or flood, have the potential to cause several incidents at the same time. For example, as a result of the Northridge earthquake, 134 locations reported hazardous materials issues, 60 of which required emergency responses. The majority of these events occurred where structural damage was minimal or absent (Perry and Lindell, 1995).

A key point to remember regarding the management of hazardous materials spills in the aftermath of an earthquake is that it is substantially more difficult to do so than under non-earthquake conditions. Hazardous material response teams responding to a

release as a result of an earthquake have to deal with potential structural and non-structural problems of the buildings housing the hazardous materials, potential leaks of natural gas from ruptured pipes, and/or downed electrical lines or equipment that could create sparks and cause a fire. When two hazards with potentially high negative consequences happen coincidently, the challenges of managing each are greatly increased. During an earthquake response, hazardous material emergencies become an additional threat that must be integrated into the response management system.

5.2 Regulations Governing Hazardous Materials, and Environmental Profile of the City of Hesperia

Various Federal and State programs regulate the use, storage, and transportation of hazardous materials. These will be discussed in this chapter as they pertain to the city of Hesperia and its management of hazardous materials. The goal of the discussions presented herein is to provide information that can be used to reduce or mitigate the danger that hazardous substances may pose to Hesperia's residents and visitors, both in normal, day-to-day conditions, and as a result of a regional disaster, such as an earthquake.

Several of the existing Federal and State programs are summarized below.

5.2.1 National Pollutant Discharge Elimination System (NPDES)

"Out of sight, out of mind" has traditionally been a common approach to dealing with used motor oil, unused paint and thinner, and other hazardous substances that people dump onto the ground, or into the sewer and storm drains. What we often forget is that substances dumped onto the ground, or into the sewer, can eventually make their way into the groundwater or waterways, with the potential to contaminate our drinking water resources. In other parts of California and the United States, substances dumped into the storm drains or sewer can eventually make their way into drainages, lakes, rivers, and eventually the ocean. Contaminants in these waterways can endanger aquatic organisms and wildlife dependent on these water sources, and can impact human health and the environment.

The Clean Water Act of 1972 originally established the National Pollutant Discharge Elimination System (NPDES) to control wastewater discharges from various industries and wastewater treatment plants known as a "point sources." A point source is defined by the EPA as a discrete, easily discernible source of pollution, such as a smokestack or sewer. Then, in 1987, the Water Quality Act amended the NPDES permit system to include "nonpoint-source" (NPS) pollution. NPS pollution refers to the introduction of bacteria, sediment, oil and grease, heavy metals, pesticides, fertilizers and other chemicals into our rivers, lakes, bays and oceans. These pollutants are not released at one specific, identifiable point, but rather, from a number of points that are spread out and difficult to identify and control, such as roadways, parking lots, yards, and farms. As a result of rain and urban runoff, these pollutants enter the storm drains, from where they are ultimately conveyed to the area's water bodies and the ocean. Nonpoint sources of pollution are now thought to account for most of the water quality problems in the United States. Therefore, strict enforcement of this program at the local level,

with everybody doing his or her part to reduce nonpoint source pollution, can make a significant difference.

The NPDES program is handled at the State-level by the California State Water Resources Control Board, with regional offices of the Board overseeing implementation and enforcement of the program at the local level. The type of NPDES permits issued depends on the size of the community. In the case of Hesperia, the California State Water Resources Control Board issued a NPDES General Permit (No. CAS000004) and an accompanying Fact Sheet for regulated small Municipal Separate Storm Sewer Systems (MS4s). The State Board has elected to utilize the General Permit approach for implementing the United States Environmental Protection Agency (USEPA) Phase II Storm Water requirements for small MS4s rather than regional permits, which have been the norm for Phase I MS4 permits. With the General Permit approach, the SWRCB writes a single statewide permit and the individual Regional Boards manage and enforce the permit for agencies subject to the permit within their individual jurisdictions. Accordingly, the Lahontan Regional Water Quality Control Board oversees the regulated small MS4s within the Mojave Watershed, governing the cities of Hesperia, Victorville, and the Town of Apple Valley. The Lahontan Regional Water Quality Control Board office is located at 14440 Civic Center Drive, in Victorville 92392. Their general telephone number is (760) 241-6583. For additional information regarding this program, refer to http://www.epa.gov/npdes/stormwater/menuofbmps.

Under NPDES, the local regulator is responsible for the following control measures:

- Public education and outreach on storm water impacts,
- Public involvement/participation,
- Illicit discharge detection and elimination,
- Construction of site storm-water runoff control,
- Post-construction storm-water management in new development and redevelopment, and
- Pollution prevention and good housekeeping for municipal operations.

Specific programs that cities and counties typically implement in support of their NPDES permits include:

- Regular maintenance of public rights-of-way, including street sweeping and litter collection, and maintenance of the existing storm drain facilities;
- Implementation of spill response procedures;
- Periodic screening of water samples collected from the local streams and storm drain system to test for specific contaminants;
- Adoption and enforcement of an ordinance prohibiting the discharge of pollutants onto the ground surface, and into the streams and local storm drain system;

- Plan review procedures to ensure that unauthorized connections to the storm drain and sewer systems are not made; and
- Public education efforts to inform residents about storm water quality. In Hesperia, these efforts typically include publishing the City's water quality report every September 15th that summarizes and assesses the NPDES program activities and stormwater pollution prevention measures implemented by the City during the previous year. Other educational efforts often utilized by cities and counties include holding public meetings, conducting presentations at businesses and schools, and meeting with citizens one-on-one to discuss measures that can be taken by businesses and individuals to reduce the potential for contamination of the local waters.

In conformance with the Federal requirements listed above, one of the major tasks of San Bernardino County is to educate the local population about keeping the water that flows into our rivers and ocean clean by eliminating discharges of hazardous materials into storm drains and other point sources. Hesperia, Victorville, and the Town of Apple Valley, in collaboration with San Bernardino County, have accomplished this by developing a Storm Water Management Program (SWMP). The program pools together staff and resources to prepare informational materials that are distributed to the public, schools and businesses; conduct workshops and community events; and sponsor free presentations to civic/rotary/group organization to discuss the prevention of stormwater pollution. Through this program, the County and City also prepare and place displays at local libraries, in county and city buildings, and booths in local events. Information regarding this program can be found at http://www.ci.hesperia.ca.us/article. cfm?id=246.

The Regional Board also monitors development projects during the construction stage. Specifically, dischargers whose projects will disturb one or more acres of soil, or whose projects are less than one acre in size but that are part of a larger development that in total will disturb one or more acres of land are required to obtain a General Permit for Discharges of Storm Water Associated with Construction Activity. Construction activity includes clearing, grading and disturbances such as stockpiling or excavation. For additional information and copies of the appropriate forms for this program refer to http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

5.2.2 Comprehensive Environmental Response, Compensation and Liability Act

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) is a regulatory or statute law developed to protect the water, air, and land resources from the risks created by past chemical disposal practices. This act is also referred to as the Superfund Act and contains the National Priority List (NPL) of sites, which are referred to as Superfund sites. According to the EPA, there are no Superfund sites in the Hesperia area; however, the EPA database lists one CERCLIS site in Hesperia (see Table 5-1). The approximate location of this site in Hesperia is shown on Plate 5-1. The EPA database did not list the specific contaminants, if any, found at this site, but states that no site assessment work is needed at this site.

Table 5-1: CERCLIS Sites in the Hesperia Area

Facility Name	Facility Address	EPA ID	Status
Hesperia Drug Lab Fire	16395 Allthorn Street	CAN000906019	Not on NPL

Source: http://www.epa.gov/superfund/sites/cursites/index.htm

5.2.3 Emergency Planning and Community Right-To-Know Act (EPCRA)

The primary purpose of the Federal Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local agencies. These reports help communities prepare to respond to chemical spills and similar emergencies.

The EPA maintains and publishes a database that contains information on toxic chemical releases and other waste management activities that are reported annually by certain industry groups and federal facilities. The database is referred to as the Toxics Release Inventory (TRI), and it was first established under the EPCRA and expanded by the Pollution Prevention Act of 1990. EPCRA's power has allowed for the mandate that Toxic Release Inventory (TRI) reports be made public. TRI reports provide accurate information about potentially hazardous chemicals and their uses in an attempt to give the community more power to hold companies accountable and to make informed decisions about how such chemicals should be managed.

Section 3131 of EPCRA requires manufacturers to report releases to the environment of more than 600 designated toxic chemicals. These reports are submitted to the EPA and State agencies. The EPA compiles these data into an on-line, publicly available national digital TRI. These data are readily available on the EPA website at http://www.epa.gov/tri/. The facilities are required to report on releases of toxic chemicals to the air, soil, and water. They are also required to report on off-site transfers of waste for treatment or disposal at separate facilities. Pollution prevention measures and activities and chemical recycling must also be reported. All reports must be submitted on or before July 1 of every year and must cover all activities that occurred at the facility during the previous year. Reporting by facilities is based on the following factors:

- If the facility has ten or more full-time employees;
- If the facility manufactures or processes over 25,000 pounds of approximately 600 designated chemicals, or 28 chemical categories specified in the regulations, or uses more than 10,000 pounds of any designated chemical or category; and
- Engages in certain manufacturing operations in the industry groups specified in the U.S. Government Standard Industrial Classification Codes (SIC) 20 through 39; or
- If the facility is a Federal facility.

There are three (3) TRI facilities in Hesperia (see Table 5-2) listed in the most recent EPA database of 2008 (released to the public in December 2009), in addition to one facility in Victorville that is located about ½-mile from Hesperia. The EPA web site (http://www.epa.gov/tri/) should be reviewed periodically for updates to this information. The approximate location of these facilities is shown on Plate 5-1.

Table 5-2: Toxic Release Inventory Facilities in the Hesperia Area

Facility Name, Address	TRI ID	Chemicals (total on-site and off-site disposal or other releases in pounds)
AllTech Associates Inc. 17434 Mojave Street, Hesperia	92345VYDCG17434	mercury (1), methanol (4,057), toluene (994)
3M Oak Hills 8981 State Highway 395, Hesperia	92345TPCNC8981S	Di(2-ethylhexyl) phthalate (70), diisocyanates (64)
Unlimited Products 8770 Caliente Street, Hesperia	92345NLMTD8770C	Styrene (1,937)
Sherwin-Williams Co. 12401 Industrial Blvd., Victorville	90745LDQKR21243	1,2,4-trinmethylbenzene (125), certain glycol ethers (22), copper compounds (1,080), ethylbenzene (259), methanol (1,373), methyl isobutyl ketone (696), n-butyl alcoho (242), toluene (368), xylene (mixed isomers) (1,437)

Source: U.S. EPA, 2009, TRI On-site and Off-site Reported releases in Hesperia, California (Zip Codes 92340, 92344 and 92345 for Hesperia; and 92392, 92393 and 92394 for Victorville); List of EPA-regulated Facilities in Envirofacts (http://www.epa.gov/triexplorer/facility.htm).

5.2.4 Resources Conservation and Recovery Act

The Resources Conservation and Recovery Act (RCRA) is the principal Federal law that regulates the generation, management and transportation of waste materials. Hazardous waste management includes the treatment, storage, or disposal of hazardous waste. Treatment is defined as any process that changes the physical, chemical, or biological character of the waste to make it less of an environmental threat. Treatment can include neutralizing the waste, recovering energy or material resources from the waste, rendering the waste less hazardous, or making the waste safer to transport, dispose of, or store. Storage is the holding of waste for a temporary period of time. The waste is treated, disposed of, or stored at a different facility at the end of the storage period. Disposal is the permanent placement of the waste into or on the land. Disposal facilities are usually designed to contain the waste permanently and to prevent the release of harmful pollutants to the environment.

The EPA lists two (2) registered transporters of hazardous waste with addresses in Hesperia, as shown on Table 5-3 below. These companies, and others registered elsewhere, including in neighboring Victorville and Apple Valley, are likely to transport hazardous waste through Hesperia, using Interstate 15, a prescribed route for all types of non-radioactive hazardous materials (NRHM) and Class 7 Highway Route Controlled Quantity (HRCQ) radioactive materials since 1992, and Toxic Inhalation Hazard (TIH) materials since 1994 (National Hazardous Materials Route Registry).

Table 5-3: Transporters of Hazardous Waste with Addresses in Hesperia

Name	Address
RLT Enterprises	17525 Alder Street #12/13, Hesperia 92345
Wickerink Property Preservation	15555 Main Street #4, Hesperia 92345

Source: California Department of Toxic Substances Control
(http://www.dtsc.ca.gov/database/Transporters/trans_cnty.cfm)

Many different types of businesses can be producers of hazardous waste. Small businesses like dry cleaners, auto repair shops, medical facilities or hospitals, photo processing centers, and metal plating shops are usually generators of small quantities of hazardous waste. The EPA defines a small quantity generator as a facility that produces between 100 and 1,000 kilograms (Kg) of hazardous waste per month (approximately equivalent to between 220 and 2,200 pounds, or between 27 and 275 gallons).

Since many of these facilities are small, start-up businesses that come and go, the list of small-quantity generators in a particular area changes significantly over time. Often, a facility remains, but the name of the business changes with new ownership. For this reason, these businesses are not listed in this report. However, as of January 2010, there were approximately 46 small-quantity generators of hazardous materials in the Hesperia area (see http://www.epa.gov/enviro/html/rcris/ – search for small quantity generators under the RCRA Info database). For specific, up-to-date information and location of small-quantity generators in the city, contact the San Bernardino County Fire Department, Hazardous Materials Division (http://www.sbcfire.org/hazmat/cesqg.asp).

Larger businesses are sometimes generators of large quantities of hazardous waste. These include chemical manufacturers, large electroplating facilities, and petroleum refineries. The EPA defines a large-quantity generator as a facility that produces over 1,000 Kg (2,200 pounds or about 275 gallons) of hazardous waste per month. Large-quantity generators are fully regulated under RCRA. The EPA identifies two large-quantity generators in the city of Hesperia as of 2007 (National Biennial RCRA Hazardous Waste Report; http://www.epa.gov/enviro/html/brs/brs_query.html). These facilities are shown on Table 5-4 below, and their general locations are shown on Plate 5-1. Additional information on these permitted sites is available at http://www.epa.gov/enviro/html/rcris/. Please note that these lists change every other year; therefore, to determine whether the list has been updated, and obtain a more recent list, if available, contact the San Bernardino County Fire Department, Hazardous Materials Division (http://www.sbcfire.org/hazmat/cesqg.asp), or refer to the EPA website.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997
Source: City of Hesperia, 2006.

N

W E

S

0 7000 14000 Feet

0 2000 4000 Meters

Scale: 1:84,000

Explanation

- Super Fund (CERCLIS) Site
- EPA-Registered Large Quantity Hazardous Waste Generator (LQG) Facility
- Toxic Release Inventory (TRI) Facility
- Leaking Underground Storage Tank (LUST) Site
- Permited (UST) Site
- Small Quantity Hazardous Waste Generator (SQG) Facility
- Approximate Location of Gas Transmission Pipeline
- Approximate Location of Hazardous Liquid Pipeline
- Hazardous Material Drop Off Site
- Landfill
- Hesperia City Limit
- Hesperia Sphere of Influence

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Date: February 2010

Hazardous Materials Sites
in and near Hesperia, California

Plate 5-1

Table 5-4: EPA-Registered Large-Quantity Generator (LQG) Facilities in Hesperia

Facility Name, Address	EPA ID	RCRA Tons Generated (Compounds)
The Separations Group (also known as AllTech Associates, Inc.) 17434 Mojave Street	CAR000089573	63 (Mercury, methanol, toluene)
High Tech Etch* 17229 Lemon Street, Bldg. E, Suite 4	CAD983661885	12.7 (not listed; corrosive waste)

Source: List of Large Quantity Generators in the United States: The National Biennial RCRA Hazardous Waste Report (2007 data extracted January 30, 2010). * High Tech Etch is in some lists identified as a Small-Quantity Generator.

5.2.5 Hazardous Materials Disclosure Program

Both the Federal government (Code of Federal Regulations, EPA, SARA and Title III) and the State of California (California State Health and Safety Code, Division 20, Chapter 6.95, Sections 25500–25520; California Code of Regulations, Title 19, Chapter 2, Sub-Chapter 3, Article 4, Sections 2729-2734) require all businesses that handle more than a specified amount of hazardous materials or extremely hazardous materials, termed a reporting quantity, to submit a Hazardous Materials Business Plan to its local Certified Unified Program Agency (CUPA). The CUPA with responsibility for the City of Hesperia is the San Bernardino County Fire Department, Hazardous Materials Division (SBCFD-HMD).

According to the SBCFD-HMD guidelines, the preparation, submittal and implementation of a business plan is required by any business that handles a hazardous material or a mixture containing a hazardous material in quantities equal to, or greater than, those outlined below:

- All hazardous waste generators, regardless of quantity generated.
- Any business that uses, generates, processes, produces, treats, stores, emits, or discharges a hazardous material in quantities at or exceeding:
  - 55 gallons or more of a liquid;
  - 500 pounds or more of a solid; or
  - 200 cubic feet (compressed) of gas at any one time in the course of a year.
- Any business that handles, stores, or uses Category (I) or (II) pesticides, as defined by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), regardless of amount.
- Any business that handles Department of Transportation (DOT) Hazard Class 1 (explosives, found in Title 49 of the Code of Federal Regulations).
- Any business that handles extremely hazardous substances in quantities exceeding the threshold planning quantity, as listed in Title 40 of the Federal Code of Regulations, Part 355.
- Any business subject to the EPCRA (also known as SARA Title III; see Section 5.2.2 above). EPCRA generally includes facilities that handle hazardous substances above threshold planning quantities. However, there are some exceptions, such as

retail gas stations with up to 75,000 gallons of gasoline, or 100,000 gallons of diesel fuel in underground storage tanks that meet the 1998 upgrade requirements.

- Any business that handles radioactive materials in quantities for which an emergency plan is required pursuant to Parts 30, 40 or 70 of Chapter 10, Title 10, Code of Federal Regulations (CFR), or equal to or greater than the amounts specified above, whichever amount is less.

Within 30 days of any one of the following events, businesses are required to submit an amendment to their business plan to the SBCFD-HMD:

- A 100-percent or more increase in the quantity of a previously disclosed hazardous material;
- Any handling of a previously undisclosed hazardous material subject to the inventory requirements of this chapter;
- Change of business address;
- Change of ownership; or
- Change of business name.

Business plans must include an inventory of the hazardous materials at the facility. If no changes have been made to the facility's inventory, a written certification suffices for the update; however, if changes have been made, those changes must be submitted to the SBCFD-HMD. Businesses are required to update their business plan at least once every three years and the chemical inventory portion of their plan every year. They must certify in writing to the SBCFD-HMD that a review was conducted and all necessary changes were made. A copy of all changes must be submitted as part of the certification. Also, business plans are required to include emergency response plans and procedures to be used in the event of a significant or threatened significant release of a hazardous material. These plans need to identify the procedures to follow for immediate notification to all appropriate agencies and personnel of a release, identification of local emergency medical assistance appropriate for potential accident scenarios, contact information for all company emergency coordinators of the business, a listing and location of emergency equipment at the business, an evacuation plan, and a training program for business personnel. Additional information regarding business plans and CUPA forms in the city of Hesperia can be obtained from the San Bernardino County Fire Department.

Business plans are designed to be used by responding agencies, such as the SBCFD-HMD during a release to allow for a quick and accurate evaluation of each situation for appropriate response. The SBCFD-HMD currently reviews submitted business plans and updates. Businesses that handle hazardous materials are required by law to provide an immediate verbal report of any release or threatened release of hazardous materials if there is a reasonable belief that the release or threatened release poses a significant present or potential hazard to human health and safety, property or the environment. Fines of up to $25,000 per day and one year in prison may be awarded to an individual or business if a release or threatened release is not reported. If a release involves a hazardous substance listed in Title 40 of the Code of Federal

Regulations in an amount equal to or exceeding the reportable quantity for that material, a notice must be filed with the California Office of Emergency Services within 15 days of the incident.

The SBCFD-HMD is charged with the responsibility of conducting compliance inspections of regulated facilities in San Bernardino County. Regulated facilities are those that handle hazardous materials, generate or treat a hazardous waste and/or operate an underground storage tank. Specialists are assigned countywide to address the wide variety of complex issues associated with hazardous substances. For example, all new installations of underground storage tanks require an inspection, along with the removal, under strict chain-of-custody protocol, of the old tanks (see Section 5.3 below).

5.2.6 Hazardous Materials Incident Response

There are thousands of different chemicals available today, each with its own unique physical characteristics; what might be an acceptable mitigation practice for one chemical could be totally inadequate for another. Therefore it is essential that agencies responding to a hazardous material release have as much available information as possible regarding the type of chemical released, the amount released, and its physical properties to effectively and quickly evaluate and contain the release. The EPA-required business plans are an excellent resource for this type of information. Knowledgeable employees present onsite can also provide information.

In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA). Title III of this legislation requires that each community establish a Local Emergency Planning Committee (LEPC) that is responsible for developing an emergency plan to prepare for and respond to chemical emergencies in their community.

This emergency plan must include the following:

- An identification of local facilities and transportation routes where hazardous materials are present;
- The procedures for immediate response in case of an accident (this must include a community-wide evacuation plan);
- A plan for notifying the community that an incident has occurred;
- The names of response coordinators at local facilities; and
- A plan for conducting exercises to test the plan.

The plan is reviewed by the State Emergency Response Commission (SERC) and publicized throughout the community. The LEPC is required to review, test, and update the plan each year.

The San Bernardino County's Office of Emergency Services (OES), the San Bernardino County Fire Department and the City of Hesperia's Office of Emergency Services are responsible for coordinating hazardous material and disaster preparedness planning and appropriate response efforts with City departments, as well as local and state

agencies. The goal is to improve public and private sector readiness, and to mitigate local impacts resulting from natural or man-made emergencies. The OES is a branch of the San Bernardino County Fire Department that deals with the planning for and response to the natural and technological disasters in the county and in the city of Hesperia, whereas the Hazardous Materials Division (HMD) of the San Bernardino County Fire Department deals with the coordination and inspection of hazardous materials facilities in the city. The City and the County Fire Department have developed a Community Emergency Response Training program (CERT) to help Hesperia's citizens and visitors prepare for potential disasters; this CERT course is taught by the Fire Department with assistance from local businesses. The CERT course, which is taught over a several sessions (for a total of 24 hours), is certified by the Federal Emergency Management Agency (FEMA) and the State OES. For more information on the CERT program, contact the City's Emergency Preparedness Coordinator at (760) 947-1245.

5.2.7 Hazardous Material Spill/Release Notification Guidance

All significant spills, releases, or threatened releases of hazardous materials must be immediately reported. **To report all significant releases or threatened releases of hazardous materials, first call 911** (or the local emergency response agency), and then call the Governor's OES Warning Center at 1-800-852-7550.

This guidance summarizes pertinent emergency notification requirements and applies to all significant releases of hazardous materials. Requirements for immediate notification of all significant spills or threatened releases cover: Owners, Operators, Persons in Charge, and Employers. Notification is required regarding significant releases from facilities, vehicles, vessels, pipelines and railroads.

State notification requirements for a spill or threatened release include (at a minimum):

- Identity of caller,
- Location, date and time of spill, release, or threatened release,
- Substance and quantity involved,
- Chemical name (if known; also report whether or not chemical is extremely hazardous), and
- Description of what happened.

Federal notification requires additional information for spills (CERCLA chemicals) that exceed Federal-reporting requirements. This information includes:

- Medium or media impacted by the release,
- Time and duration of the release,
- Proper precautions to take,
- Known or anticipated health risks, and
- Name and phone number for more information.

In addition, all releases that result in injuries, or workers harmfully exposed, must be immediately reported to Cal/OSHA (CA Labor Code §6409.1 (b)). For additional reporting requirements, also refer to the Safe Drinking Water and Toxic Enforcement Act of 1986, better known as Proposition 65, and §9030 of the California Labor Code.

The California Accidental Release Prevention Program (CalARP) became effective on January 1, 1997 in response to Senate Bill 1889. The CalARP replaced the California Risk Management and Prevention Program (RMPP). Under the CalARP, the Governor's Office of Emergency Services must adopt implementing regulations and seek delegation of the program from the EPA. The CalARP aims to be proactive and therefore requires businesses to prepare Risk Management Plans (RMPs), which are detailed engineering analyses of:

- The potential accident factors present at a business, and
- The mitigation measures that can be implemented to reduce this accident potential.

In most cases, local governments have the lead role in working directly with businesses in this program. The County of San Bernardino is designated as the Administering Agency for hazardous materials in the city of Hesperia.

5.3 Leaking Underground Storage Tanks (LUSTs)

Leaking underground storage tanks (USTs) have been recognized since the early 1980s as the primary cause of groundwater contamination by gasoline compounds and solvents. In California, regulations aimed at protecting against UST leaks have been in place since 1983, one year before the Federal Resource Conservation and Recovery Act (RCRA) was amended to add Subtitle I requiring UST systems to be installed in accordance with standards that address the prevention of future leaks. The Federal regulations are found in the Code of Federal Regulations (CFR), parts 280-281. The State law and regulations are found in the California Health and Safety Code, Division 20, Chapter 6.7, and in the California Code of Regulations Title 23, Division 3, Chapter 16, commonly referred to as the "Underground Tank Regulations." Federal and State programs include leak reporting and investigation regulations, and standards for clean up and remediation. UST cleanup programs are available to fund the remediation of contaminated soil and ground water caused by leaking tanks. California's program is more stringent than the Federal program, requiring that all tanks be double walled, and prohibiting gasoline delivery to non-compliant tanks. The State Water Resources Control Board (SWRCB) has been designated the lead regulatory agency in the development of UST regulations and policy.

Older tanks are typically single-walled steel tanks. Many of these have leaked as a result of corrosion and detached fittings. As a result, the state of California required the replacement of older tanks with new double-walled, fiberglass tanks with flexible connections and monitoring systems. UST owners were given a ten-year period to comply with the new requirements, and the deadline came due on December 22, 1998. However, many UST owners did not act by the deadline, so the State granted an extension for the Replacement of Underground Storage Tanks (RUST) program to January 1, 2002. Nevertheless, in that RUST grant funds are still

available for the 2009-2010 period indicates that there are still UST owners, typically small, independent operators, that have yet to comply with the RUST requirements. RUST grants, ranging from $3,000 to $50,000 (maximum per person or entity), can be used to finance up to 100% of the costs to upgrade USTs by installing containment sumps, double-walled piping, dispensers, under-dispenser containment boxes or pans, electronic monitoring systems, and enhanced vapor recovery systems. The funds can also be used to conduct enhanced leak detection tests. For additional information on this program, refer to http://www.swrcb.ca.gov/water_issues/programs/ustcf/rust.shtml.

The California legislature established the Barry Keene Underground Storage Tank Cleanup Fund Act of 1989 to provide a means for petroleum UST owners and operators to meet the Federal and state requirements, and to assist small businesses and individuals by providing reimbursement for unexpected and catastrophic expenses associated with the cleanup of leaking petroleum USTs. The fund also provides money to the Regional Water Quality Control Boards to cleanup abandoned sites or abate emergency situations that pose a threat to human health, safety and the environment as a result of a petroleum release from a UST (http://www.swrcb.ca.gov/water_issues/programs/ustcf/). Revenues for the Fund are generated by a storage fee for every gallon of petroleum product placed into a UST. The State Board of Equalization collects these fees on a quarterly basis from owners of active USTs. In the last few years, the fund has experienced a cash shortage. As a result, in May 2009, the State Water Resources Control Board passed Resolution No. 2009-0042 that defines specific actions that the Regional Boards are to take to improve administration of the UST Cleanup Fund and the UST Cleanup Program. The most significant decision in this resolution is that the Regional Boards are to review the open UST cleanup cases and identify those where continued investigation, remediation or monitoring poses little to no environmental benefit. Those sites open for more than five years that are found to not pose a threat to water quality or sensitive receptors, will be recommended for closure.

The California Regional Water Quality Control Board (CRWQCB), in cooperation with the Office of Emergency Services, maintains an inventory of leaking underground storage tanks (LUSTs) in a Statewide database called GeoTracker, which is available at http://geotracker.swrcb.ca.gov/. The database, as of January 2010, lists twelve (12) reported LUST cases in Hesperia. (A thirteenth site, referred to as Hayward Lumber, is incorrectly located in Hesperia. Officials from the San Bernardino County Hazardous Materials Division have acknowledged that this site is not located in the City.) All twelve LUSTs correctly assigned to Hesperia (see Table 5-5 below and Plate 5-1) have been remediated; therefore additional actions, in the form of monitoring, testing, and remediation, are not necessary. Please note, however, that additional leaks may be reported, as there are at least 31 permitted underground storage tanks in the city. The State's GeoTracker list should be referenced at least bi-annually to obtain the most current information possible on leaking underground storage tanks in Hesperia.

With the exception of one case that impacted groundwater not used for drinking purposes (Lake Silverwood SRA), all other cases listed in Table 5-5 reportedly impacted the surrounding soil only. Information on the LUST sites in Hesperia can be obtained from the State's CRWQCB website http://geotracker.swrcb.ca.gov/.

Table 5-5: Leaking Underground Storage Tanks Reported in the Hesperia Area

Site Name	Address	State Case No.	Case Type	Status, Contaminant	Report Date
Affordable RV	11854 Mariposa Rd.	6B3601032T	S	8, D	Case Closed: 24-Oct-04
Arco AM/PM	16815 Main Street	6B3600998T	S	8, G	Case Closed: 21-Aug-01
Cedar Dam Maintenance Station	16051 Highway 173	T0607100851	S	8, G	Case Closed: 28-Sept.-1995
Circle K #1034	15853 Main Street	6B3600186T	S	8, G	Case Closed: 20-Jan.-2010
Firestone	17320 Main Street	6B3600254T	S	8, O	Case Closed: 12-Aug-87
Goodspeed Auto Fuel Systems	9269 Santa Fe Avenue	6B3601037T	S	8, D&G	17-Aug-05 Case Closed: 15-Dec-06
Goodyear Tire & Rubber	15787 Main Street	6B3600799T	S	8, O	27-Jan-97 Case Closed: 11-Aug-08
Hesperia Towing	9531 Santa Fe Street	6B3600471T	S	8, G	9-May-91 Case Closed: 4-Jun-09
Lake Silverwood SRA	14651 Cedar Circle	6B3600815T	O	8, G	Case Closed: 12-Jul-02
Shell Service Station	13105 W. Main Street	6B3600208T	S	8, G	15-Aug-90 Case Closed: 20-Nov-08
Timothy Lane	8685 US Hwy. 395	6B3600962T	S	8, G	Case Closed: 01-Jul-99
US Rentals	11612 Mariposa Road	6B3600798T	S	8, D	24-Jan-97 Case Closed: 11-Aug-08

Source: GeoTracker (http://geotracker.swrcb.ca.gov/)

Abbreviations Used for Case Type: **S** = Soil contaminated, groundwater not impacted; **O** = Other Groundwater, uses other than drinking water; **W** = Groundwater impacted. **Abbreviations Used for Status:** **8** = Case Closed. **Abbreviations Used for Contaminant: G** = Gasoline; **D** = Diesel; **O** = Oil.

5.4 Drinking Water Quality

Most people in the United States take for granted that the water that comes out of their kitchen taps is safe to drink. In many areas, this is true, thanks to the efforts of hundreds of behind-the-scene individuals that continually monitor the water supplies for contaminants, in accordance with the drinking water standards set by the EPA. Primary authority for EPA water programs was established by the 1986 amendments to the Safe Drinking Water Act (SDWA) and the 1987 amendments to the Clean Water Act (CWA).

The National Primary Drinking Water Standard protects drinking water quality by limiting the levels of specific contaminants that are known to occur or have the potential to occur in water and can adversely affect public health. All public water systems that provide service to 25 or more individuals are required to satisfy these legally enforceable standards. Water purveyors

must monitor for these contaminants on fixed schedules and report to the EPA when a Maximum Contaminant Level (MCL) has been exceeded. MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. Drinking water supplies are tested for a variety of contaminants, including organic and inorganic chemicals (minerals), substances that are known to cause cancer (carcinogens), radionuclides (such as uranium and radon), and microbial contaminants. The contaminants for which the EPA has established MCLs are listed at http://www.epa.gov/safewater/mcl.html. Changes to the MCL list are typically made every three years, as the EPA adds new contaminants or, based on new research or new case studies, revised MCLs for some contaminants are issued.

One of the contaminants checked for on a regular basis is the coliform count. Coliform is a group of bacteria primarily found in human and animal intestines and wastes. These bacteria are widely used as indicator organisms to show the presence of such wastes in water and the possible presence of pathogenic (disease-producing) bacteria. Pathogens in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk to infants, young children, and people with severely compromised immune systems. One of the fecal coliform bacteria that water samples are routinely tested for is Escherichia coli (E. coli). To fail the monthly Total Coliform Report (TCR), the following must occur:

- For systems testing more than 40 samples, more than five percent test positive for Total Coliform, or
- For those systems testing less than 40 samples, more than one sample test positive for Total Coliform.

Drinking water is provided to the residents of Hesperia by the Hesperia Water District, although many residents have their own water wells on their property and are not tied to the main water system. Hesperia Water District's water comes from a network of 14 water wells located throughout the city. According to the EPA Safe Drinking Water Information System Violation Report, available at www.epa.gov/enviro/html/sdwis/sdwis_ov.html, two health violations have been reported for the City's water system since 1993, when records were first kept. The first incident occurred in September 1999 and was a non-significant monitoring violation for Total Coliform in which sampling was not conducted in a timely manner. The second incident occurred in February 2005 and was a health-based violation in which the concentration for Total Coliform exceeded the MCL. Although a public water system strives not to exceed a MCL for any contaminant, the fact this has occurred only once since 1993 is a particularly good record: the EPA indicates that in 2005, the last fiscal year for which the EPA has complete data, 24 percent of all water purveyors had a reporting/monitoring violation, 6.1 percent reported a MCL violation, and 1.5 percent reported a treatment technique violation.

A contaminant that local water agencies are now testing for is perchlorate. Perchlorates are negatively charged molecules that are highly persistent in the environment, lasting decades under typical groundwater and surface conditions. Perchlorate salts are used extensively in several industries. For example, ammonium perchlorate is used as a booster or oxidant for solid fuel powering rockets and missiles, in explosives, and for chemical processes and pyrotechnics. Ammonium perchlorate typically constitutes 60 to 75 percent of missile propellant and about 70 percent of space shuttle rocket motors. Potassium perchlorate is also

used as a solid rocket fuel oxidizer, and in flares and pyrotechnics. Sodium perchlorate is used as a precursor to potassium and ammonium perchlorate and in explosives. Magnesium perchlorate is used in military batteries (Rogers, 1998). Perchlorate salts are used in automobile air bags, as a component of air bag inflators, and in nuclear reactors and electronic tubes. Other commercial and industrial uses of perchlorate salts include: as additives in lubricating oils; as fixatives (mordants) for fabrics and dyes, in the production of paints and enamels, tanning and finishing of leathers; electroplating; aluminum refining; and the manufacture of rubber (Siddiqui et al., 1998).

Humans exposed to perchlorate are likely to absorb this compound primarily through ingestion, either by drinking water with perchlorate, or possibly by ingesting produce (such as lettuce or other vegetables that store water) that has been irrigated with water containing perchlorate. Although studies indicate that most ingested perchlorate is eliminated rapidly in the urine without being metabolized (Eichler and Hackenthal, 1962; Anbar et al., 1959), small amounts of perchlorate can displace iodide in the thyroid gland. In adults, this can lead to hypothyroidism and goiter (enlarged thyroid). Symptoms and effects of hypothyroidism include depression and slow metabolism. In children, the thyroid plays a major role in proper development. Impairment of thyroid function in expectant mothers and newborns can result in delayed development and decreased learning capability. Even temporary disruptions in thyroid function can cause permanent physical and mental impairment, including mental retardation, speech impairments, deafness and/or mutism, impaired fine motor skills, delayed reflexes and gait disturbances.

In 2004, the California's Office of Environmental Health Hazard Assessment (OEHHS) established a public health goal (PHG) of 6.0 micrograms per liter (µg/L) for perchlorate (www.dhs.ca.gov/ps/ddwem/chemicals/perchl/perchlorateMCL.htm). Effective October 2007, perchlorate became a regulated drinking water contaminant in California, with a maximum contaminant level (MCL) of 6 µg/L. Perchlorate at concentrations between 6.8 and 8.8 µg/L was detected in three of Hesperia Water District water wells tested in 2006 (http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Perchlorate.aspx). Regular monitoring of these wells is required to determine whether these tests were anomalous, or whether these wells are indeed impacted and need to be remediated. Please note that the drinking water provided to the community by the Hesperia Water District reportedly does not contain perchlorate, as shown on both the 2007 and 2008 drinking water quality Consumer Confidence Reports issued by the District. For additional and/or the latest information regarding the quality of the drinking water provided by the Water District, refer to http://www.cityofhesperia.us/index.aspx?nid=496.

5.5 Household Hazardous Waste and Recycling

According to FEMA (1999), most victims of chemical accidents are injured at home. These accidents usually result from ignorance or carelessness in using flammable, combustible or corrosive materials. This is not surprising considering that households use environmentally significant quantities of hazardous materials. For example, in an average city of 100,000 residents, 23.5 tons of toilet bowl cleaner, 13.5 tons of liquid household cleaners, and 3.5 tons of motor oil are discharged into its city drains each month (http://www.fema.gov/hazard/hazmat/backgrounder.shtm).

San Bernardino County and the City of Hesperia have adopted a Household Hazardous Waste and Oil-Recycling program free to residents, in accordance with the California Integrated Solid Waste Management Act of 1989 (AB 939). **The local drop-off facility is located at 17443 Lemon Street** and it is open Tuesdays and Thursdays (9:00 am to 1:00 pm) and Saturdays from 9:00 am to 3:00 pm (see the City's website for more information http://www.ci.hesperia.ca.us/)**.** Employees who have been trained in hazardous waste handling and emergency response procedures operate the facility. A variety of household toxics are accepted. Acceptable wastes include used oil filters, various kinds of batteries including vehicle batteries, antifreeze, water- and oil-based paints, and other similar chemicals. Information about the collection center can be obtained from Hesperia's website (http://www.cityofhesperia.us/index.aspx?NID=138) or the Household Hazardous Waste facility at (800) 645-9228. You can also contact the San Bernardino County Fire Department Hazardous Materials Division by calling (909) 382-5401 or (800) OILY-CAT (645-9228). Free curbside service is available for senior citizens and disabled residents. The County also sponsors site collection services for Conditionally Exempt Small-Quantity Generators (CESQG) who are not able to take their waste to the collection site.

The City of Hesperia has a series of programs designed to reduce the amount of waste that is taken to the County's landfills. These waste reduction and recycling programs include curb-side service for collecting grass and composting material, implementing recycling and reuse of construction and demolition materials, collecting and recycling used tires (free service), and recycling unwanted holiday paper, boxes and Christmas trees. Information on the City's waste reduction and recycling programs can be obtained at the following web address: http://www.ci.hesperia.ca.us/, or by calling Advance Disposal, the City's local trash hauler, at (760) 244-9773.

There are no active landfills in the Hesperia area. Solid waste generated in Hesperia is collected by Advanced Disposal, Hesperia's trash hauler and taken to their Material Recovery Facility (MRF). Here the waste is separated from the recyclables before it is taken to a landfill. The Hesperia Sanitary Landfill (Class III Landfill) at 5500 Hesperia Dump Road (also listed as on C Street, south of Community) was closed in 2005. Semi-annual testing of soil-pore gas samples indicates that volatile organic compounds in the landfill gas have not impacted the groundwater at this site (GeoLogic Associates, 2009). The Shaharold Mine at 10730 E Avenue, in Hesperia, is included in the GeoTracker (2009) database as a land disposal site that has been open since 1965, but no site history or cleanup status is provided for this facility.

5.6 Oil Fields

The map "Oil, Gas, and Geothermal Fields in California, 2001" published by the California Department of Conservation, Division of Oil and Gas shows that no oil fields are present or have been present in Hesperia. The map is available in pdf format from the Division of Oil and Gas website at: www.consrv.ca.gov/dog/. There are no known reservoirs of natural gas or petroleum under or near the city of Hesperia, so issues associated with the development and redevelopment of oil fields (such as oil-impacted soils that need to be treated or disposed of offsite, or the proper re-abandonment of oil wells, or methane production) do not apply to the Hesperia area.

5.7 Hazardous Materials Incidence Response along Transportation Routes and Due to Pipeline Failures

Interstate I-15 and Highway CA-395 traverse along the western part of Hesperia and a Burlington Northern Santa Fe (BNSF) railroad line cuts across the downtown area from south to north (with the Cushenbury Branch extending east-southeastward from its junction with the main line north of Main Street) (see Plate 1-5). A Union Pacific (UP RR) railroad line extends in a northwesterly direction through the city's southwestern corner. The interstate, highway and railroad lines are used to transport hazardous materials, posing a potential for spills or leaks from non-stationary sources to occur within the area. Trucks and trains carrying hazardous materials are required to have placards that indicate, at a glance, the chemicals being carried, and whether they are corrosive, flammable and/or explosive. The conductors are required to carry detailed "material data sheets" for each of the substances on board. These documents are designed to help emergency response personnel assess the situation immediately upon arrival at the scene of an accident, and take the appropriate precautionary and mitigation measures. The California Highway Patrol is in charge of spills that occur in or along freeways, with Caltrans, and local sheriffs and fire departments responsible for providing additional enforcement and routing assistance.

While train derailment can occur at anytime, it is during an earthquake that a derailment and hazardous materials release would result in the greatest impact. According to the California Public Utilities Commission (1994), it is standard operating procedure to stop all trains within one hundred miles of the epicenter of a magnitude 6.0 or greater earthquake. The stoppage of trains in the area of the 1994 Northridge earthquake took approximately 14 minutes to implement. A derailment in the Northridge earthquake included a train with 29 cars and one locomotive. One of 13 tank cars spilled an estimated 2,000 gallons of sulfuric acid, and 1,000 gallons of diesel fuel spilled from the locomotive.

Additionally, pipelines and electrical transmission lines extend across the city (see Plates 1-5 and 5-1). A high-pressure gas transmission line extends through the south-central portion of the city, subparallel to Summit Valley Road; other, smaller segments of a high-pressure gas line extend along the city's northern boundary, parallel to Bear Valley Road. A hazardous liquid pipeline follows Baldy Mesa Road, along the City's Sphere of Influence western boundary (https://www.npms.phmsa.dot.gov/searchp/Application.asp). Rupture of any portion of a pipeline could adversely impact the surrounding area. Pipeline operators are responsible for the continuous maintenance and monitoring of their pipelines to evaluate and repair, when necessary, corroded sections of pipe that no longer meet the pipeline strength criteria. All excavations or drilling operations near pipelines, or anywhere else, for that matter, should be conducted only after proper clearance by the appropriate utility agencies or companies. California law requires that all excavations be cleared in advance. This is done locally by the **Underground Service Alert of Southern California,** or **DigAlert.** Their telephone number is **1-800-227-2600.** Calls need to be made at least two (2) working days before digging, and the proposed excavation area needs to be delineated or marked.

Pipeline and power line failures during an earthquake are more often the result of permanent ground deformations, including fault rupture, liquefaction, landslides, and consolidation of loose granular soils. Tectonic uplift or subsidence can also impact a pipeline. Seismic shaking typically has less of an impact on buried utilities than it does on above-ground structures.

Given that there are no active faults mapped through the central and northern portions of Hesperia, the risk of pipeline damage in the city due to surface fault rupture is low to none. Rupture of the San Andreas fault south of Hesperia, 4 miles from the city at its closest approach, is expected to damage the pipelines that extend across it in the Cajon Pass area. This could impact Hesperia residents that commute south of the Interstate 15. Given that Hesperia is located near several significant seismic sources, liquefaction and earthquake-induced settlement may occur locally as a result of strong ground shaking, with the potential to impact pipelines, power lines, communication towers, and other lifelines that service Hesperia.

5.8 Hazard Analysis

The primary concern associated with a hazardous materials release is the short- and/or long-term effect to the public from exposure to the hazardous substance, especially if a toxic gas is involved. The best way to reduce the risk posed by a hazardous material release is enforcement of stringent regulations governing the storage, use, manufacturing, and handling of hazardous materials.

The City of Hesperia observes the most current version of the California Fire Code (currently the 2007) for usage, storage, handling and transportation requirements for hazardous materials. Risk minimization criteria include secondary containment, segregation of chemicals to reduce reactivity during a release, sprinkler and alarm systems, monitoring, venting and auto shutoff equipment, and treatment requirements for toxic gas releases.

There are currently five reported Significant Hazardous Materials Sites in the Hesperia area. A Significant Hazardous Materials Site includes facilities identified in Federal and/or State databases as Superfund-Active or Archived Sites (CERCLIS), RCRA/RCRIS-EPA registered Large-Quantity Hazardous Waste Generators, and Toxic Release Inventory Sites (TRIs). There are also about 46 reported Small-Quantity Generators of hazardous materials in Hesperia. Compared to other cities in southern California, Hesperia at this time has a relatively small number of facilities that use or store hazardous materials. Nevertheless, several of the existing significant hazardous sites are located within about 1 mile of schools in the community (see Plates 1-4 and 5-1). Furthermore, this is a snapshot in time, and as the city continues to grow, more, especially small-quantity generators of hazardous materials are expected to be located in the area. City planners are advised to encourage the establishment of future significant hazardous materials sites in the city in areas far away from critical facilities with evacuation constraints, such as schools and nursing homes. Facilities that use, store, generate or transport hazardous materials are also expected to come and go; so these lists, or comparable lists, should be updated at least once a year. Residents and property and business owners that are interested in obtaining current data for a particular area or site should request it from the San Bernardino County Fire Department, Hazardous Materials Division or the EPA.

The city is located within about 4 to 16.5 miles of the San Andreas fault, a fault that has a relatively high probability of generating an earthquake in the next 30 years (see Chapter 1). Therefore, all hazardous materials sites in Hesperia could be subject to moderate to severe seismic shaking. Their business plans should address, provide and implement mitigation measures designed to reduce the potential for releases of hazardous materials during an

earthquake. It has been shown in previous urban earthquakes that hazardous materials spills can occur even when the building does not suffer significant damage. Hazardous material containers not properly secured and fastened could easily be punctured and/or tipped over, pipes may rupture, and storage tanks may fail. Containers may also explode if subject to high temperatures, such as those generated by a fire. Improperly segregated chemicals could react forming a toxic gas cloud. In a worst-case scenario, several hazardous materials releases could occur simultaneously.

The hazardous materials facilities shown on Plate 5-1 are not located within the 100-year floodplain (see Plate 3-1). Future hazardous materials facilities should be located outside of the floodplain zones also, unless all standards of elevation, anchoring, and flood proofing have been satisfied, and hazardous materials are stored in watertight containers designed to not float.

5.9 Summary of Findings

National Pollutant Discharge Elimination System (NPDES)

The City of Hesperia was issued a NPDES General Permit (No. CAS000004) and an accompanying Fact Sheet for regulated small Municipal Separate Storm Sewer Systems (MS4s). The Lahontan Regional Water Quality Control Board oversees the regulated small MS4s within the Mojave Watershed governing the cities of Hesperia, Victorville, and the Town of Apple Valley.

Superfund, Hazardous Waste, and Toxic Release Inventory Sites

According to EPA data, there are no Superfund sites in Hesperia, nor have there ever been in the past. The EPA reports that there is one (1) CERCLIS site, one or two (1-2) permitted Large Quantity Generators of hazardous materials, and four (4) Toxic Release Sites in or near the Hesperia area. The TRI list changes at least annually, so for the most current information refer to the EPA's web page. As of 2008, there were 46 permitted Small-Quantity Generators of hazardous materials located throughout the city. This figure is expected to increase as the city grows.

Hazardous Materials Disclosure Program

Both the Federal government and the State of California require businesses that handle more than a specified amount of hazardous materials or extremely hazardous materials, termed a reporting quantity, to submit a business plan to the local Certified Unified Program Agency (CUPA). In Hesperia, the local CUPA is the San Bernardino County Fire Department, Hazardous Materials Division, (SBCFD-HMD); they are responsible for reviewing the annually submitted business plans. For more information refer to their website (http://www.sbcfire.org/hazmat/index.asp), or contact them by phone at (909) 386-8401.

Leaking Underground Fuel Tanks

According to data from the State Water Quality Control Board, twelve leaking underground storage tank (LUST) sites were reported in Hesperia between 1988 and 2006 (a 13th site that according to the database is in Hesperia is actually not in the city, and was therefore not included herein). All twelve LUST sites have been remediated and/or considered to not pose a risk to human health and the environment; their cases have been closed by the appropriate

regulatory agency. Eleven of these sites reportedly impacted the surrounding soil only; one site impacted groundwater that is not used for drinking purposes (see the Statewide database, GeoTracker, which is available at http://geotracker.swrcb.ca.gov/). The California Regional Water Quality Control Board (CRWQCB), in cooperation with the Office of Emergency Services provides oversight and conducts inspections of all underground tank removals and installation of new ones. Given that there are at least 31 permitted underground storage tanks in the city, future leaks could be reported. The GeoTracker database should be reviewed periodically for updates.

Water Quality

The Hesperia Water District provides drinking water to the residents of Hesperia (with the exception of those residents that have their own water wells). According to the EPA Safe Drinking Water Violation Report, the Hesperia Water District has had two health violations reported since 1993, when they started keeping records. The first incident occurred in September 1999 and was a non-significant monitoring violation for Total Coliform in which sampling was not conducted in a timely manner. The second occurred in February 2005 and was a health-based violation in which the concentration for Total Coliform exceeded the MCL. Compared to State statistics for drinking water violations, Hesperia's record is very good.

Household Hazardous Waste

San Bernardino County and the City of Hesperia have adopted a Household Hazardous Waste and Oil-Recycling program that is free to residents, in accordance with the California Integrated Solid Waste Management Act of 1989. **The Hesperia drop-off facility is located at 17443 Lemon Street,** and it is open Tuesdays and Thursdays from 9:00 am to 1:00 pm, and on Saturdays from 9:00 am to 3:00 pm (see the City's website for more information http://www.ci.hesperia.ca.us/). Free curbside service is available for senior citizens and disabled residents. The County also sponsors site collection services for Conditionally Exempt Small-Quantity Generators who are not able to take their waste to the collection site. The County also provides a recycle and reuse program, as well as other outreach and education programs that encourage recycling and conservation. The City of Hesperia has programs designed to reduce the amount of waste taken to landfills. Waste reduction and recycling programs include: curb-side service for collecting grass and composting material, implementing recycling and reuse of construction and demolition materials, collecting and recycling used tires (free service), and recycling unwanted holiday paper, boxes and Christmas trees. Information on the City's waste reduction and recycling programs can be obtained at the following web address: http://www.ci.hesperia.ca.us/, or by calling (760) 244-9773.

Oil Fields

There are no oil fields in or near Hesperia, so environmental issues associated with oil fields are not a concern in the city.

Hazard Analysis

The primary concern associated with a hazardous materials release is the short- and/or long-term effect to the public from exposure to the hazardous materials released. The best way to reduce the possibility for a hazardous material release is by implementing and enforcing stringent regulations governing the storage, use, manufacturing and handling of hazardous materials. None of the hazardous materials sites in Hesperia are located on or near the

mapped traces of active faults, so surface fault rupture is not considered a hazard for these sites.

However, the entire city of Hesperia will be subjected to intense ground shaking as a result of an earthquake on any of several nearby earthquake sources, especially the San Andreas fault, located at its closest about 4 miles from the city's southern boundary, and approximately 13 miles from City Hall (for more information refer to Chapter 1). It has been observed in previous urban earthquakes that hazardous materials spills can occur even when the building housing the materials does not suffer significant damage. Hazardous material containers not properly secured and fastened can easily be punctured and/or tipped over. Improperly segregated chemicals could react, forming a toxic gas cloud. In a worst-case scenario, several hazardous materials releases could occur simultaneously. Therefore, hazardous material sites in Hesperia should be designed with secondary containment systems, tank bracing systems, and other engineering solutions to reduce the potential for tanks and containers to tip over during an earthquake. All business plans for sites within the city should address the hazard of intense ground shaking and identify specific measures to be taken to reduce this hazard to an acceptable level.

At present, none of the significant hazardous materials sites identified in Hesperia are located within the 100-year flood zones. Future hazardous materials sites established in Hesperia should be similarly not located in the floodplain, unless very specific containment measures are implemented to reduce the potential for hazardous materials to leak during a flood. Furthermore, street flooding as a result of intense storms and inadequate storm drain capacity could result in the flooding of some of the hazardous materials facilities not within the mapped floodplain. Therefore, the business plans for all hazardous materials businesses should address the hazards of flooding and of strong ground shaking during an earthquake, and provide for mitigation measures to be implemented to reduce the potential for hazardous materials to leak during a natural disaster.

Incidence Response for Transportation Routes and Pipeline Failures

Hazardous materials are transported through the city of Hesperia along Interstate I-15, highway CA-395, and the BASF and UP railroad lines. Releases of hazardous materials from trucks or trains can occur during an accident. Hazardous material releases can also occur if a train derailment occurs in response to an earthquake. The California Highway Patrol is the responding agency in the event of a spill on the freeways, but local emergency response agencies, such as police and fire departments are responsible for additional enforcement and routing assistance. All transportation of hazardous materials needs to be conducted under strict protocol. Material data sheets for each substance being transported need to be carried by the conductor. These data sheets are designed to help emergency response personnel identify the most appropriate action to contain the specific substances involved in the spill.

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APPENDIX B: GLOSSARY

Acceleration – The rate of change for a body's magnitude, direction, or both over a given period of time. In this report, it generally refers to the standard value of the Earth's gravitational acceleration, g, equal to ~9.81 meters per second square, or ~32.2 feet per second squared. Ground shaking produced by an earthquake is often measured as a percentage of the gravitational acceleration, g.

Active fault – For implementation of Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) requirements, an active fault is one that shows evidence of having experienced surface displacement within the last 11,000 years. APEFZA classification is designed for land use management of surface rupture hazards. A more general definition by the National Academy of Sciences (1988) is "a fault that on the basis of historical, seismological, or geological evidence has the finite probability of producing an earthquake." The American Geological Institute (1972) defines an active fault as one along which there is recurrent movement, usually indicated by small, periodic displacements or seismic activity.

Acute – Quick, one-time exposure to a chemical.

Adjacent grade – Elevation of the natural or graded ground surface, or structural fill, abutting the walls of a building. See *highest adjacent grade* and *lowest adjacent grade*.

Aeolian – Related to or pertaining to the wind; carried, eroded or deposited by wind action.

Aftershocks – Minor earthquakes following a greater one and originating at or near the same location.

Aggradation – The building up of earth's surface by deposition of sediment.

Alluvial – Pertaining to, or composed, of alluvium, or deposited by a stream or running water.

Alluvial fan – A low, outspread relatively flat to gently sloping surface consisting of loose sediment that is shaped like an open fan, deposited by a stream at the place where the stream comes out of a narrow canyon onto a broad valley or plain. Alluvial fans are steepest near the mouth of the canyon, and spread out, gradually decreasing in gradient, away from the stream source.

Alluvium – Surficial sediments of poorly consolidated gravels, sand, silts, and clays deposited by flowing water.

Amplitude – The height of a wave between its crest (high point) and its mid-point

Anchor – To secure a structure to its footings or foundation wall in such a way that a continuous load transfer path is created and so that it will not be displaced by flood, wind, or seismic forces.

Aplite – A light-colored igneous rock with a fine-grained texture and free from dark minerals. Aplite forms at great depths beneath the earth's crust.

Apparatus – Fire apparatus includes firefighting vehicles of various types.

Aquifer – A body of rock or sediment that contains sufficient saturated permeable material to allow the flow of ground water and to yield economically significant quantities of ground water to wells and springs.

Argillic – Alteration in which certain minerals of a rock or sediments are converted to clay. Also said of a soil horizon characterized by the illuvial accumulation of clay.

Armor – To protect slopes from *erosion* and *scour* by *flood* waters. Techniques of armoring include the use of riprap, gabions, or concrete.

Artesian – An adjective referring to ground water confined under hydrostatic pressure. The water level in wells drilled into an **artesian** aquifer (also called a confined aquifer) will stand at some height above the top of the aquifer. If the water reaches the ground surface, the well is referred to as a "flowing" **artesian** well.

Aspect – The direction a slope faces.

Attenuation – The reduction in amplitude of a wave with time or distance traveled.

Automatic Aid Agreement – An agreement between two or more agencies whereby such agencies are automatically dispatched simultaneously to predetermined types of emergencies in predetermined areas.

A zone – Under the *National Flood Insurance Program*, area subject to inundation by the *100-year flood* where wave action does not occur or where waves are less than 3 feet high, designated Zone A, AE, A1-A30, A0, AH, or AR on a *Flood Insurance Rate Map* (FIRM).

Base flood – *Flood* that has as 1-percent probability of being equaled or exceeded in any given year. Also known as the *100-year flood*.

Base Flood Elevation (BFE) – Elevation of the *base flood* in relation to a specified datum, such as the *National Geodetic Vertical Datum* or the *North American Vertical Datum*. The Base Flood Elevation is the basis of the insurance and *floodplain management* requirements of the *National Flood Insurance Program*.

Basement – Under the *National Flood Insurance Program*, any area of a building having its floor subgrade on all sides. (Note: What is typically referred to as a "walkout basement," which has a floor that is at or above grade on at least one side, is not considered a basement under the *National Flood Insurance Program*.)

Beaufort Scale – A scale devised in 1805 by Admiral Francis Beaufort of the British Navy to classify wind speed based on the wind's effect on the seas and vegetation. The scale goes from 0 (calm) to 12 (hurricane).

Bedding – The arrangement of a sedimentary rock or deposit in beds or layers of varying thickness and character.

Bedrock – Designates hard rock that is in its natural intact position and underlies soil or other unconsolidated surficial material.

Bench – A grading term that refers to a relatively level step excavated into earth material on which fill is to be placed. A bench is also a long, narrow, relatively level or gently inclined platform of land or rock bounded by steeper slopes above and below.

Bioregion – A major, regional ecological community characterized by distinctive life forms and distinctive plant and animal species.

Biotite – A general term to designate all ferromagnesian micas. More specifically, biotite is a widely distributed and important rock-forming mineral that is usually black, brown or dark green, and that is an original constituent of igneous and metamorphic rocks, or a detrital constituent of sedimentary rocks.

Blind thrust fault – A thrust fault is a low-angle reverse fault (where the top block is being or has been pushed over the bottom block). A "blind" thrust fault refers to one that does not reach the surface.

Braided stream – A stream that divides into or follows an interlacing or tangled network of several, small, branching and reuniting shallow channels separated from each other by channel bars. Also referred to as an **anastomosing** stream.

Brush – A collective term that refers to stands of vegetation dominated by shrubby, woody plant, or low-growing trees.

Brushfire – A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Building code – Regulations adopted by local governments that establish standards for construction, modification, and repair of buildings and other structures.

Carcinogen – Material capable of causing cancer in humans.

Cast-in-place concrete – Concrete that is poured and formed at the construction site.

CEQA – The California Environmental Quality Act (Chapters 1 through 6 of Division 13 of the Public Resources Code). A state statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

Chronic – Continual or repeated exposure to a hazardous material.

Cladding – Exterior surface of the building envelope that is directly loaded by the wind.

Clay – A rock or mineral fragment having a diameter less than 1/256 mm (4 microns, or 0.00016 in.). A clay commonly applied to any soft, adhesive, fine-grained deposit.

Claystone – An indurated clay having the texture and composition of shale, but lacking its fine lamination. A massive mudstone in which clay predominates over silt.

Climate – The average condition of weather over time in a given region.

Code official – Officer or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative, such as a building, zoning, planning, or *floodplain management* official.

Collapse – A relatively sudden change in the volume of a soil mass resulting in the local settlement of the ground surface, with the potential to cause significant damage to overlying structures. If due to strong ground shaking, the soil grains in the soil column are re-arranged by the shaking so that the pore space between grains is reduced and the grains become more tightly packed, resulting in the overall reduction of the thickness of the soil column. This is referred to as earthquake-induced subsidence. Collapse can also occur in certain types of sediments, where with the introduction of water (due to an increase in irrigation, for example), the cement between soil grains dissolves, allowing the soil particles to become more tightly packed, again resulting in the local settlement of the ground surface. This process is also referred to as **hydro-collapse** or **hydroconsolidation**.

Column foundation – Foundation consisting of vertical support members with a height-to-least-lateral-dimension ratio greater than three. Columns are set in holes and backfilled with compacted material. They are usually made of concrete or masonry and often must be braced. Columns are sometimes known as posts, particularly if the column is made of wood.

Compressible soil – Geologically young unconsolidated sediment of low density that may compress under the weight of a proposed fill embankment or structure.

Community at Risk – Wildland interface community in the vicinity of Federal lands that is at high risk from wildfire.

Complex (Fire) –Two or more individual incidents located in the same general area and assigned to a single incident commander or unified command.

Concrete Masonry Unit (CMU) – Building unit or block larger than 12 inches by 4 inches by 4 inches made of cement and suitable aggregates.

Conglomerate – A coarse-grained sedimentary rock composed of rounded to subangular fragments larger than 2 mm in diameter set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica or hardened clay. The consolidated equivalent of gravel.

Connector – Mechanical device for securing two or more pieces, parts, or members together, including anchors, wall ties, and fasteners.

Consolidation – Any process whereby loosely aggregated, soft earth materials become firm and cohesive rock. Also the gradual reduction in volume and increase in density of a soil mass in response to increased load or effective compressive stress, such as the squeezing of fluids from pore spaces.

Corrosion-resistant metal – Any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.

Coseismic rupture - Ground rupture occurring during an earthquake but not necessarily on the causative fault.

Cretaceous – The final period of the Mesozoic era (before the Tertiary period of the Cenozoic era), thought to have occurred between about 136 and 65 million years ago.

Dead load – Weight of all materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, *cladding*, and other similarly incorporated architectural and structural items and fixed service equipment. See *Loads*.

Debris – (Seismic) The scattered remains of something broken or destroyed; ruins; rubble; fragments. (Flooding, Coastal) Solid objects or masses carried by or floating on the surface of moving water.

Debris burning – Any fire originally set for the purpose of clearing land or for burning rubbish, garbage, range, stubble, or meadow burning.

Debris impact loads – Loads imposed on a structure by the impact of floodborne debris. These loads are often sudden and large. Though difficult to predict, debris impact loads must be considered when structures are designed and constructed. See *Loads*.

Debris flow – A saturated, rapidly moving saturated earth flow with 50 percent rock fragments coarser than 2 mm in size which can occur on natural and graded slopes.

Debris line – Line left on a structure or on the ground by the deposition of debris. A debris line often indicates the height or inland extent reached by *flood* waters.

Defensible Space – An area, either natural or manmade, where material capable of causing a fire to spread has been treated, cleared, reduced, or changed in order to provide a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, defensible space is defined as an area with a minimum of 100 feet around a structure that is cleared of flammable brush or vegetation. Distance from the structure and the degree of fuels treatment vary with vegetation type, slope, density, and other factors.

Deflected canyons – A relatively spontaneous diversion in the trend of a stream or canyon caused by any number of processes, including folding and faulting.

Deformation - A general term for the process of folding, faulting, shearing, compression, or extension of rocks.

Design flood – The greater of either (1) the *base flood* or (2) the *flood* associated with the *flood hazard area* depicted on a community's flood hazard map, or otherwise legally designated.

Design Flood Elevation (DFE) – Elevation of the *design flood*, or the flood protection elevation required by a community, including wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.

Development – Under the *National Flood Insurance Program*, any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations or storage of equipment or materials.

Differential settlement – Non-uniform settlement; the uneven lowering of different parts of an engineered structure, often resulting in damage to the structure. Sometimes included with liquefaction as ground failure phenomenon.

Dike – A tabular shaped, igneous intrusion that cuts across bedding of the surrounding rock.

Diorite – A group of igneous rocks that form at great depth beneath the earth's crust. These rocks are intermediate in composition between acidic and basic rocks.

Dispatch – The implementation of a command decision to move a resource or resources from one place to another.

Displacement - The length, measured in kilometers (km), of the total movement that has occurred along a fault over as long a time as the geologic record reveals.

DMA 2000 - Disaster Mitigation Act of 2000. Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Public Law 106-390, October 30, 2000. DMA 2000 is intended to establish a continuing means of assistance by the Federal Government to State and local governments in carrying out their responsibilities to alleviate the suffering and damage which result from disasters by (1) revising and broadening the scope of existing disaster relief programs; (2) encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by the States and by local governments; (3) achieving greater coordination and responsiveness of disaster preparedness and relief programs; (4) encouraging individuals, States, and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; (5) encouraging hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations; and (6) providing Federal assistance programs for both public and private losses sustained in disasters .

Dynamic analysis – A complex earthquake-resistant engineering design technique (UBC - used for critical facilities) capable of modeling the entire frequency spectra, or composition, of ground motion. The method is used to evaluate the stability of a site or structure by considering the

motion from any source or mass, such as that dynamic motion produced by machinery or a seismic event.

Earth flow – Imperceptibly slow-moving surficial material in which 80 percent or more of the fragments are smaller than 2 mm, including a range of rock and mineral fragments.

Earthquake – Vibratory motion propagating within the Earth or along its surface caused by the abrupt release of strain from elastically deformed rock by displacement along a fault.

Earth's crust – The outermost layer or shell of the Earth.

Effective Flood Insurance Rate Map (FIRM) – See *Flood Insurance Rate Map*.

El Niño – Phenomenon that originates, every few years, typically in December or early January, in the southern Pacific Ocean, off of the western coast of South America, characterized by warmer than usual water. This warmer water is statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of earthquakes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific.

Emergency Planning and Community Right to Know (EPCRA) – The portion of SARA that specifically outlines how industries report chemical inventory to the community.

Encroachment – Any physical object placed in a floodplain that hinders the passage of water or otherwise affects the flood flows.

Engineering geologist – A geologist who is certified by the State as qualified to apply geologic data, principles, and interpretation to naturally occurring earth materials so that geologic factors affecting planning, design, construction, and maintenance of civil engineering works are properly recognized and used. An engineering geologist is particularly needed to conduct investigations, often with geotechnical engineers, of sites with potential ground failure hazards.

Environmental Protection Agency (EPA) – Federal agency tasked with ensuring the protection of the environment and the nation’s citizens.

Ephemeral stream – A stream or reach of a stream that flows only briefly in direct response to precipitation.

Epicenter – The point at the Earth's surface directly above where an earthquake originated.

Erodible soil – Soil subject to wearing away and movement due to the effects of wind, water, or other geological processes during a flood or storm or over a period of years.

Erosion – Under the *National Flood Insurance Program*, the process of the gradual wearing away of landmasses. In general, erosion involves the detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.

Erosion analysis – Analysis of the short- and long-term *erosion* potential of soil or strata, including the effects of wind action, *flooding* or *storm surge*, moving water, wave action, and the interaction of water and structural components.

Evacuation – Movement of people from an area, typically their homes, to another area considered to be safe, typically in response to a natural or man-made disaster that makes an area unsafe for people.

Expansive soil – A soil that contains clay minerals that take in water and expand. If a soil contains sufficient amount of these clay minerals, the volume of the soil can change significantly with changes in moisture, with resultant structural damage to structures founded on these materials.

Extremely hazardous substance – A substance that shows high acute or chronic toxicity, carcinogenity, bioaccumulative properties, is persistent in the environment, or is water reactive (California Code of Regulations, Title 22).

Fanglomerate – A sedimentary rock consisting of a heterogeneous mix of fragments of all sizes, originally deposited in an alluvial fan and subsequently cemented into a firm rock. Generally said of the coarser, consolidated rock material that occurs in the upper part of an alluvial fan.

Fault – A fracture (rupture) or a zone of fractures along which there has been displacement of adjacent earth material.

Fault segment – A continuous portion of a fault zone that is likely to rupture along its entire length during an earthquake.

Fault slip rate – The average long-term movement of a fault (measured in cm/year or mm/year) as determined from geologic evidence.

Federal Emergency Management Agency (FEMA) – Independent agency created in 1979 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. FEMA administers the *National Flood Insurance Program*.

Federal Insurance Administration (FIA) – The component of the *Federal Emergency Management Agency* directly responsible for administering the flood insurance aspects of the *National Flood Insurance Program*.

Federal Responsibility Areas (FRA) – Areas within which a federal government agency has the financial responsibility of preventing and suppressing fires.

Feldspar – The most widespread of any mineral group; constitutes ~60% of the earth's crust. Feldspars occur as components of all kinds of rocks and, on decomposition, yield a large part of the clay of a soil.

Fill – Material such as soil, gravel, or crushed stone placed in an area to increase ground elevations or change soil properties. See *structural fill*.

Fire behavior – The manner in which a fire reacts to the influences of fuel, weather and topography.

Fire flow – The flow rate of a water supply expressed in gallons per minute (gpm), measured at 20 pounds per square inch (psi) residual pressure, that is available for fire fighting.

Fire frequency – The number of fires occurring within a defined area in a given time period.

Fire regime – The long-term fire pattern characteristic of a region or ecosystem described using a combination of seasonality, fire return interval, size, spatial complexity, intensity, severity, and fire type.

Fire resistant – A characteristic of a plant species that allows individuals to resist damage or mortality during a fire. Also used to describe construction materials that resist damage to fire.

FIRESCOPE – **FI**refighting **RES**ources of **C**alifornia **O**rganized for **P**otential **E**mergencies. A cooperative effort involving all agencies with fire fighting responsibilities in California. The goal of this group is to create and implement new applications in fire service management, technology and coordination, with an emphasis on incident command and multi-agency coordination. This dynamic state-wide program serves the needs of California fire service management as an ongoing program.

First responders – A group designated by the community as those who may be first to arrive at the scene of a fire, accident, or chemical release.

Fire weather – The weather conditions that influence fire behavior, including air temperature, atmospheric moisture, atmospheric stability, clouds and precipitation.

Five hundred (500)-year flood – *Flood* that has as 0.2-percent probability of being equaled or exceeded in any given year.

Flash flood – A local and sudden flood or torrent overflowing a stream channel in an usually dry valley, carrying an immense load of mud and rock fragments, and generally resulting from a rare and brief but heavy rainfall over a relatively small area having steep slopes.

Flood – A rising body of water, as in a stream or lake, which overtops its natural and artificial confines and covers land not normally under water. Under the *National Flood Insurance Program*, either:
(a) a general and temporary condition or partial or complete inundation of normally dry land areas from:
(1) the overflow of inland or tidal waters,
(2) the unusual and rapid accumulation or runoff of surface waters from any source, or

(3) mudslides (i.e., mudflows) which are proximately caused by flooding as defined in (2) and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when the earth is carried by a current of water and deposited along the path of the current, or
(b) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in (1), above.

Flood-damage-resistant material – Any construction material capable of withstanding direct and prolonged contact (i.e., at least 72 hours) with floodwaters without suffering significant damage (i.e., damage that requires more than cleanup or low-cost cosmetic repair, such as painting).

Flood elevation – Height of the water surface above an established elevation datum such as the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or *mean sea level*.

Flood hazard area – The greater of the following: (1) the area of special flood hazard, as defined under the *National Flood Insurance Program*, or (2) the area designated as a flood hazard area on a community's legally adopted flood hazard map, or otherwise legally designated.

Flood insurance – Insurance coverage provided under the National Flood Insurance Program.

Flood Insurance Rate Map (FIRM) – Under the *National Flood Insurance Program*, an official map of a community, on which the *Federal Emergency Management Agency* has delineated both the special hazard areas and the risk premium zones applicable to the community. (Note: The latest FIRM issued for a community is referred to as the *effective FIRM* for that community.)

Flood Insurance Study (FIS) – Under the *National Flood Insurance Program*, an examination, evaluation, and determination of *flood* hazards and, if appropriate, corresponding *water surface elevations*, or an examination, evaluation, and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards in a community or communities. (Note: The *National Flood Insurance Program* regulations refer to Flood Insurance Studies as "flood elevation studies.")

Flood-related erosion area or flood-related erosion prone area – A land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer *flood*-related *erosion* damage.

Flooding – See *Flood*.

Floodplain – Under the *National Flood Insurance Program*, any land area susceptible to being inundated by water from any source. See *Flood*.

Floodplain management – Operation of an overall program of corrective and preventive measures for reducing *flood* damage, including but not limited to emergency preparedness plans, flood control works, and *floodplain management regulations*.

Floodplain management regulations – Under the *National Flood Insurance Program*, zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance, and erosion control ordinance), and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of *flood* damage prevention and reduction.

Floodway – The channel of a river or other watercourse, and the adjacent land areas that must be kept free of encroachment in order to discharge the base flood without cumulatively increasing the water surface elevation more than a certain height.

Flow failure – A type of liquefaction-induced failure that generally occurs in slopes greater than 3 degrees, and that is characterized by the displacement, often over tens to hundreds of feet, of blocks of soil riding on top of the liquefied substrate.

Footing – Enlarged base of a foundation wall, pier, post, or column designed to spread the load of the structure so that it does not exceed the soil bearing capacity.

Footprint – Land area occupied by a structure.

Freeboard – Under the *National Flood Insurance Program*, a factor of safety, usually expressed in feet above a *flood* level, for the purposes of *floodplain management*. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the heights calculated for a selected size flood and floodway conditions, such as the hydrological effect of urbanization of the watershed.

Fuel – The source of heat that sustains the combustion process. In wildland fires, fuel is the combustible plant biomass, including grass, leaves, ground litter, shrubs, plants and trees.

Fuel load – The amount of fuel that is potentially available for combustion.

Fuel moisture – The moisture content expressed as a percentage of the dry weight of the fuel.

Gabbro – A group of dark-colored intrusive igneous rocks composed principally of plagioclase. The approximate intrusive equivalent of basalt.

Geomorphology – The science that treats the general configuration of the Earth's surface. The study of the classification, description, nature, origin and development of landforms, and the history of geologic changes as recorded by these surface features.

Geotechnical engineer – A licensed civil engineer who is also certified by the State as qualified for the investigation and engineering evaluation of earth materials and their interaction with earth retention systems, structural foundations, and other civil engineering works.

Gneiss – A metamorphic rock in which bands of granular minerals alternate with bands in which mineral have a flaky or prismatic habit, with less than 50 percent of the minerals showing preferred parallel orientation.

Grading – Any excavating or filling or combination thereof. Generally refers to the modification of the natural landscape into pads suitable as foundations for structures.

Granite – Broadly applied, any completely crystalline, quartz-bearing, plutonic rock.

Ground failure – Permanent ground displacement produced by fault rupture, differential settlement, liquefaction, or slope failure.

Ground lurching – A form of earthquake-induced ground failure where soft, saturated soils move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks at the surface.

Ground oscillations – A type of liquefaction-induced failure where liquefaction occurs at depth, in an area where the ground surface is too level to permit the lateral displacement of the overlying soil blocks. The blocks instead separate from one another and oscillate above the liquefied layer. This may result in the opening and closing of fissures or cracks, and the formation of sand boils or volcanoes.

Ground rupture – Displacement of the earth's surface as a result of fault movement associated with an earthquake.

Hazardous material (HAZMAT) – Substance that has the ability to harm humans, property or the environment. The United States Environmental Protection Agency defines hazardous waste as substances that: 1) may cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed; and 3) whose characteristics can be measured by a standardized test or reasonably detected by generators of solid waste through their knowledge of their waste. Hazardous waste is also ignitable, corrosive, or reactive (explosive) (EPA 40 CFR 260.10). A material may also be classified as hazardous if it contains defined amounts of toxic chemicals.

Hazardous Waste Operations and Emergency Response (HAZWOPER) – The Occupational Safety and Health Agency (OSHA) regulation that covers safety and health issues at hazardous waste sites and response to chemical incidents.

Hazard reduction – Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Highest adjacent grade – Elevation of the highest natural or regarded ground surface, or structural fill, that abuts the walls of a building.

Holocene – An epoch of the Quaternary period spanning from the end of the Pleistocene to the present time (the past about 11,000 years).

Hornblende – The most common mineral of the amphibole group. It is a primary constituent in many intermediate igneous rocks.

Hydrocompaction – Settlement of loose, granular soils that occurs when the loose, dry structure of the sand grains held together by a clay binder or other cementing agent collapses upon the introduction of water.

Hydrodynamic loads – Loads imposed on an object, such as a building, by water flowing against and around it. Among these loads are positive frontal pressure against the structure, drag effect along the sides, and negative pressure on the downstream side.

Hydrostatic loads – Loads imposed on a surface, such as a wall or floor slab, by a standing mass of water. The water pressure increases with the square of the water depth.

Hypocenter – The earthquake focus, that is, the place at depth, along the fault plane, where an earthquake rupture started.

Igneous – Type of rock or mineral that formed from molten or partially molten magma.

Ignition point – The location of the ignition.

Ignition source – The origin or source of a fire.

Infiltration – The process by which water seeps into the soil, as influenced by soil texture, soil structure, and vegetation cover.

Intensity – A measure of the effects of an earthquake at a particular place. Intensity depends on the earthquake magnitude, distance from the epicenter, and on the local geology.

Invasive plants – Plants that aggressively expand their ranges over the landscape, typically at the expense of native plants that are displaced or destroyed by the newcomers. Invasive species are typically considered a major threat to biological diversity.

ISO – Insurance Services Office. Private organization that formulates fire safety ratings based on fire threat and responsible agency's ability to respond to the threat. ISO ratings from one (excellent) to ten (no fire protection). Many insurance companies use ISO ratings to set insurance premiums. ISO may establish multiple ratings within a community, such as a rating of 5 in the hydranted areas and one of 8 in the non-hydranted areas.

Jet stream – A relatively narrow stream of fast-moving air in the middle and upper troposphere. Surface cyclones develop and move along the jet stream.

Jetting (of piles) – Use of a high-pressure stream of water to embed a pile in sandy soil. See *pile foundation*.

Joist – Any of the parallel structural members of a floor system that support, and are usually immediately beneath, the floor.

ka – thousands of years before present.

Lacustrine flood hazard area – Area subject to inundation by *flooding* from lakes.

Ladder fuels – Fuels that provide vertical continuity between strata, allowing fire to move from the surface fuels to the crowns of shrubs and trees with relative ease.

Landslide – A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse.

Lateral force – The force of the horizontal, side-to-side motion on the Earth's surface as measured on a particular mass; either a building or structure.

Lateral spreading – Lateral movements in a fractured mass of rock or soil which result from liquefaction or plastic flow or subjacent materials.

Left-lateral fault – A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the left.

Level-of-service standard (LOS standard) – Quantifiable measures against which services being delivered by a service provider can be compared. Standards based upon recognized and accepted professional and county standards, while reflecting the local situation within which services are being delivered. Levels-of-service standards for fire protection may include response times, personnel per given population, and emergency water supply. LOS standards can be used to evaluate the way in which fire protection services are being delivered, for use in countywide fire planning efforts.

Lifeline system – Linear conduits or corridors for the delivery of services or movement of people and information (e.g., pipelines, telephones, freeways, railroads)

Lineament – Straight or gently curved, lengthy features of earth's surface, frequently expressed topographically as depressions or lines of depressions, scarps, benches, or change in vegetation.

Liquefaction – Changing of soils (unconsolidated alluvium) from a solid state to weaker state unable to support structures; where the material behaves similar to a liquid as a consequence of earthquake shaking. The transformation of cohesionless soils from a solid or liquid state as a result of increased pore pressure and reduced effective stress.

Litter – Recently fallen plant material that is only partially decomposed, forming a surface layer on some soils.

Live loads – *Loads* produced by the use and occupancy of the building or other structure. Live loads do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load. See *Loads*.

Load-bearing wall – Wall that supports any vertical load in addition to its own weight. See *Non-load-bearing wall*.

Loads – Forces or other actions that result from the weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those in which variations over time are rare or of small magnitude. All other loads are variable loads.

Local Responsibility Area (LRA) – Lands in which the financial responsibility of preventing and suppressing fires is primarily the responsibility of the local jurisdiction.

Lowest floor – Under the *National Flood Insurance Program*, the lowest floor of the lowest enclosed area (including basement) of a structure. An unfinished or *flood*-resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement is not considered a building's lowest floor, provided that the enclosure is not built so as to render the structure in violation of *National Flood Insurance Program* regulatory requirements.

Lowest horizontal structural member – In an elevated building, the lowest beam, *joist*, or other horizontal member that supports the building. *Grade beams* installed to support vertical foundation members where they enter the ground are not considered lowest horizontal structural members.

Ma – millions of years before present.

Macroburst – A strong downdraft over 2.5 miles in diameter that can cause damaging winds lasting 5 to 20 minutes. Formed by an area of significantly rain-cooled air that after hitting ground levels spreads out in all directions.

Magnitude – A measure of the size of an earthquake, as determined by measurements from seismograph records. Also refers to both a fire's intensity and severity.

Main shock – The biggest earthquake of a sequence of earthquakes that occur fairly close in time and space. Smaller shocks before the main shock are called **foreshocks**; smaller shocks that occur after the main shock are called **aftershocks**.

Major earthquake – Capable of widespread, heavy damage up to 50+ miles from epicenter; generally near Magnitude range 6.5 to 7.0 or greater, but can be less, depending on rupture mechanism, depth of earthquake, location relative to urban centers, etc.

Manufactured home – Under the *National Flood Insurance Program*, a *structure*, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

Masonry – Built-up construction of combination of building units or materials of clay, shale, concrete, glass, gypsum, stone, or other approved units bonded together with or without mortar or grout or other accepted methods of joining.

Mass casualty – Incident in which the number of victims exceeds the capability of the emergency management system to manage the incident effectively.

Material Safety Data Sheets (MSDS) – Information sheets for employees that provide specific information about a chemical that they may come in contact at their place of work, with attention to health effects, handling, and emergency procedures.

Maximum Contaminant Level (MCL) – Federal drinking water standard: "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system" (Code of Federal Regulations [CFR], Title 40, Part 141.2).

Maximum Magnitude Earthquake (Mmax) – The highest magnitude earthquake a fault is capable of producing based on physical limitations, such as the length of the fault or fault segment.

Maximum Probable Earthquake (MPE) – The design size of the earthquake expected to occur within a time frame of interest, for example within 30 years or 100 years, depending on the purpose, lifetime or importance of the facility. Magnitude/frequency relationships are based on historic seismicity, fault slip rates, or mathematical models. The more critical the facility, the longer the time period considered.

Mediterranean climate – The climate characteristic of the Mediterranean region and most of California, characterized by hot, dry summers, and cool, wet winters.

Metamorphic rock – A rock whose original mineralogy, texture, or composition has been changed due to the effects of pressure, temperature, or the gain or loss of chemical components.

Mean sea level (MSL) – Average height of the sea for all stages of the tide, usually determined from hourly height observations over a 19-year period on an open coast or in adjacent waters having free access to the sea. See *National Geodetic Vertical Datum*.

Microburst – A very localized zone of sinking air, less than 2.5 miles in diameter, producing damaging, straight-line, divergent winds at or near the ground surface lasting 2 to 5 minutes.

Mitigation – Any action taken to reduce or permanently eliminate the long-term risk to life and property from natural hazards.

Mitigation Directorate – Component of *Federal Emergency Management Agency* directly responsible for administering the flood hazard identification and *floodplain management* aspects of the *National Flood Insurance Program*.

Moderate earthquake – Capable of causing considerable to severe damage, generally in the range of Magnitude 5.0 to 6.0 (Modified Mercalli Intensity <VI), but highly dependent on rupture mechanism, depth of earthquake, and location relative to urban center, etc.

Modified Mercalli Intensity – A qualitative measure of the size of an earthquake based on people's description of how strongly the earthquake was felt, and the damage it caused to the built

environment. The scale has 12 divisions, ranging from I (felt by only a very few people) to XII (total damage).

Mutual Aid Agreement – A reciprocal aid agreement between two or more agencies that defines what resources each will provide to the other in response to certain predetermined types of emergencies. Mutual aid response is provided upon request.

National Fire Protection Association (NFPA) – A group that issues fire and safety standards for industry and emergency responders.

National Fire Incident Reporting System (NFIRS) – A database of fire incident reports compiled at the local fire department level. NFIRS was an outgrowth of the 1974 National Fire Prevention and Control Act, Public Law 93–498. The U.S. Fire Administration (USFA), an entity of the Department of Homeland Security, developed NFIRS as a means of assessing the nature and scope of the fire problem in the United States.

National Flood Insurance Program (NFIP) – Federal program created by Congress in 1968 that makes *flood* insurance available in communities that enact and enforce satisfactory *floodplain management regulations*.

National Geodetic Vertical Datum (NGVD) – Datum established in 1929 and used as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or *Mean Sea Level*. The *Base Flood Elevations* shown on most of the *Flood Insurance Rate Maps* issued by the *Federal Emergency Management Agency* are referenced to NGVD or, more recently, to the *North American Vertical Datum*.

Near-field earthquake – Used to describe a local earthquake within approximately a few fault zone widths of the causative fault which is characterized by high frequency waveforms that are destructive to above-ground utilities and short period structures (less than about two or three stories).

New construction – For the purpose of determining flood insurance rates under the *National Flood Insurance Program*, *structures* for which the start of construction commenced on or after the effective date of the initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. (See *Post-FIRM structure*.) For *floodplain management* purposes, new construction means *structures* for which the *start of construction* commenced on or after the effective date of a *floodplain management regulation* adopted by a community and includes any subsequent improvements to such structures.

Non-coastal A zone – The portion of the *Special Flood Hazard Area* in which the principal source of *flooding* is runoff from rainfall, snowmelt, or a combination of both. In non-coastal A zones, *flood* waters may move slowly or rapidly, but waves are usually not a significant threat to buildings. See *A zone* and *coastal A zone*. (Note: the *National Flood Insurance Program* regulations do not differentiate between non-coastal A zones and *coastal A zones*.)

Non-load-bearing wall – Wall that does not support vertical loads other than its own weight. See *Load-bearing wall*.

North American Vertical Datum (NAVD) – Datum used as a basis for measuring flood, ground, and structural elevations. NAVD is used in many recent *Flood Insurance Studies* rather than the *National Geodetic Vertical Datum*.

Oblique-reverse fault – A fault that combines some strike-slip motion with some dip-slip motion in which the upper block, above the fault plane, moves up over the lower block.

Offset ridge – A ridge that is discontinuous on account of faulting.

Offset stream – A stream displaced laterally or vertically by faulting.

One hundred (100)-year flood – See *Base flood*.

Orthoclase – One of the most common rock-forming minerals; colorless, white, cream-yellow, flesh-reddish, or grayish in color.

Paleoseismic – Pertaining to an earthquake or earth vibration that happened decades, centuries, or millennia ago.

Peak flood – The highest discharge or stage value of a flood.

Peak Ground Acceleration (PGA) – The greatest amplitude of acceleration measured for a single frequency on an earthquake accelerogram. The maximum horizontal ground motion generated by an earthquake. The measure of this motion is the acceleration of gravity (equal to 32.2 feet per second squared, or 981 centimeters per second squared), and generally expressed as a percentage of gravity.

Pedogenic – Pertaining to soil formation.

Pegmatite – An igneous rock with extremely large grains, more than a centimeter in diameter.

Perched ground water – Unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Perennial Stream – A stream that flows continuously throughout the year.

Plagioclase – One of the most common rock forming minerals.

Playa – Term used in the Southwestern US to describe a flat-floored, typically unvegetated area composed of thin, stratified sheets of fine clay, silt or sand that represent the bottom or central part of a shallow, completely closed or undrained desert lake basin where water accumulates after a rainstorm and quickly evaporates, leaving behind deposits of soluble salts.

Plutonic – Pertaining to igneous rocks formed at great depth.

Plywood – Wood structural panel composed of plies of wood veneer arranged in cross-aligned layers. The plies are bonded with an adhesive that cures on application of heat and pressure.

Pore pressure – The stress transmitted by the fluid that fills the voids between particles of a soil or rock mass.

Post foundation – Foundation consisting of vertical support members set in holes and backfilled with compacted material. Posts are usually made of wood and usually must be braced. Posts are also known as columns, but columns are usually made of concrete or masonry.

Post-FIRM structure – For purposes of determining insurance rates under the *National Flood Insurance Program*, structures for which the *start of construction* commenced on or after the effective date of an initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. This term should not be confused with the term *new construction* as it is used in *floodplain management*.

Potentially active fault – According to the Alquist-Priolo Earthquake Fault Zone Act guidelines, a fault showing evidence of movement within the last 1.6 million years but that has not been shown conclusively whether or not it has ruptured in the past about 11,000 years ago. The U.S. Geological Survey considers a fault potentially active if it has moved in the time period between about 11,000 years ago (the Holocene) and 750,000 years ago, and that is thought capable of generating damaging earthquakes.

Precast concrete – Structural concrete element cast elsewhere than its final position in the structure. See *Cast-in-place concrete*.

Prescribed Fire – A fire ignited under known conditions of fuel, weather, and topography to achieve specific objectives.

Primary fault rupture - Fissuring and displacement of the ground surface along a fault that breaks in an earthquake.

Project – A development application involving zone changes, variances, conditional use permits, tentative parcel maps, tentative tract maps, and plan amendments.

Quartzite – A metamorphic rock consisting mostly of quartz.

Quartz monzonite – A plutonic rock containing major plagioclase, orthoclase and quartz; with increased orthoclase it becomes a granite.

Quaternary – The second period of the Cenozoic era, consisting of the Pleistocene and Holocene epochs; covers the last approximately 1.6 to 2 million years.

Rain shadow – A reduction in precipitation in an area on the leeward side of a mountain or range of mountains, caused by the release of moisture on the windward side.

Resonance – Amplification of ground motion frequencies within bands matching the natural frequency of a structure and often causing partial or complete structural collapse; effects may demonstrate minor damage to single-story residential structures while adjacent 3- or 4-story buildings may collapse because of corresponding frequencies, or vice versa.

Recurrence interval – The time between earthquakes of a given magnitude, or within a given magnitude range, on a specific fault or within a specific area.

Reinforced concrete – *Structural concrete* reinforced with steel bars.

Remote shutoff – Valve that can be used to shut off the flow of a substance or chemical from a location away from the spill or break.

Reportable quantity – A term used by the EPA and the Department of Transportation (DOT) to denote a quantity of chemicals that require some kind of action, such as reporting an inventory or reporting an accident involving a certain amount of chemicals.

Response spectra – The range of potentially damaging frequencies of a given earthquake applied to a specific site and for a particular building or structure.

Response Time – The time that elapses between the moment a 911 call is placed to the emergency dispatch center and the time that a first-responder arrives on scene. Response time includes dispatch time, turnout time (the time it takes firefighters to travel to the fire station, don their personal protection equipment, and prepare the apparatus), and travel time.

Retrofit – Any change made to an existing structure to reduce or eliminate damage to that structure from flooding, *erosion*, high winds, earthquakes, or other hazards.

Revetment – Facing of stone, cement, sandbags, or other materials placed on an earthen wall or embankment to protect it from *erosion* or *scour* caused by *flood* waters or wave action.

Rhyolite – A group of extrusive igneous rocks, generally exhibiting flow texture, with large crystals (phenocrysts) of quartz and alkali feldspar in a glassy to cryptocrystalline groundmass. The approximate extrusive equivalent of granite.

Ridgetop shattering – An earthquake-induced type of ground failure that occurs along at or along the top of ridges, forming linear, fault-like fissures, and leaving the area looking like it was plowed.

Right-lateral fault – A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the right.

Riprap – Broken stone, cut stone blocks, or rubble that is placed on slopes to protect them from *erosion* or *scour* caused by *flood* waters or wave action.

Rockfall – Free-falling to tumbling mass of bedrock that has broken off steep canyon walls or cliffs.

Sand boil – An accumulation of sand resembling a miniature volcano or low volcanic mound produced by the expulsion of liquefied sand to the sediment surface. Also called sand blows, and sand volcanoes.

Sandstone – A medium-grained, clastic sedimentary rock composed of abundant rounded or angular fragments of sand size set in a fine-grained matrix and more or less firmly united by a cementing material.

Santa Ana (or Santana) wind – Strong, typically extremely dry offshore winds that characteristically blow through southern California and northern Baja California in late fall and winter. They typically originate in the Great Basin or upper Mojave Desert, and can be either hot or cold. The winds tend to funnel down the valleys and canyons, where gusts can attain speeds of 60 to 90 miles per hour (mph). Several devastating wildfires in southern California have been associated with Santa Ana winds.

Saturated – Said of the condition in which the interstices of a material are filled with a liquid, usually water.

Scarp – A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of escarpment.

Schist – A metamorphic rock characterized by a preferred orientation in grains resulting in the rock's ability to be split into thin flakes or slabs.

Scour – Removal of soil or fill material by the flow of *flood* waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence. See *Erosion*.

Secondary fault rupture - Ground surface displacements along faults other than the main traces of active regional faults.

Sediment – Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, ice, or that accumulates by other natural agents, such as chemical precipitation from solution, and that forms in layers on the Earth's surface in a loose, unconsolidated form.

Seiche – A free or standing-wave oscillation of the surface of water in an enclosed or semi-enclosed basin (such as a lake, bay, or harbor), that is initiated chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and earthquakes, and that continues, pendulum-fashion, for a time after cessation of the originating force.

Seismic Moment – A measure of the size of an earthquake that is associated with the amount of energy released (the force that was necessary to overcome the friction along the fault plane), the area of the fault rupture, and the average amount of slip.

Seismogenic – Capable of producing earthquake activity.

Seismograph – An instrument that detects, magnifies, and records vibrations of the Earth, especially earthquakes. The resulting record is a seismogram.

Shearwall – *Load-bearing wall* or *non-load-bearing wall* that transfers in-plane lateral forces from lateral *loads* acting on a structure to its foundation.

Sheet flow – An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rocks surfaces and not concentrated into channels larger than rills.

Shutter ridge – That portion of an offset ridge that blocks or "shutters" the adjacent canyon.

Sidehill fill – A wedge of artificial fill typically placed on the side of a natural slope to create a roadway or a level building pad.

Silt – A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 1/256 to 1/16 mm (4-62 microns, or 0.00016-0.0025 in.). An indurated silt having the texture and composition of shale but lacking its fine lamination is called a siltstone.

Slip rate – The speed at which a fault is moving, typically expressed in millimeters per year (mm/yr), and generally estimated by measuring the amount of offset that has occurred in a given, known amount of time.

Slope ratio – Refers to the angle or gradient of a slope as the ratio of horizontal units to vertical units. For example, in a 2:1 slope, for every two horizontal units, there is a vertical rise of one unit (equal to a slope angle, from the horizontal, of 26.6 degrees).

Slump – A landslide characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface.

Soft-story building – Building with a story, generally the ground or first floor, lacking adequate strength or toughness due to too few shear walls. Examples of this type of structure include apartments above glass-fronted stores, and buildings perched atop parking garages.

Soil horizon – A layer of soil that is distinguishable from adjacent layers by characteristic physical properties such as structure, color, or texture.

Special Flood Hazard Area (SFHA) – Under the *National Flood Insurance Program*, an area having special *flood*, mudslide (i.e., mudflow) and/or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or *Flood Insurance Rate Map* as Zone A, AO, A1-A30, AE, A99, AH, V, V1-V30, VE, M or E.

Spot fire – Ignition resulting from embers from the fireline transported aerially in front of the fireline and often increasing fire spread.

Standardized Emergency Management System (SEMS) – (Government Code § 8607). The group of principles developed for coordinating state and local emergency response in California. SEMS provides for organization of a multiple-level emergency response, and is intended to structure and facilitate the flow of emergency information and resources within and between the organizational levels--the field response, local government, operational areas, regions and the state management level. SEMS incorporates by reference: the Incident Command System (ICS); multi-agency or inter-agency coordination; the State's Mutual Aid Program; and Operational Areas.

State Responsibility Area (LRA) – Per California Public Resources Code 4125-4127, the lands in which the State has primary financial responsibility for preventing and suppressing fires.

Storage capacity – Dam storage measured in acre-feet or decameters, including dead storage.

Strike-slip fault – A fault with a vertical to sub-vertical fault surface that displays evidence of horizontal and opposite displacement.

Structural concrete – All concrete used for structural purposes, including *plain concrete* and *reinforced concrete*.

Structural engineer – A licensed civil engineer certified by the State as qualified to design and supervise the construction of engineered structures.

Structural fill – Fill compacted to a specified density to provide structural support or protection to a *structure*. See *Fill*.

Structure – Something constructed, such as a building, or part of one. For *floodplain management* purposes under the *National flood Insurance Program*, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. For insurance coverage purposes under the NFIP, structure means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a *manufactured home* on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration, or repair, unless such materials or supplies are within an enclosed building on the premises.

Subsidence – The sudden sinking or gradual downward settling of the Earth's surface with little or no horizontal motion.

Superfund Amendments and Reauthorization Act (SARA) – Law that regulates a number of environmental issues, predominantly for the chemical inventory reporting by industry to the local community.

Swale – In hillside terrace, a shallow drainage channel, typically with a rounded depression or "hollow" at the head.

Talus – The cone-shaped accumulation of angular fragments of rock or soil at the base of a cliff that has experienced rockfalls.

Tectonic plate – Any of several large pieces, or blocks, of the Earth's lithosphere that are slowly moving relative to each other as part of the process called plate tectonics.

Thrust fault – A fault, with a relatively shallow dip, in which the upper block, above the fault plane, moves up over the lower block.

Tornado – A localized but violently destructive windstorm occurring over land (at sea it is called a waterspout) characterized by a funnel-shaped cloud extending toward the ground.

Transform system – A system in which faults of plate-boundary dimensions transform into another plate-boundary structure when it ends.

Transpression – In crustal deformation, an intermediate stage between compression and strike-slip motion; it occurs in zones with oblique compression.

Tsunami – Great sea wave produced by submarine earth movement, volcanic eruption, oceanic meteor impact, or underwater nuclear explosion.

Typhoon – Name given to a *hurricane* in the area of the western Pacific Ocean west of 180 degrees longitude.

Unconfined aquifer – Aquifer in which the upper surface of the saturated zone is free to rise and fall.

Unconsolidated sediments – A deposit that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth.

Undermining – Process whereby the vertical component of erosion or scour exceeds the depth of the base of a building foundation or the level below which the bearing strength of at the foundation is compromised.

Unreinforced Masonry (URM) structure – Building without adequate anchorage of the masonry walls to the roof and floor diaphragms and lack of steel reinforcement, of limited strength and ductility, and as a result, that tends to perform poorly when shaken during an earthquake.

Uplift – Hydrostatic pressure caused by water under a building. It can be strong enough lift a building off its foundation, especially when the building is not properly anchored to its foundation.

Upper bound earthquake – Defined as a 10% chance of exceedance in 100 years, with a statistical return period of 949 years.

Underground Storage Tank (UST) – Tank, commonly used to store gasoline, diesel or other chemical, that is buried under the ground.

Variance – Under the *National Flood Insurance Program*, grant of relief by a community from the terms of a *floodplain management regulation*.

Violation – Under the *National Flood Insurance Program*, the failure of a structure or other development to be fully compliant with the community's *floodplain management regulations*. A *structure* or other *development* without the elevation certificate, other certifications, or other evidence of compliance required in Sections 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) of the NFIP regulations is presumed to be in violation until such time as that documentation is provided.

Watershed – A topographically defined region draining into a particular river or lake.

Water surface elevation – Under the *National Flood Insurance Program*, the height, in relation to the *National Geodetic Vertical Datum* of 1929 (or other datum, where specified), of *floods* of various magnitudes and frequencies in the *floodplains* of coastal or riverine areas.

Water table – The upper surface of groundwater saturation of pores and fractures in rock or surficial earth materials.

Water year – The 12-month period from October 1 through September 30 of the following year.

Weather – The short-term state of the air or atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness, or any other meteorologic phenomena.

X zone – Under the *National Flood Insurance Program*, areas where the *flood* hazard is less than that in the *Special Flood Hazard Area*. Shaded X zones shown on recent *Flood Insurance Rate Maps* (B zones on older maps) designate areas subject to inundation by the *500-year flood*. Unshaded X zones (C zones on older *Flood Insurance Rate Maps*) designate areas where the annual probability of flooding is less than 0.2 percent.