Greenbriar Development Project
Sacramento, California

Second Recirculated Draft Environmental Impact Report

State Clearinghouse Number 2005062144

Prepared for:

City of Sacramento
Environmental Planning Services

and

Sacramento Local Agency Formation Commission

April 2007

EDAW

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Sacramento, California

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ABBREVIATIONS AND ACRONYMS

ALUC	Sacramento County Airport Land Use Commission
Blueprint)	Sacramento Region Blueprint: Transportation/Land Use Study
City	City of Sacramento's
CLUP	Comprehensive Land Use Plan
CLUP	Comprehensive Land Use Plan
HCP	Habitat Conservation Plan
I-5	Interstate 5
I-80	Interstate 80
Joint Vision	North Natomas Joint Vision
LAFCo	Sacramento Local Agency Formation Commission
MOU	Memorandum of Understanding
NNCP	North Natomas Community Plan
NNCP	North Natomas Community Plan
NOP	Notice of Preparation
proposed project	Greenbriar development project
PUD	Planned Unit Development
RD 1000	Reclamation District Number 1000
RDEIR	Recirculated Draft Environmental Impact Report
RT	Sacramento Regional Transit
SACOG	Sacramento Area Council of Governments
SACOG's	Sacramento Area Council of Government's
SOI	Sphere of Influence
SOI	Sphere of Influence
SPA	Special Planning Area
SR 70/99	State Route 70/99
SRCSD	Sacramento Regional County Sanitation District

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF THE SECOND RECIRCULATED DRAFT ENVIRONMENTAL IMPACT REPORT

In July 2006, the City of Sacramento (City) and the Sacramento Local Agency Formation Commission (LAFCo) published the Greenbriar Development Project Draft Environmental Impact Report (DEIR), which assessed the potential environmental impacts of implementing the proposed Greenbriar development project. The proposed project would be a sphere-of-influence boundary change and annexation to the City of Sacramento of 577 acres; it would include development of 3,473 residential units, approximately 27.5 acres of commercial land uses, an approximately 39-acre lake/detention basin, a 10-acre elementary school, approximately 49 acres of parks and open space, and a 250-foot linear open space/buffer along the property's western boundary that would be managed as habitat for the giant garter snake.

The DEIR was circulated for public review and comment for a period of 45 days that ended on September 5, 2006. At the end of the review period, comments were received on the DEIR. The City and LAFCo reviewed those comments to identify specific environmental concerns and determine whether any additional environmental analysis would be required to respond to issues raised in the comments. Three issues were raised regarding the air quality, flooding, and the transportation analyses included in the DEIR. The City determined that two of these issues resulted in the addition of significant new information to the EIR: new information related to the ability of local levees to protect the site from flooding during the 100-year flood event, and additional information relating to exposure of project residents to diesel particulate emissions from traffic on Interstate 5 and State Route 70/99. The third issue addressed the inclusion of several regional projects into the cumulative traffic modeling for the project. The City and LAFCo determined that because the City's traffic model includes regional growth factors to account for growth outside the City's boundaries, the inclusion of these projects into the traffic model would not likely substantially affect the analysis provided in the DEIR. Thus, the City and LAFCo proceeded with the recirculation of the DEIR for two issues: flooding and air quality. The Recirculated DEIR (RDEIR) was made available to public agencies and the public on November 14, 2006 for a public review period of 45 days.

To confirm that the cumulative regional projects suggested by commenters would not result in any new significant cumulative traffic impacts, the City and LAFCo proceeded to modify the City's traffic model to include the specific traffic assumptions for each of the requested cumulative projects. The results of that analysis were available in February 2007 and revealed that the cumulative traffic scenario would change and would result in the substantial worsening of 3 significant and unavoidable traffic impacts to freeway ramps from the conditions described in the DEIR. As such, in compliance with CEQA, the City and LAFCo have decided to prepare a Second RDEIR, focusing on the transportation analysis.

Section 15088.5 of the California Environmental Quality Act Guidelines (State CEQA Guidelines) requires lead agencies to recirculate information in an EIR when significant new information is added to the EIR after public notice is given of the availability of the DEIR for review. Significant new information requiring recirculation includes a disclosure showing "changes to the project or environmental setting," or that "a new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented," or that "a substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance." Section 15088.5 requires recirculation of only the significant new information, rather than the entire DEIR. The proposed project would result in the substantial worsening of 3 cumulative traffic impacts. Therefore, the City and LAFCo have decided to recirculate the Transportation and Circulation section and related sections (e.g., Cumulative impacts) of the DEIR for public review.

As required by Section 15088 of the State CEQA Guidelines, the City and LAFCo will evaluate and respond to all comments that have been received on the DEIR, RDEIR, and new comments provided on the sections included in the Second RDEIR. All comments and responses will be included in the final EIR (FEIR).

1.2 CONTENT OF THE SECOND RDEIR

Consistent with the requirements of Section 15088.5(c) of the State CEQA Guidelines, this Second RDEIR contains only those sections of the DEIR in which significant new information is provided (e.g., transportation and circulation) and that was not previously recirculated in the RDEIR. This information is considered significant new information based on Section 15088.5(a) of the State CEQA Guidelines; therefore, the City and LAFCo are providing this information to the public for its review as part of this Second RDEIR.

In determining the content requirements of the Second RDEIR, the City and LAFCo performed a comprehensive review of the comments received to date on the DEIR and RDEIR, the results of the new traffic data, and reviewed whether the new traffic data would result in any other significant changes to the analysis presented in the DEIR or RDEIR. A project's traffic trips result in secondary impacts in the areas of traffic noise along local roadways and freeways and air emissions associated with vehicle trips. As such, the City and LAFCo reexamined whether the changed traffic data for the cumulative freeway ramps and mainline segments would result in any new or substantially worse significant air quality and noise impacts. The results of that evaluation are summarized below.

AIR QUALITY

The revised transportation analysis included several regional projects in the cumulative scenario. These cumulative projects would increase the volume of traffic trips along regional freeway facilities that pass by the Greenbriar site (i.e., I-5 and SR 70/99). Cumulative impacts to these regional transportation facilities were re-modeled and the results of that analysis is presented in the Section 6.1, "Transportation and Circulation," of this document.

Construction of the project would not change from that described in the DEIR and RDEIR. Therefore, no changes in the impacts associated with construction-related air emissions would occur.

Project-generated long-term operational (both regional and local) emissions of ozone precursors, PM10, and carbon monoxide (CO) were assessed based on project-specific information (e.g., size and type of proposed land uses); URBEMIS default settings for the Sacramento Valley Air Basin (SVAB); and daily trip generation data from the transportation and circulation analysis (Refer to impacts 6.2-2 and 6.2-3 of the RDEIR). The revised cumulative traffic data would not result in any changes to the parameters used to assess this impact, specifically the proposed project trip generation. Thus, this impact would remain the same and no new significant project-generated long-term operation-related impacts would occur.

Exposure to toxic air contaminants (TAC) emissions from short-term construction activities, stationary sources, airports, and on-site mobile sources (Refer to Impact 6.1-4 of the RDEIR); and odor emissions (Refer to Impact 6.1-5 of the RDEIR) were assessed based on project-specific information (e.g., estimated duration of construction, size and type of proposed land uses, and nearby existing land use types). The addition of the cumulative projects to the cumulative traffic scenario would not result in any changes to the parameters used to assess these impacts.

The RDEIR also addresses potential exposure to TACs from off-site mobile sources along I-5 and SR 99. With respect to I-5, the reported incremental cancer risk levels were based on a peak hour traffic volume of 9,984 trips, which fell between the values of 8,000 and 12,000 in the Sacramento Metropolitan Air Quality Management District's (SMAQMD) protocol look-up tables and thus both of the associated values were included in the discussion (i.e., 90 and 135 per 1 million). According to the new traffic data, the peak hour traffic volume for I-5

(East of Power Line Road) would be 11,236. This new value would also fall between 8,000 and 12,000 and thus would result in the same incremental cancer risk levels.

With respect to SR 70/99, the reported incremental cancer risk levels were based on a peak hour traffic volume of 6,369 trips, which fell between the values of 4,000 and 8,000 in the protocol's look-up tables and thus both of the associated values were included in the discussion (i.e., 24 and 45 per 1 million). According to the new traffic data, the peak hour traffic volume for SR 70/99 (Between Elkhorn Boulevard and I-5/SR 70/99 Interchange) would be 6,941. This new value would also fall between 4,000 and 8,000 and thus would result in the same incremental cancer risk levels. In conclusion, no new significant or substantially more severe impacts related to exposure from TACs or odors would occur with incorporation of the new cumulative projects into the cumulative traffic scenario.

NOISE

Project-generated short-term construction-related noise levels were assessed based on project-specific information (e.g., estimated duration of construction, size and type of proposed land uses, and construction equipment types and number requirements) (Refer to Impact 6.3-1 of the DEIR). The new traffic data would not result in any changes to the parameters used to assess this impact. Thus, this impact would remain the same and no new significant project-generated short-term construction-related impacts would occur.

Project-generated long-term operational traffic noise levels at nearby existing sensitive receptors were assessed based average daily traffic volumes from the transportation and circulation analysis for baseline and baseline plus project conditions (Refer to Impact 6.3-2 of the DEIR). The new cumulative traffic analysis would not result in any changes to the parameters used to assess this impact, specifically the baseline and baseline plus project daily traffic volumes. Thus, this impact would remain the same and no new significant project-generated long-term operation-related impacts from traffic sources would occur.

Project-generated long-term stationary and area-source noise levels at nearby existing sensitive receptors were assessed based on project-specific information (e.g., type of proposed land uses and distances from receptors) (Refer to Impact 6.3-3 of the DEIR). The new cumulative traffic analysis would not result in any changes to the parameters used to assess this impact. Thus, this impact would remain the same and no new significant project-generated long-term operation-related impacts from stationary and area-sources would occur.

The land use compatibility of the proposed residential and school uses with on-site daily and hourly average (L_{dn}/CNEL) from light rail, aircraft, and agricultural source noise levels was based on project-specific information (e.g., type of proposed land uses and distance from sources), noise monitoring, and projected airport noise contours (Refer to Impact 6.3-4 of the DEIR). The new traffic data would not result in any changes to the parameters used to assess these impacts.

Impact 6.3-4 also addresses the land use compatibility of the proposed residential and school uses with on-site predicted traffic noise contours under future plus project conditions which were based on cumulative (2025) plus project average daily traffic volumes from the transportation and circulation analysis. The new cumulative traffic analysis would result in some changes in the average daily traffic volumes on these modeled roadways. Table 6.3-13 summarizes the distances from each roadway centerline to the 55, 60, 65, and 70 dBA L_{dn}/CNEL contours for future plus project conditions based on the new cumulative traffic analysis.

Table 6.3-13
Predicted Traffic Noise Contours under Future Plus Project Conditions

Scenario/Roadway Segments	Distance (feet) From Roadway Centerline to Exterior Noise Contour (dBA)			
	70 L_{dn}/CNEL	65 L_{dn}/CNEL	60 L_{dn}/CNEL	55 L_{dn}/CNEL
I-5 west of SR 70/99 Split	304	655	1,410	3,040
SR 70/99 between Elkhorn Boulevard and I-5 Split	231	497	1,070	2,306
Elkhorn Boulevard between Lone Tree Road and SR 70/99	201	426	916	1,971
Lone Tree Road south of Elkhorn Boulevard	98	207	445	957
Meister Way (on the project site) [1]	59	126	270	582

Note: Traffic noise levels were calculated using the FHWA Noise Prediction Model (FHWA 1988) based on traffic information (e.g., average daily traffic, vehicle speeds, roadway width) obtained from the data prepared for this project and calibrated to reflect project specific. Modeling assumes no natural or human-made shielding (e.g., vegetation, berms, walls, buildings). Contour distances of "0" are within roadway right-of-way.

[1] Meister Way currently does not exist and would not be constructed under the No Project Alternative.

Source: Modeling performed by EDAW in 2007 and Calibration by Bollard Acoustical Consultants (Sawyer, pers. comm., 2006).

Based on the new noise contours, there was no substantive change in contour distances along SR 70/99, Elkhorn Boulevard, Lone Tree Road, or Meister Road. Therefore, no new significant impacts or substantially more severe noise compatibility impacts would occur.

Along I-5, the new contour distances represent a +2 dB increase in traffic noise levels presented in the DEIR. However, mitigation recommended for the project would require the project applicants to implement a variety of noise reduction measures (e.g., construct concrete walls, re-orient home and drainage features) to reduce to the maximum extent feasible on-site noise levels. Further, a site-specific acoustical analysis will be conducted to ensure that the development will meet the City's interior noise standards. This mitigation would adequately mitigate the project's on-site noise impacts based on the new cumulative traffic analysis. Therefore, no new significant impacts would occur along I-5.

The land use compatibility of proposed residences and school uses with on-site aircraft SENL noise levels (Refer to Impact 6.3-5 of the DEIR) and the exposure of sensitive receptors to or generation of excessive vibration levels (Refer to Impact 6.3-6 of the DEIR) were assessed based on project-specific information (e.g., estimated duration of construction, size and type of proposed land uses, and construction equipment types and number, noise monitoring, and other requirements). The new cumulative traffic analysis would not result in any changes to the parameters used to assess these impacts. Thus, these impacts would remain the same and no new significant land use compatibility impacts from aircraft or vibration-related impacts would occur.

Based on the discussion provided above, no new significant air quality or noise impacts would result from the changed cumulative roadway segment, freeway ramp, and mainline segment traffic analysis. As a result, reanalysis of potential air quality and noise impacts resulting from the project is not included in this Second RDEIR. Further, the City and LAFCo have determined that no other environmental issue areas previously circulated as part of the DEIR or RDEIR would require recirculation. A copy of the revised noise modeling data is included in Appendix A of the document.

The Second RDEIR consists of the following chapters and sections. All chapter and section numbering is consistent with the chapter and section numbering outline in the DEIR (released July 2006). Where substantive changes to the DEIR text have occurred, these paragraphs have been highlighted throughout the Second RDEIR.

Chapter 1, "Introduction": Chapter 1 describes the purpose and organization of the RDEIR.

Chapter 3, "Project Description": Chapter 3 describes the project location, background, proposed actions by the applicants, lead agency, trustee and responsible agency actions, project characteristics, and project objectives. This chapter also describes project construction and regulatory requirements. No changes to the project description have occurred since publication of the DEIR (July 2006).

Section 6.1, "Transportation and Circulation": This section describes the project's potential transportation and circulation impacts. This section identifies the substantial worsening of 3 significant and unavoidable cumulative impacts to freeway ramps and freeway mainline segments.

Chapter 7, "Other CEQA-Mandated Sections": This chapter provides an analysis of the project's potential growth-inducing and cumulative impacts. The discussion of the project's growth-inducing and cumulative impacts is the same as that circulated in the DEIR except for the discussion of traffic impacts.

Chapter 9, "References": This chapter sets forth a comprehensive listing of all sources of information used in the preparation of the RDEIR.

Chapter 10, "Report Preparation": This chapter identifies the RDEIR authors and the consultants who provided analysis in support of the RDEIR's conclusions.

Appendices: This section contains revised traffic data.

1.3 RELATIONSHIP TO THE DEIR

Consistent with the requirements of Section 15087 of the State CEQA Guidelines, this Second RDEIR is being made available on April 10, 2007, for public review for a period of 45 days. The public-review period ends on May 25, 2007. During this period, the general public, agencies, and organizations may submit written comments on the RDEIR to the lead agencies (i.e., City of Sacramento and LAFCo). Pursuant to procedures set forth in Section 15088.5(f)(2) of the State CEQA Guidelines, reviewers are requested to limit their comments to the materials contained in this RDEIR.

As required under Sections 15087 and 15088.5(d) of the State CEQA Guidelines, the City and LAFCo have sent a notice of availability to all those who submitted comments on the DEIR and RDEIR, to all organizations and members of the public who were on the City's distribution list for the DEIR, and to any additional persons or organizations that have requested information about the EIR since the publication of the DEIR and RDEIR.

Copies of this Second RDEIR are available for review at:

City of Sacramento
Development Services Department
901 I Street
Sacramento, CA 95814

Sacramento Local Agency Formation Commission
1112 I Street, Suite 100
Sacramento, CA 95814

All written comments on this Second RDEIR should be addressed to:

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After close of the comment period, the City will consider all comments received on this RDEIR, prepare responses as required, and prepare the FEIR. The FEIR, which will consist of the DEIR, RDEIR, Second RDEIR comments on the DEIR, comments on the RDEIR, comments on the Second RDEIR, responses to comments, and any text changes, will be considered by the City Council and the LAFCo Board of Directors for certification if it is determined that the FEIR has been completed in compliance with CEQA. Following certification of the EIR, the City Council and Sacramento LAFCo Board of Directors will consider the proposed project for approval.

3 PROJECT DESCRIPTION

This second recirculated draft environmental impact report (Second RDEIR) evaluates the environmental effects of development of the Greenbriar development project (proposed project). No changes to the proposed project have occurred since publication of the previous DEIR on July 14, 2006.

3.1 PROJECT LOCATION

The project site encompasses approximately 577 acres located northwest of the intersection of State Route 70/99 (SR 70/99) and Interstate 5 (I-5) in Sacramento County. The project site is located in the unincorporated portion of Sacramento County, adjacent to and west of the City of Sacramento and outside the City of Sacramento's (City's) existing Sphere of Influence (SOI).

The project site is bordered by agricultural and rural residential land uses to the west and north, I-5 and agricultural lands to the south, and SR 70/99 and a new residential community currently under development within North Natomas to the east and south. Regional access to the project site is provided from SR 70/99 and I-5 (Exhibit 3-1). Local access to the project site is provided by Elkhorn Boulevard (Exhibit 3-2).

3.2 EXISTING SETTING

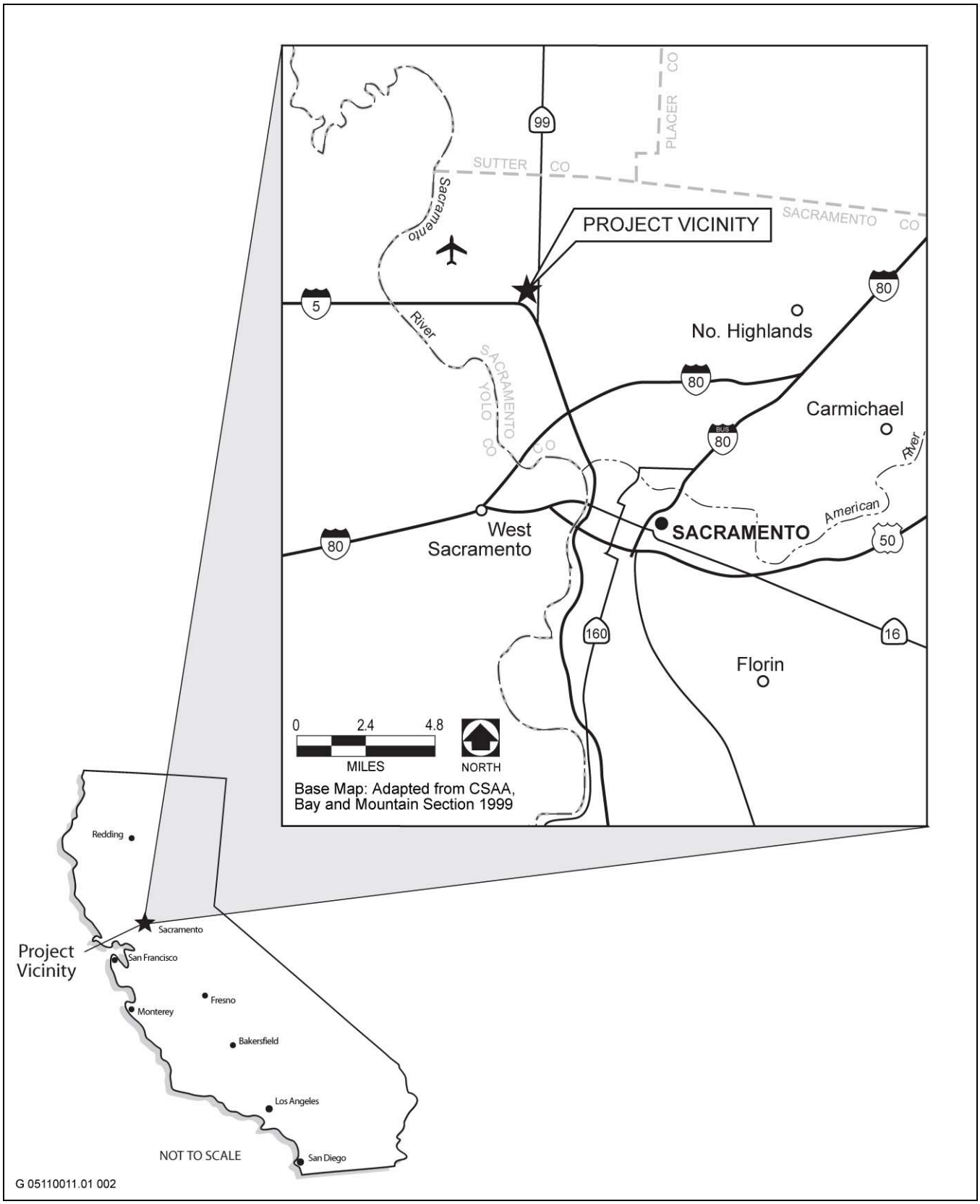
The project site consists of 12 parcels of land that have been in agricultural production and agricultural support uses. As of the publication of the notice of preparation (NOP) for the DEIR, the project site was fallow; however, the site has historically been rotated from fallow to active crop cultivation conditions. The majority of the site consists of former rice fields and associated water canals. Other crops that have been cultivated on-site include alfalfa and hay. A racehorse training facility was located in the northwest corner of the project site, but it has since been demolished and only some remnant building foundations and the dirt racetrack remain. Other buildings that were located on the project site include agricultural outbuildings, greenhouses, and other support structures (e.g., wells) (Exhibit 3-3). All on-site buildings have been demolished and removed from the site.

Surrounding land uses include agricultural land uses to the north and south, new residential development in the North Natomas community to the east and south, and the recently approved Metro Air Park development project to the west. The Metro Air Park development consists of proposed commercial, hotel, and recreational (i.e., golf course) land uses. The North Natomas Community Plan (NNCP) area is located adjacent to the eastern boundary of the project site across SR 70/99. Future development in the North Natomas area includes residential and commercial land uses.

The project site is located approximately 1 mile east of the Sacramento International Airport. The western two-thirds of the project site is located within the airport overflight safety zone. The airport overflight safety zone defines the area in which airplanes taking off or landing have the greatest opportunity to fly directly over the project site.

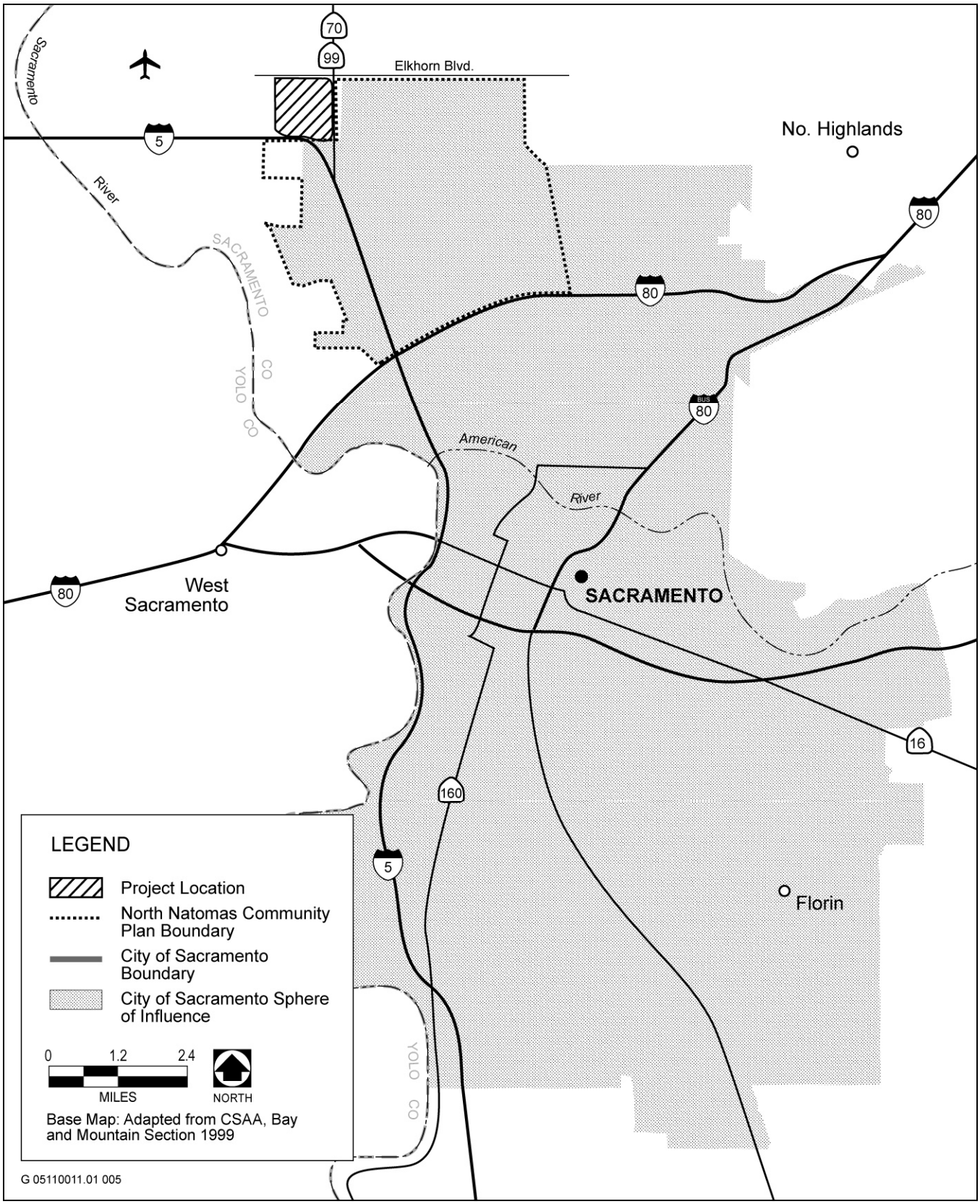
3.3 PROJECT PURPOSE

The proposed plan, land uses, zoning, and public improvements for the project site would create a residential development that provides access to alternative modes of transportation (e.g., light rail, bicycle, walking) to on-site commercial and retail centers and to off-site employment centers. The project would provide a variety of housing types at an intensified density along with mixed-use development to promote use of alternative modes of transportation. The project's use of a grid street pattern would provide multiple access routes to destinations on-site and off-site and would allow for narrower streets within residential neighborhoods.



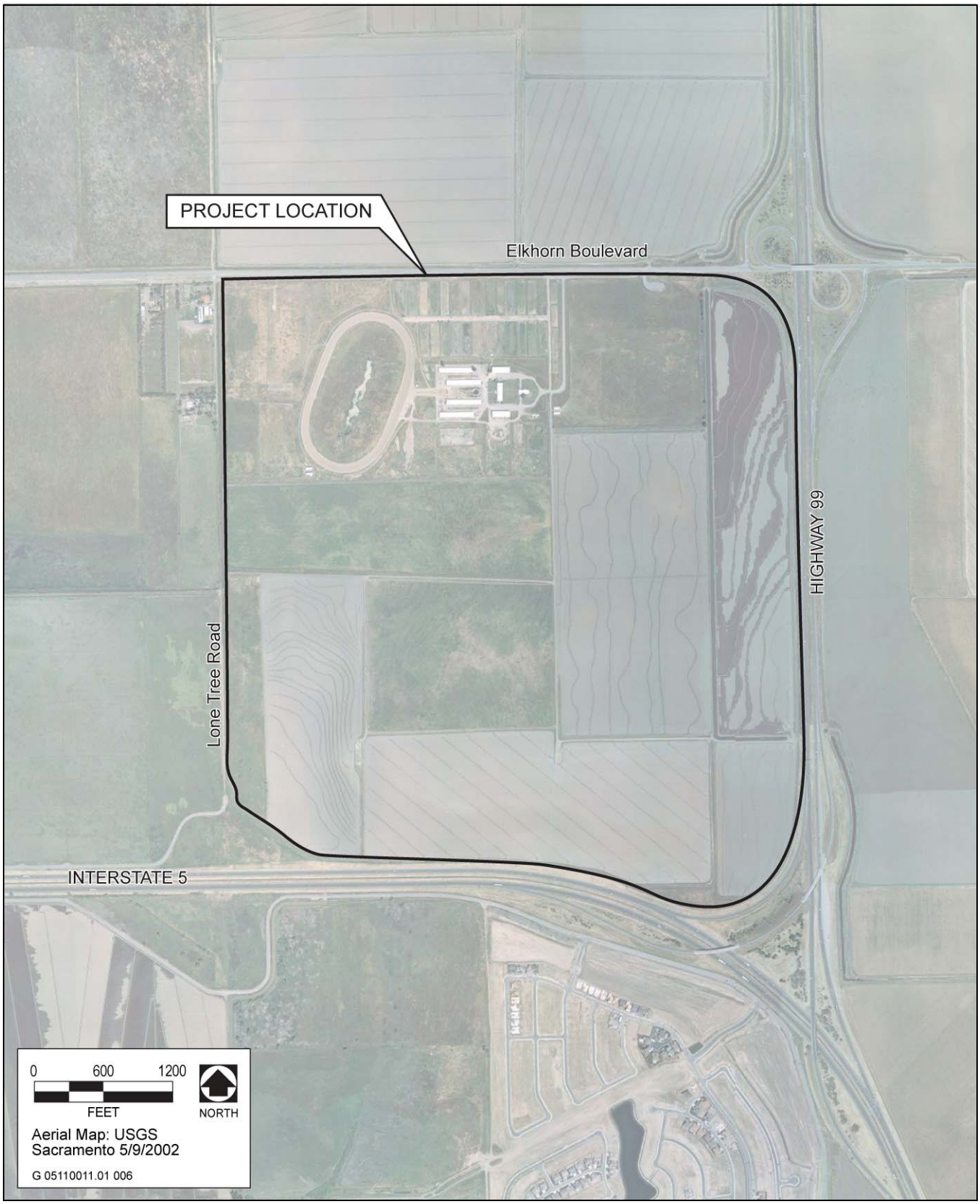
Source: EDAW 2005

Project Vicinity Map **Exhibit 3-1**



Source: EDAW 2005

Project Location Map **Exhibit 3-2**



Source: EDAW 2005

Aerial Map of the Project Site **Exhibit 3-3**

The purpose of the project is to create a mixed-use neighborhood through the development of retail and commercial uses, multifamily attached homes, and high-density single-family detached homes. In addition, the project would allow for future on-site retail and commercial development in support of surrounding housing. The project also promotes the use of public transportation by incorporating a light rail station at the core of development.

3.4 PROJECT OBJECTIVES

The project has the following project objectives:

- create a quality residential development near the major employment centers of downtown Sacramento and Metro Air Park;
- create a transit-oriented, pedestrian-friendly development;
- provide development and land for construction of a light rail stop along the proposed Downtown-Natomas-Airport light rail line with densities that would support the feasibility of a light rail line;
- develop the project site in a manner consistent with and supportive of the Sacramento Area Council of Government's (SACOG's) Blueprint plan;
- develop a project that is consistent with the Sacramento International Airport Comprehensive Land Use Plan (CLUP) to the degree feasible;
- design a project that promotes using various modes of transportation by locating high-density residential development within one-quarter mile of the proposed light rail station;
- provide vertically and horizontally mixed-use neighborhoods;
- provide neighborhood and community retail near residential development to shorten or reduce the number of vehicle trips;
- incorporate parks and open space into the project design in a manner that provides community connectivity;
- create a residential development with a variety of housing types;
- provide park and recreation opportunities within walking distance of residents;
- provide an elementary school site to serve the project's student demands;
- encourage walking and bicycle use by designing residential areas in a grid street pattern;
- make efficient use of development opportunity as the project site is bordered on three sides by existing or planned urban development;
- satisfy the requirements of the City of Sacramento's Inclusionary Housing Ordinance in part by providing an age-restricted facility (senior housing, retirement community) located near transit and other services that are affordable to very-low- and low-income households;
- ensure adequate, timely, and cost effective public services for the project; and
- develop and implement the project consistent with the General Plan Update Vision and Guiding Principles adopted by the City of Sacramento.

3.5 PROJECT CHARACTERISTICS

3.5.1 LAND USES

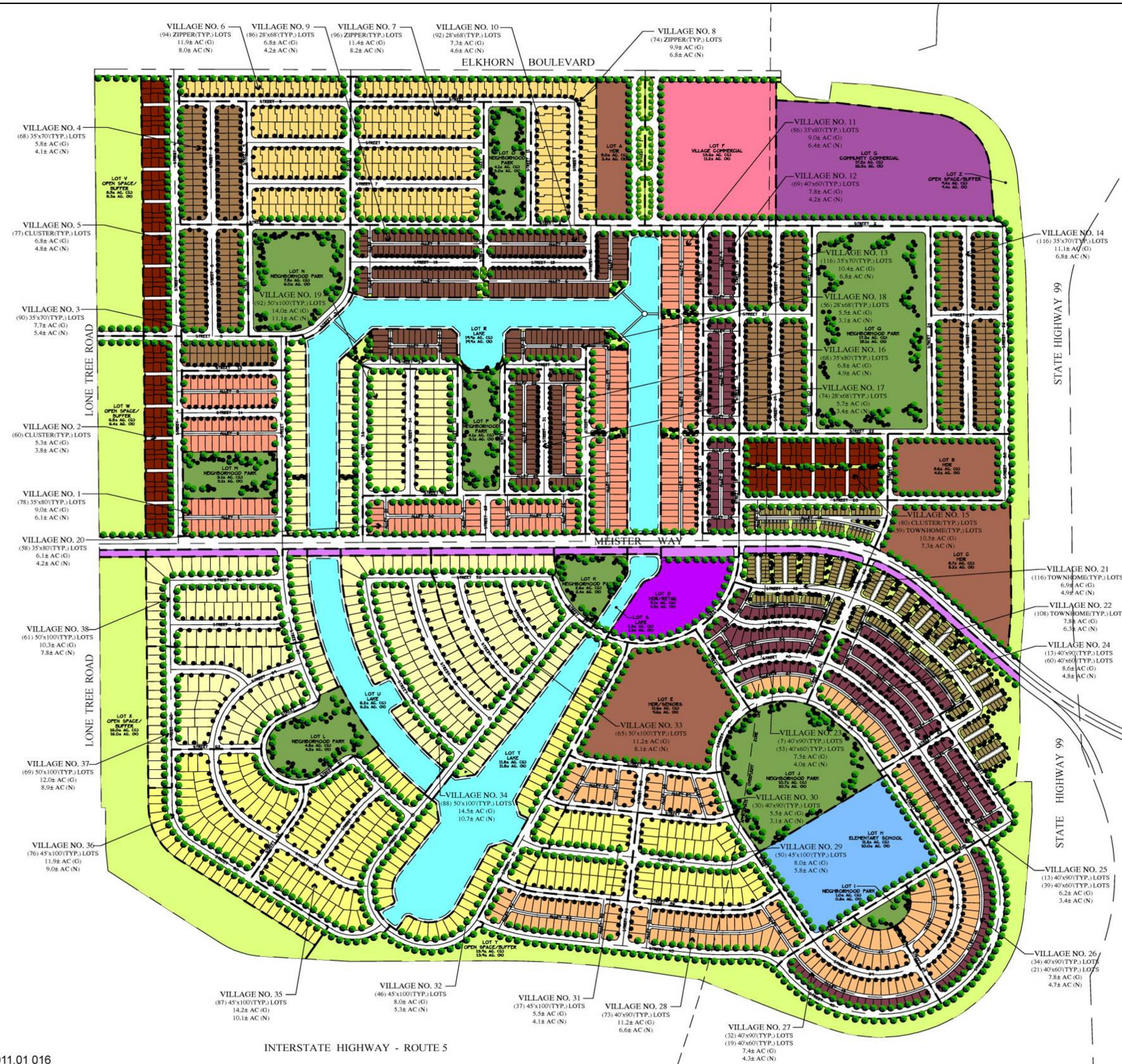
The project includes the construction of a range of housing types (e.g., high-, medium-, low-density) that would be located within close proximity of public transportation systems (Exhibit 3-4). The proposed land use plan is a predominantly residential development centered on a common lake/detention basin (approximately 39 acres). A total of 3,473 housing units and approximately 27.5 net acres of retail and commercial space would be provided on-site. A 10-acre (net) elementary school would be provided in the southeastern portion of the project site and would meet the school demands of the project site. A total of eight neighborhood parks (48.5 net acres) would be provided throughout the community and would be connected by the central lake/detention basin and pedestrian paths and trails. Along with this, the project incorporates a 250-foot linear open space/buffer along the western edge of the site adjacent to Lone Tree Canal (measured from the center of the canal) for the protection of giant garter snake habitat. This area is proposed to be preserved as natural habitat and would only undergo periodic maintenance activities to ensure that the primary objective of providing quality giant garter snake habitat is preserved. No facilities (e.g., trails, paths) or other activities would occur within this corridor. Two other groundwater wells would be constructed near the lake/detention basin and would be used periodically (if at all) to maintain adequate water levels in the lake/detention basin. The project applicant would also grant a navigation easement over the project site to the Sacramento International Airport. This easement would require title notification to future residents of the project site that aircraft operations occur less than 1 mile east of the site and that those occupants could be subject to increased noise levels associated with aircraft overflights.

The project would also provide an age-restricted facility that provides housing for seniors and retirees to satisfy the requirements of the City's Inclusionary Housing Ordinance (Section 17.190 of the City of Sacramento Zoning Code). The Inclusionary Housing Ordinance requires that 10% of housing units in new developments be affordable to very-low-income households and 5% of housing units affordable to low-income households. Development of senior housing would create a retirement community that would serve very-low and low-income households and would increase the mixture of housing types within the project. The total number of housing units proposed to be developed as part of the project is shown in Table 3-1 below.

Medium- and high-density housing and retail land uses would be located in the center of the project site along a new arterial (Meister Way) that connects the project site to the North Natomas Community to the east via a new overpass over SR 70/99 and Metro Air Park to the west. Easements would be provided for a new light rail station to be constructed along this new roadway arterial by Sacramento Regional Transit (RT), and RT intends to provide a new light rail stop along RT's proposed Downtown-Natomas-Airport light rail line. Commercial development would be located primarily in the northeastern portion of the project site along Elkhorn Boulevard. The project includes the construction of 155,000 square feet of large-format retail uses (including a 10,000-square-foot garden center), 67,000 square feet of grocery uses, and 66,000 square feet of retail shops on the village and community commercial designated parcels (Exhibit 3-4) for a total of 288,000 square feet of commercial services.

3.5.2 ANNEXATION AND SPHERE OF INFLUENCE EXPANSION

The project site is currently located in the County of Sacramento, adjacent to and west of the corporate limits and SOI of the City of Sacramento, and outside the City of Sacramento's SOI. The applicant requests approval by the Sacramento Local Agency Formation Commission (LAFCo) for amendment of the City's SOI and annexation of the project site into the City consistent with the Memorandum of Understanding.

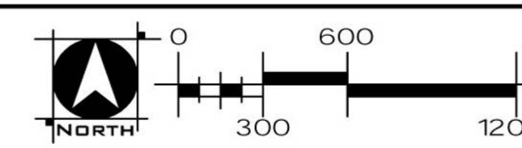


LAND USE SUMMARY

LOT NO./VILLAGE NO.	GENERAL PLAN/ COMM. PLAN/ZONING DESIGNATION	USE	ACRES (G)	ACRES (N)	UNITS	DENSITY
VILLAGES 19, 33, 34, 37 + 38	LDR/LD/R-1(PUD)	LOW DENSITY RESIDENTIAL (50'x100')	62.0	46.6	375	8.1
VILLAGES 29, 31, 32, 35 + 36	LDR/LD/R-1(PUD)	LOW DENSITY RESIDENTIAL (45'x100')	47.6	34.3	296	8.6
SUBTOTAL			109.6	80.9	671	–
VILLAGES 6, 7 + 8	MDR/MD/R-1A(PUD)	MEDIUM DENSITY RESIDENTIAL (ZIPPER)	33.2	23.0	264	11.5
VILLAGES 28 + 30	MDR/MD/R-1A(PUD)	MEDIUM DENSITY RESIDENTIAL (40'x90')	16.7	9.7	103	10.6
VILLAGES 23, 24, 25, 26 + 27	MDR/MD/R-1A(PUD)	MEDIUM DENSITY RESIDENTIAL (40'x90' + 40'x60')	37.5	21.2	291	13.7
VILLAGES 1, 11, 16 + 20	MDR/MD/R-1A(PUD)	MEDIUM DENSITY RESIDENTIAL (35'x80')	30.9	21.6	290	13.4
VILLAGES 3, 4, 13 + 14	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (35'x70')	35.0	23.1	390	16.9
VILLAGE 12	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (40'x60')	7.8	4.2	69	16.4
VILLAGES 9, 10, 17 + 18	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (28'x68')	25.3	15.3	308	20.1
VILLAGES 2 + 5	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (CLUSTER)	12.1	8.6	137	15.9
VILLAGES 21 + 22	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (TOWNHOMES)	14.7	11.2	224	20.0
VILLAGE 15	MDR/MD/R-2B(PUD)	MEDIUM DENSITY RESIDENTIAL (CLUSTER + TOWNHOMES)	10.5	7.3	139	19.0
SUBTOTAL			223.7	145.2	2,215	–
LOTS A, B + C	HDR/HD/R-2B(PUD)	HIGH DENSITY RESIDENTIAL	19.3	15.8	307	22
LOT D	HDR/HD/R-2B(PUD)	HIGH DENSITY RESIDENTIAL (RETAIL)	5.1	4.5	25	22
LOT E	HDR/HD/R-2B(PUD)	HIGH DENSITY RESIDENTIAL (SENIORS)	11.6	9.6	255	30
SUBTOTAL			36.0	29.9	587	–
LOT F	CNCO/CNCO/SC(PUD)	VILLAGE COMMERCIAL	13.6	11.2	–	–
LOT G	CNCO/CNCO/C-2(PUD)	COMMUNITY COMMERCIAL	17.2	16.3	–	–
LOT H	LDR/ES/R-1(PUD)	ELEMENTARY SCHOOL	11.2	10.0	–	–
LOTS I – Q	PROS/P/R-1(PUD)	NEIGHBORHOOD PARK	55.2	48.4	–	–
LOTS R – U	W/OS/A-OS(PUD)	LAKE	39.2	39.2	–	–
LOTS V – Z	PROS/OS/A-OS(PUD)	OPEN SPACE/BUFFER	54.3	54.0	–	–
LOT AA	PROS/OS/A-OS(PUD)	LIGHT RAIL CORRIDOR	0.2	0.2	–	–
LOTS BB, CC, EE + FF	LDR/LD/R-1(PUD)	LIGHT RAIL CORRIDOR	1.8	1.8	–	–
LOTS DD + HH	W/OS/A-OS(PUD)	LIGHT RAIL CORRIDOR	0.4	0.4	–	–
LOT GG	PROS/P/A-OS(PUD)	LIGHT RAIL CORRIDOR	0.4	0.4	–	–
LOT II	HDR/HD/R-2B(PUD)	LIGHT RAIL CORRIDOR	0.6	0.6	–	–
LOTS JJ + KK	MDR/MD/R-1A(PUD)	LIGHT RAIL CORRIDOR	1.6	1.6	–	–
LOTS LL – PP	–	LANDSCAPE CORRIDOR	–	1.8	–	–
LOTS QQ, RR + MMM – RRR	LDR/LD/R-1(PUD)	OPEN SPACE/PEDESTRAIN PASEO	–	0.65	–	–
LOTS SS – LLL + SSS	MDR/MD/R-1A(PUD)	OPEN SPACE/PEDESTRIAN PASEO	–	1.98	–	–
ELKHORN BOULEVARD + MEISTER WAY			12.0	12.0	–	–
LOCAL RESIDENTIAL STREETS			–	120.5	–	–
SUBTOTAL			207.7	321.0	–	–
TOTAL			577.0	577.0	3,473	–

NOTES

1. LANDSCAPE CORRIDOR AND LANDSCAPE/PEDESTRIAN ACCESS TOTALS ALREADY INCLUDED IN GROSS ACREAGE OF ABOVE VILLAGES.
2. DWELLING UNITS ON HDR – LOT D HAS BEEN CAPPED TO 25 DWELLING UNITS.
3. PER THE NNCP, RESIDENTIAL DWELLING UNITS ON HDR LOTS A, B, C + E WERE CALCULATED USING 0.89% OF THE NET ACREAGE MULTIPLIED BY THE TARGET DENSITY FOR EACH PARCEL.



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Source: Wood Rodgers, September 2005

Project Site Plan **Exhibit 3-4**

Table 3-1
Proposed Housing Types and Number of Units

Housing Type		Number of Housing Units
Low-Density		
50 x 100-foot lots		375
45 x 100-foot lots		296
	Subtotal	671
Medium-Density		
Zipper lots [a]		264
45 x 90-foot lots		103
40 x 90-foot + 40 x 60-foot lots		291
35 x 80-foot lots		290
35 x 70-foot lots		390
40 x 60-foot lots		69
28 x 68-foot lots		308
10-unit cluster		217
Townhomes		283
	Subtotal	2,215
High-Density		
Apartments		307
Senior housing		255
Mixed-use housing		25
	Subtotal	587
	Total Housing Units	3,473

[a] Lot design in which rear lot line moves back and forth to vary the depth of the rear yard and concentrate open space on the side of lot.
Source: Data compiled by EDAW 2005

A variety of public services would be provided to the project site by the City and other local/regional service agencies including the Sacramento Regional County Sanitation District (SRCSD) (wastewater), City of Sacramento (water, parks and recreation, fire, and police), Reclamation District Number 1000 (RD 1000) (stormwater), Rio Linda Union School District and Grant Joint Union High School District (schools), Sacramento Police Department, and Sacramento Fire Department.

The project site lies within the service area of these service providers, with the exception of SRCSD and Sacramento Police Department. The project site is adjacent to and east of SRCSD's SOI. As such, before SRCSD can provide service to the project site, the project would require approval from LAFCo for the amendment of SRCSD's SOI to include the project site. The City would be responsible for providing law enforcement services after annexation of the project site into the city.

3.5.3 GENERAL PLAN AMENDMENT, GENERAL PLAN UPDATE, AND SACOG BLUEPRINT

The project would require the amendment of the City's existing general plan land use designations on the project site from AG-80 (agricultural cropland uses/80-acre minimum lot size) to land use designations that would be consistent with proposed land uses as described in Table 3-2. The project would also amend the boundaries of the NNCP. The project includes the adoption of Planned Unit Development (PUD) Guidelines and the Greenbriar Finance Plan, which would guide development of the project.

Table 3-2
Proposed City Land Use Designations and Acreages (Net) for the Project Site

Designation	General Plan Land Use	Acres
LDR	Low-density residential (4–15 du/ac)	80.9
MDR	Medium-density residential (16–29 du/ac)	145.2
HDR	High-density residential (30+ du/ac)	29.9
PROS	Neighborhood park/Open space/Buffer	105
W	Water	39.2
LDR	Elementary school	10.0
CNCO	Community/Village commercial	27.5
--	Major and secondary roads	12.0
--	Local Residential Streets	120.4
--	Light Rail Corridor	5.0
--	Landscape Corridor	1.8
Total		576.9

Note: du/ac = dwelling units per acre

The project would generally be consistent with the City of Sacramento General Plan Update Vision and Guiding Principles document adopted in November 2005, and SACOG's Seven Principles of Smart Growth used to develop the regional blueprint. The project's compliance with these two sets of broad policy directives will be described in the Planned Unit Development Design Guidelines prepared for the project. The City will consider adoption of the Planned Unit Development Design Guidelines as one of several discretionary actions necessary to approve the project as described in Section 3.6, "Required Discretionary Actions."

3.5.4 ZONING AMENDMENT

The project would also require a zoning amendment to change the City's existing zoning designations for the project site from the current designation of AG-80 (agricultural cropland uses/80-acre minimum lot size) to zoning designations that are consistent with proposed land uses as described in Table 3-3.

Table 3-3
Proposed Zoning Designations and Acreages for the Project Site

Designation	Land Use	Acres
R-1 (PUD)	*Low-density residential/Elementary School:* Allows residential land uses with densities from four to 15 dwelling units per acre. Typical development will include single-family detached units, duplexes, halfplexes, townhomes, condominiums, zero-lot-line units, and cluster units (City of Sacramento 1988).	90.9
R-1A (PUD)	*Medium-density residential:* Allows multiple-family dwellings with densities ranging from 16 to 29 dwelling units per acre. Typical development will include condominiums, garden apartments, and light-density apartment uses (City of Sacramento 1988).	86.7
R-2B (PUD)	*High-density residential:* Allows a mixture of residential densities along with limited commercial or office use with densities from 30 to 156 units per net acre (City of Sacramento 1988).	88.4
A-OS (PUD)	*Neighborhood park/Open space/Buffer/Water:* Allows development of neighborhood parks and open space areas consistent with the General Plan's definition for such uses. The buffer designation allows an enhanced movement corridor for giant garter snake. The water features allow development of a lake/detention basin that would detain water on a year-round basis.	146.0
SC (PUD)	*Village commercial:* Allows development of commercial centers that are intended to serve as the focal point for two to four neighborhoods. The anchor tenant would be a grocery store and/or drugstore.	11.2
C-2 (PUD)	*Community commercial:* Allows development of commercial centers that offer comparison shopping as well as convenience items. The anchor tenant would be a junior department store, large variety, or discount store. Other tenants may include specialty clothing stores, furniture or appliance stores, jewelry stores, and entertainment services.	16.3
--	Major and secondary roads	132.4
--	Light rail corridor	5.0
Total		576.9

3.5.5 PARKS AND OPEN SPACE

The project includes several park and open space features, including greenbelt areas along I-5, SR 70/99, and Elkhorn Boulevard; a 250-foot linear open space/buffer along the Lone Tree Canal (measured from the center of the canal), the western edge of the project site, for the protection of giant garter snake habitat; bike and pedestrian trails located throughout the proposed community; and 48.4 net acres of parks. A 10-acre neighborhood park would be located adjacent to the proposed elementary school in the southeast portion of the site. A total of six smaller park sites (i.e., park sites ranging from 2 to 6 acres) would be located in the eastern half of the project site north and south of Meister Way. A 23-acre community park site would be located in the northeast quadrant of the project site. Exhibit 3-4 presents the general location of the proposed park facilities; however, since preparation of this site plan, the applicant in coordination with the City of Sacramento has made minor adjustments to the park acreages to better reflect the City's goal for park development within the project site. These changes have been described above.

3.5.6 TRANSPORTATION FACILITIES AND CIRCULATION

The project includes the construction of the Meister Way overpass over SR 70/99. This overpass would generally be located near the center of the project site and would connect the project site to the North Natomas Community east of the project site. In addition, Meister Way would be extended west of the project site once the Metro Air Park project is constructed (discussed further in Section 3.7, "Related Projects"). The proposed overpass would consist of two lanes (one lane in each direction) and pedestrian sidewalks on either side of the roadway. The

overpass would extend from East Commerce Way east of the site to its first intersection within the project site. The project applicant would contribute its fair share to funding this improvement, which would ultimately be constructed under the direction of the City. Timing of construction of this improvement is linked to an increase in project trips as described in Section 4.1, "Transportation and Circulation."

Other proposed transportation improvements would include the widening of Elkhorn Boulevard to provide adequate ingress and egress at the project site (e.g., turning lanes) and construction of an internal roadway circulation network. The project would provide automobile access to off-site locations via Elkhorn Boulevard at the northern project boundary, Lone Tree Road at the western project boundary, SR 70/99 at the eastern boundary, and Meister Way, which passes through the center of the project site in an east-west direction (Exhibit 3-4). Meister Way would connect to areas east of the project site via a new roadway overpass over SR 70/99. The overpass is an element of the proposed project and would extend from East Commerce Way east of the project site to its first intersection within the project site.

The project site is located along the proposed Downtown-Natomas-Airport light rail line and includes dedication of a corridor that could accommodate a future transit stop and light rail alignment located near the center of the project site along the proposed Meister Way roadway. The light rail station would provide public transportation access to downtown Sacramento, the Sacramento International Airport, and Metro Air Park.

On-site vehicle circulation would be provided by local residential streets and collector streets through each neighborhood. All roadways except for local residential neighborhood streets, including the Meister Way overpass, would include a separate bike lane (Class II). Sidewalks and green spaces would be located throughout residential neighborhoods to allow pedestrian access throughout the development and to surrounding areas. Approximately 3.9 acres of pedestrian trails would be provided around the on-site lake/detention basin.

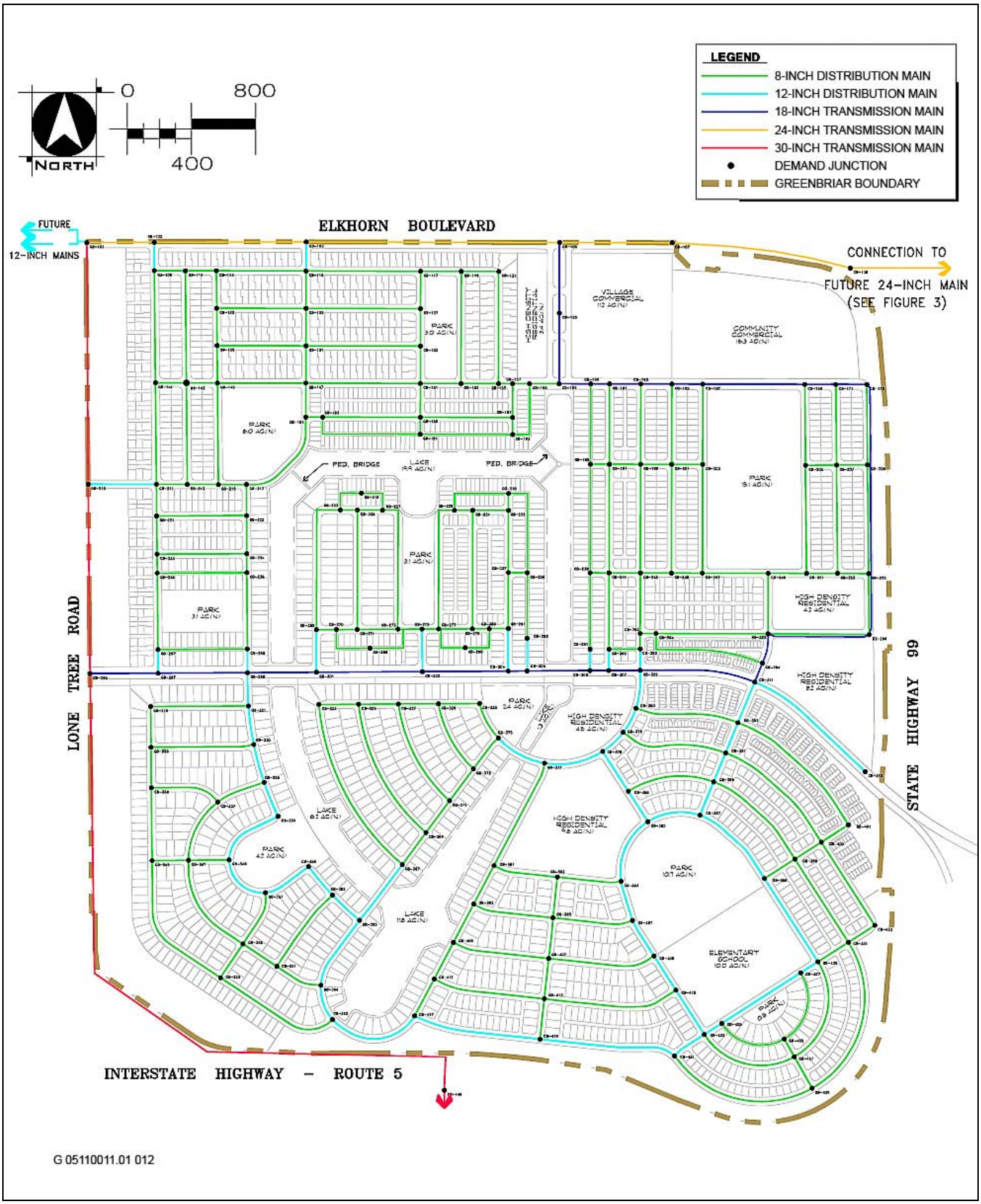
Using Meister Way as an east-west dividing line through the project site, vehicle circulation in the northern portion of the project site is focused along a grid pattern (no use of cul-de-sacs) of streets extending through residential neighborhoods and neighborhood parks. The northern portion has four access points along Elkhorn Boulevard and eight access points from Meister Way. The southern portion of the project site also includes a grid pattern with streets extending through residential neighborhoods and neighborhood parks in a curvilinear form. The southern portion has three access points from Meister Way. These three access points also extend north across Meister Way to provide a connection to the northern and southern parts of the project site. The use of a grid pattern for streets throughout the project site provides multiple access points and routes to on- and off-site areas.

3.5.7 INFRASTRUCTURE PLANS

The project would include phased expansion and extension of public utility infrastructure from adjacent areas (e.g., NNCP area) to the project site. Infrastructure plans would specify the size and locations of pipelines necessary to convey potable water, wastewater (including pump and lift stations if necessary), and stormwater drainage to and from the project site. In addition, locations for placing electrical infrastructure and natural-gas lines would also be identified on the plans.

Water Facilities

The main water supply for the project site would be a 30-inch transmission line that would be extended from South Bayou Road (south of the project site) under I-5 (via a jack-and-box construction method) (Exhibit 3-5) to Elkhorn Boulevard. Additional reliability and redundancy in the water distribution system would be provided through a 24-inch transmission line that would be constructed from Natomas Boulevard and Elkhorn Boulevard (east of the project site) to the intersection of Lone Tree Road and Elkhorn Boulevard, where it would connect to on-site distribution facilities. The proposed water distribution system would consist of a grid of 8-inch and



Source: Wood Rodgers 2005

Water Distribution System **Exhibit 3-5**

12-inch distribution mains throughout areas designated for residential land uses. An 18-inch transmission main would run under Meister Way from the western edge of the project site to the east; it would then run north between two parcels designated for high-density residential land uses (near the eastern boundary), east along the boundary of the site, and would terminate at a 24-inch transmission main located in Elkhorn Boulevard. Three groundwater wells would be constructed on-site: one to periodically maintain flow in Lone Tree Canal, and two to maintain (if needed) flows within the on-site lake detention basin.

Wastewater Facilities

The project includes the construction of a gravity-flow and force-main wastewater collection system. Approximately one-quarter of the site would be served by a gravity-flow system that would connect to the existing 33-inch North Natomas interceptor located at the terminus of Greg Thatch Circle (immediately east of the project site) (Exhibit 3-6). The remaining portions of the project site would be served by gravity flow to a centrally located lift station. Flows from the lift station would be conveyed by a 16-inch sewer force main that would ultimately connect to the 33-inch North Natomas Interceptor along the northwestern boundary of the property.

STORM DRAINAGE FACILITIES

The project includes the construction of an approximately 39-acre lake/detention basin. The project site would be graded to create building pads and streets that would direct drainage to the lake/detention basin. Storm drainage trunk lines within the project site would be sized from 24 to 54 inches and would convey on-site stormwater to the lake/detention basin, which would use a gravity outfall to discharge flows into the West Drainage Canal through two 78-inch reinforced concrete pipes and three 8-feet by 5-feet box culverts at the I-5 undercrossing located in the southwestern portion of the project site.

3.5.8 CONSTRUCTION PLANS

Construction activities associated with project development would include grubbing/clearing of on-site areas, excavation and relocation of soil on the site (i.e., balanced grading), backfilling and compaction of soils, construction of utilities (i.e., potable-water conveyance, wastewater conveyance, stormwater drainage facilities, underground electrical and natural-gas facilities), and construction of proposed buildings associated with residential and commercial land uses. With the exception of proposed infrastructure connections, all construction activities would occur within the 577-acre site. Off-site infrastructure (e.g., water and sewer pipelines) construction would generally occur within existing roadways and would encompass an approximately 50-foot corridor. The Meister Way overpass and Elkhorn Boulevard improvements would also occur in existing roadway alignments. Construction equipment would vary day-to-day depending on activities occurring, but would involve operation of scrapers/earthmovers, wheeled dozers, water trucks, forklift, wheeled loaders, and a motor grader. A maximum of 250 workers would commute to the project site on a daily basis. Construction workers would access the site via Elkhorn Boulevard and SR 70/99. The project would be developed in two phases with Phase 1 developing land north of Meister Way and Phase 2 developing land south of Meister Way. Following the initial site preparation (grubbing, clearing, grading) phase, building construction would commence. Construction of the project is anticipated to begin in spring/summer 2007 and would last approximately 5–10 years.

Timing of construction of the proposed Meister Way overpass would be determined based on project transportation impacts identified in Section 4.1, “Transportation and Circulation,” and through the financing plan prepared for this project, which would be prepared in consultation with the City of Sacramento. Timing for the extension of light rail service and construction of a light rail station would depend on Sacramento Regional Transit’s schedule for implementation, which is currently unknown at this time.

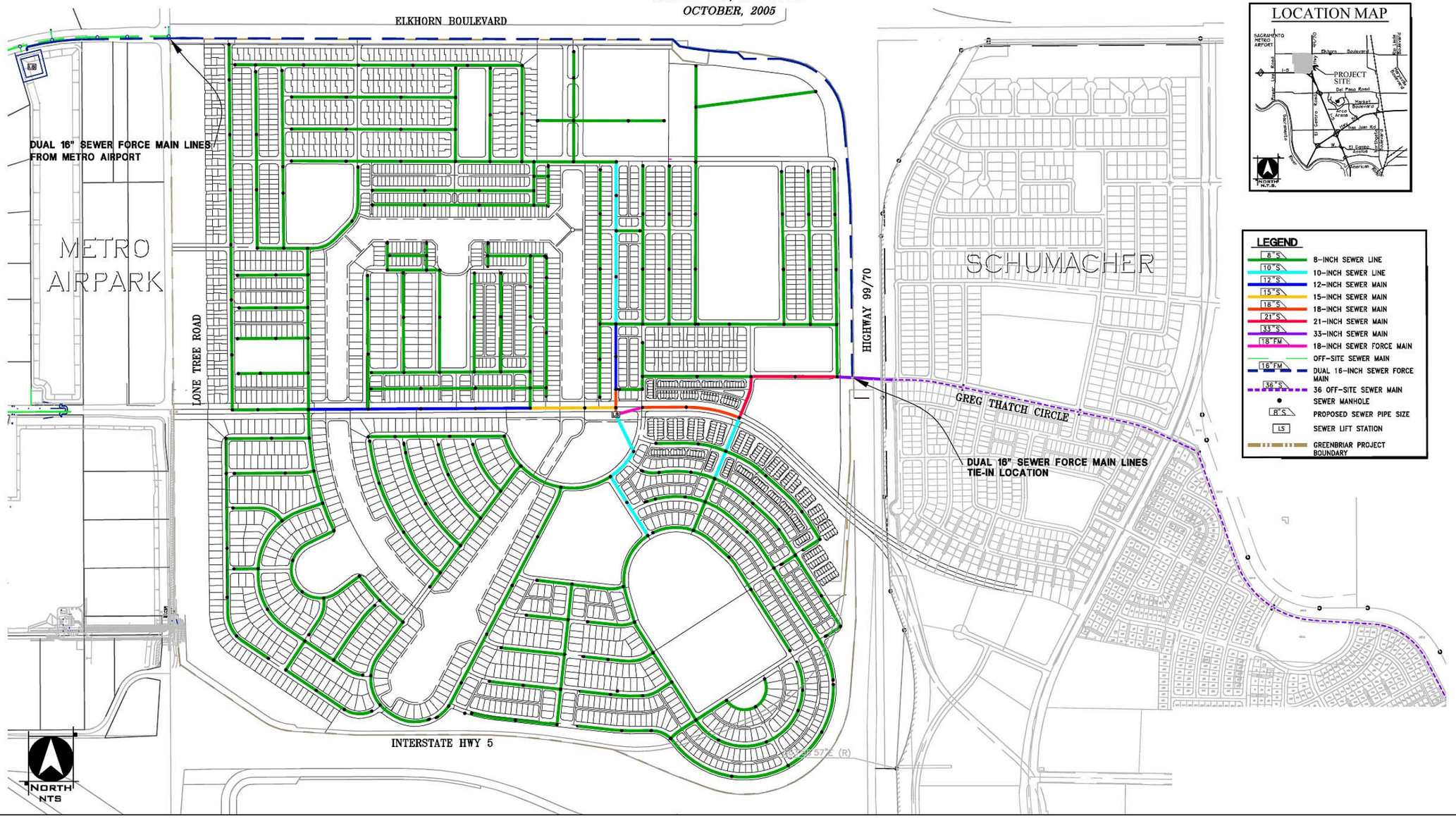
SEWER SYSTEM LAYOUT FOR

GREENBRIAR

CITY OF SACRAMENTO

SACRAMENTO, CALIFORNIA

OCTOBER, 2005



Source: Wood Rodgers 2005

Wastewater Conveyance System **Exhibit 3-6**

3.6 REQUIRED DISCRETIONARY ACTIONS

Project approval requires the lead agencies (and responsible agencies) to approve the project or project components, issue required permits, or affirm compliance with agency requirements. The Sacramento LAFCo and City of Sacramento are the co-lead agencies for the Greenbriar project. A lead agency, as defined in Section 15367 of the California Environmental Quality Act Guidelines (State CEQA Guidelines), is "the public agency that has the principal responsibility for carrying out or approving a project." Described below are the environmental review process for the project and the discretionary actions sought by the project applicant for the Greenbriar project that the City and LAFCo will consider during its review. The City is the project applicant for LAFCo proceedings (i.e., SOI amendment [SOIA] and reorganization).

- The DEIR will be circulated for public review and comment, as described in Chapter 1, "Introduction."

- The City will refer the project to the Sacramento County Airport Land Use Commission (ALUC) for a review of the project's consistency with the Comprehensive Land Use Plan (CLUP).

- The Sacramento LAFCo will hold a public hearing during the public review period, at which time individuals and public agencies may comment on the adequacy of the DEIR.

- ALUC will issue a consistency determination for the project.

    - If ALUC determines that the project is inconsistent with the CLUP, the City will review ALUC's decision and will determine whether to issue a Statement of Override for ALUC's decision.

    - If a Statement of Override is issued by the City, the City will forward a notice of its decision to ALUC 45 days before the City takes action to override ALUC's decision.

    - Within 30 days of receiving the City's notice to override its consistency determination, ALUC will submit its findings to the City.

- After the close of the public review period for the DEIR, the final EIR (FEIR), consisting of all comments received on the DEIR together with responses to those comments and necessary changes to the EIR text, will be prepared and circulated to public agencies for a 10-day review period.

- After the close of the 10-day review period, LAFCo will hold a public hearing at which it will consider the adequacy of the FEIR regarding the SOIA only, including review of written comments on the adequacy of the FEIR response to comments on the DEIR.

- After certification of the FEIR by LAFCo, the commission will then consider the merits of the project as it relates to the issues of growth projections, rate of buildout, municipal service provision, and open space and prime agricultural resources in a public hearing, at which time the public can comment on the merits of the SOIA application before LAFCo.

- Applications that LAFCo would consider for approval, conditional approval, or denial include whether to:

    - accept the Municipal Services Review for the project;
    - approve amendment of the City's SOI to incorporate the project site; and
    - approve amendment of SRCSD's SOI to incorporate the project site.

- After LAFCo considers the SOIA and if recommendations for approval or conditional approval are made, the City of Sacramento Planning Commission will hold a public meeting at which it will consider the adequacy of the FEIR for prezoning, amendment of the NNCP boundaries, and land use entitlements (e.g., general plan amendments, maps, PUD guidelines, and finance plan).

- When the Planning Commission is satisfied that the FEIR is complete, it will recommend that the City Council certify the FEIR as being adequate according to CEQA requirements.

- Following the Planning Commission recommendation to the City Council, the Planning Commission will then consider the merits of the project. This consideration could occur during the same meeting at which it considers the adequacy of the FEIR. The Planning Commission will hold a public hearing at which individuals and public agencies can comment on the merits of the project, after which the Planning Commission will recommend approval, conditional approval, or denial of project applications.

- Entitlement actions under consideration by the Planning Commission during its review of the project merits will include whether to:

    - recommend approval of a prezone of the project site to zoning designations consistent with the proposed development plan and the City's zoning categories;

    - recommend approval of a general plan amendment to amend the City land use designation of AG-80 to low-density residential, medium-density residential, high-density residential, neighborhood park/open space/buffer, water, community/village commercial;

    - recommend approval for review of project to the Sacramento LAFCo to consider approval of reorganization of the project site, annexation into the City of Sacramento, and SRCSD and detachment from Natomas Fire Protection District (FPD);

    - recommend approval for referring the project to the Sacramento City Council to consider approval of the Greenbriar Planned Unit Development Design Guidelines;

    - recommend approval of the project's financing plan (Greenbriar Finance Plan);

    - recommend approval of the project's Senate Bill 610 (SB 610) Water Supply Assessment;

    - recommend approval of large-lot tentative subdivision map;

    - recommend that the City Council repeal Resolution No. 2001-518, which was adopted by the City of Sacramento on July 24, 2001, pursuant to the *Agreement to Settle Litigation in the National Wildlife Federation v. Bruce Babbitt, Secretary of Interior* case;

    - recommend approval of the ALUC override (if an override is determined to be necessary);

    - recommend approval of an inclusionary-housing plan;

    - recommend approval of small-lot tentative subdivision maps; and

    - recommend approval of a development agreement for the project.

- After the Planning Commission considers the project and if recommendations for approval or conditional approval are made, the City Council would then hold a public meeting, at which time it will decide whether to certify the FEIR.

- After certification of the FEIR, the City Council will then consider the merits of the project in a public hearing, at which time the public can comment on the merits of the project and applications for project approval. The City Council will approve, conditionally approve, or deny the Greenbriar project. After approval or conditional approval of the project by the City Council, the City will adopt a resolution to initiate the reorganization (annexation and detachment).

- After approval or conditional approval of the project by the City Council, LAFCo will hold a public meeting to consider whether to approve, conditionally approve, or deny the reorganization (annexation and detachment) of the project site to the City of Sacramento and SRCSD.

- Once all project entitlements are obtained from the City of Sacramento and LAFCo, other responsible agencies would consider the project and associated entitlements when considering permitting or other related actions. Examples of potential responsible agency actions that could be required for this project are provided in Section 1.3, "Lead and Responsible Agencies."

3.7 RELATED PROJECTS

State CEQA Guidelines Section 15130, "Discussion of Cumulative Impacts," requires an EIR to discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. A cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. The following sections discuss projects that are approved or proposed and would potentially result in environmental impacts that would contribute to cumulative conditions. See Section 7.2, "Cumulative Impacts, for Additional Analysis."

3.7.1 NORTH NATOMAS COMMUNITY PLAN

The project site is located adjacent to the NNCP area, a developing area in the northern portion of the City of Sacramento. The community plan area consists of approximately 9,000 acres. Within this area the City of Sacramento envisions the development of urban land uses consisting of residential, employment, commercial, and civic land uses that would be interdependent on local transit service and transit routes, including light rail. According to the City of Sacramento, development within the NNCP area as of September 14, 2005, includes approval of 12,162 lots for development of residential, commercial, and industrial land uses; approval of 10,801 building permits; approval of 11,599 single-family residential special permits; and approval of 6,003 multifamily residential special permits.

3.7.2 NORTH NATOMAS JOINT VISION AREA

The project site is located within the North Natomas Joint Vision (Joint Vision) area, which is a collaborative effort between the City and County of Sacramento (County) to develop a vision for the area of the county between the northern city limits and Sutter County. Greenbriar is located within this area. In December 2002, the City Council and County Board of Supervisors entered into a Memorandum of Understanding (MOU), which defined a set of guiding principles for the implementation of the following goals:

- Proactively guide future urban growth for more efficient use of the land, while securing permanent preservation of open space/farmland at a mitigation ratio of at least one-to-one.

- Improve future air quality through efficient land use, which reduces automobile travel by accommodating future growth according to Smart Growth principles adopted by City Council (Smart Growth Principles/Resolution).

- Provide for revenue sharing between the City and County to prevent competition for tax revenues and promote balanced regional planning.

- Protect future airport operations.

The land use plan has not been developed, but general concepts have been considered. In general, the preferred land use scenario for the Joint Vision area consists of a mixture of residential densities, an industrial park adjacent to the eastern edge of the Sacramento International Airport, and open spaces in the northern extent separating

development from the Sutter County boundary. The Joint Vision area's preferred land use scenario specifically for the project site includes the development of high-density mixed residential and single-family small-lot land uses. The proposed project has been designed to be consistent with this preferred land use scenario.

The Joint Vision area includes approximately 10,000 acres, including the Greenbriar project site, and is located outside the City of Sacramento's SOI as established by LAFCo. The City, consistent with its planning efforts for the Joint Vision area, is reviewing the possibility of applying for LAFCo approval of an amendment to the City's SOI boundary to include the Joint Vision area. LAFCo approval of annexation of any such land areas to the City would also require LAFCo approval.

3.7.3 SACRAMENTO REGION BLUEPRINT

The Sacramento Area Council of Governments (SACOG) recently prepared the Sacramento Region Blueprint: Transportation/Land Use Study (Blueprint) (December 2004), which describes how and where the greater Sacramento region should grow, how Sacramento area residents should travel, and how growth within Sacramento affects the environment. The Blueprint process involved consideration of land use patterns throughout the six-county SACOG region (i.e., Sacramento, Placer, Yolo, Yuba, Sutter, El Dorado) and how these patterns could develop over the next 50 years if land use patterns continue along their recent historical course. The intent of the Blueprint is to support an alternative course of development throughout the region that would serve to reduce potential conversion of farmland, open space, and habitat, and provide for a more effective regional transportation system. The Blueprint provides an opportunity for the entire Sacramento region to develop detailed technical data for use by local elected leaders in making their land use decisions. SACOG will also use the Blueprint to decide what transportation projects would best serve the greater Sacramento region as it grows. Although the Blueprint suggests how land uses should develop throughout the region, it is not a land use plan adopted by any land use agencies. Further, it provides guidance to local land use agencies, including the City and County of Sacramento, for how land uses could develop in an orderly and efficient manner while meeting economic, transportation, and environmental objectives.

The Blueprint developed Preferred Scenario Maps that depict an option for how the region should grow through the year 2050 in a manner generally consistent with the Blueprint growth principles. These growth principles generally consist of providing a variety of transportation choices, offering housing choices and opportunities, taking advantage of compact development, using existing infrastructure assets, conserving natural resources, and encouraging distinctive and attractive communities with quality design.

3.7.4 CITY OF SACRAMENTO SPHERE OF INFLUENCE EXPANSION

The City of Sacramento is considering an expansion of its SOI boundary. The proposed SOI expansion would encompass approximately 10,000 acres to the north and west of the current city boundaries. This expansion would generally accommodate the boundaries of the Joint Vision areas as described above in Section 3.7.3, "North Natomas Joint Vision Area."

3.7.5 CITY OF SACRAMENTO GENERAL PLAN UPDATE

The City of Sacramento recently initiated a comprehensive update of its General Plan. The General Plan provides guidance to City decision-makers when making determinations about the allocation of resources and the future physical form and character of development within the city. The General Plan also describes the City's vision for the extent and types of development needed to achieve the community's physical, economic, social, and environmental goals.

Sacramento's existing General Plan was adopted in 1988. Various elements of the General Plan have been updated over time but the overall General Plan has not been comprehensively revised since adoption. Some of the data, analyses, and policies in the existing General Plan do not reflect current conditions in the City. As a result,

the City determined that an update of the General Plan is necessary to reflect the current vision for accommodating future growth, as well as what resources to protect and how quality of life is defined, within the City of Sacramento over the next 25 years.

The City of Sacramento recently completed the Technical Background Report for the General Plan Update while the Planning Issues Report, Vision and Guiding Principles, and Land Use Alternatives continue to be drafted. The Technical Background Report is a thorough compilation of existing conditions in the General Plan Study Area including current land uses, transportation systems, environmental factors, and public facilities, and serves as the foundation for determining future land use and infrastructure needs in the City. Preparation of the Draft General Plan itself has not begun. The Draft General Plan process will include a financing plan, an EIR, and public hearings. The Draft General Plan is scheduled to be completed sometime in late 2006 or early 2007.

3.7.6 METRO AIR PARK

The Sacramento County Board of Supervisors approved a Special Planning Area (SPA) Ordinance in 1989 to allow development of Metro Air Park as a high quality, multidistrict, industrial business park that follows the general intent and spirit of the Metro Air Park Land Use Plan, Summary Report. Land uses allowed in the Metro Air Park include airport-related uses, light manufacturing, high-tech research and development, professional offices, limited support retail, and recreation. The Metro Air Park development was created to provide a balanced mix of uses that would ensure economic viability while providing an economic business environment that is complementary to the Sacramento International Airport. Metro Air Park is designed to provide a distinctive identity reflecting the relationship between its land uses to the airport, its orientation around an open space/recreation spine that accommodates drainage and wildlife needs, and its landscape and site design considerations as set forth in the Metro Air Park Landscape and Design Guidelines. The project site is located adjacent and east of Metro Air Park.

3.7.7 PANHANDLE

The Panhandle is an area of land located approximately 3 miles east of the project site in the unincorporated area of Sacramento County. The Panhandle site is bounded by Interstate 80 (I-80) to the south; Northgate Boulevard, Sorento Road, and East Levee Road to the east; Elkhorn Boulevard to the north; and Gateway Park Boulevard at the southwest corner. The Panhandle includes vacant land south of Elkhorn Road and north of Del Paso Road (approximately 595 acres) and approximately 853 acres south of Del Paso Road that is substantially built out with light industrial and office land uses. The Panhandle area is currently being considered for annexation.

The City is considering development applications for a mix of residential, commercial, park, open space, and school uses on the vacant parcels between Elkhorn Road and Del Paso Road.

3.7.8 NATOMAS BASIN HABITAT CONSERVATION PLAN

The Natomas Basin Habitat Conservation Plan (HCP) was adopted by the Sacramento City Council on August 17, 1997, and updated in 2003 and allows development to continue within the existing permit and while providing for the protection of the giant garter snake and Swainson's hawk and 24 other listed or candidate threatened or endangered species. The HCP covers the entire Natomas Basin area, which encompasses a total of 53,537 acres, with 11,387 acres within the City of Sacramento. The project site is located within the boundaries of the study area of the HCP. For additional details, please refer to Section 6.12, "Biological Resources."

6.1 TRANSPORTATION AND CIRCULATION

As described in Chapter 1 of this document, comments were received on the DEIR that requested the incorporation of several regional cumulative projects in the Cumulative (2025) Condition and Cumulative (2025) plus Project Condition traffic scenarios. Cumulative traffic volumes were produced using the SACMET 2025 model. The SACMET 2025 model is the City of Sacramento's traffic model that reflects approved land use changes, including growth from regional projects, in the project area and in the Sacramento region. The SACMET model also contains roadway network described in the SACOG Metropolitan Transportation Plan. The City has refined the cumulative SACMET 2025 model to include the specific traffic projections for each of the requested cumulative regional traffic projects

Some commenters also questioned whether it was reasonable to assume a trip generation discount of 11% in the project's trip generation estimate, which accounts for the use of light rail transit (LRT) services by project residents. While the City believes it was reasonable to assume a trip discount factor for the use of light rail because the project would dedicate an easement corridor for LRT services that would eventually run through the center of the project site along Meister Way, the City acknowledges that construction of the light rail line would not likely occur before buildout of the proposed development (year 2025). Therefore, the analysis provided below presents a revised trip generation table for the project and removes the trip discount assumed for LRT services to show the trip generation rates of the project before construction of the LRT line.

While in process of revising the trip generation estimates for the project, an error in the trip generation calculation formula presented in the DEIR was discovered. This error resulted in the over estimation of traffic trips associated with the residential linked trips to the school land uses on the project site. This error was corrected and the trip generation calculation was revised using the ITE equations rather than trip rate estimation. A copy of the equations are included in Appendix B of this document. The revised trip generation calculations are provided in Table 6.1-20 below. The new trip generation estimates (even with removal of the 11% LRT discount) indicate that the project would generate approximately 1,200 fewer daily trips (i.e., 2.8%) than those assumed in the DEIR. As a result, the analysis provided in the DEIR slightly overestimates the traffic impacts of the project. Because the revised traffic generation trips are virtually the same as the traffic generation assumptions of the DEIR, the City and LAFCo have determined that the analysis provided in the DEIR for Existing Conditions and Existing Plus Project is adequate and would not require re-modeling. Therefore, no changes to the Existing, Baseline and Baseline Plus Project traffic modeling scenarios have occurred and the analysis provided below for these scenarios is the same as the information presented in the DEIR

The analysis provided below presents the revised trip generation estimates for the project and provides a revised transportation analysis for freeway ramps and mainline and roadway segments under the Cumulative (2025) Condition and Cumulative (2025) plus Project Condition based on the revised trip generation estimates. Because the regional cumulative projects are not located within the City and are distant from the Greenbriar project site, traffic trips contributed by these projects would affect the regional freeway facilities (e.g., mainline segments and off ramps), but impacts to roadways and intersections would not be expected to be substantially different from that described in the DEIR. Therefore, the DEIR analysis of the project's cumulative impacts to roadways and intersections is sufficient and does not require re-modeling.

Where substantive changes to the analysis are made, these changes are identified by highlighted text.

6.1.1 INTRODUCTION

This section of the EIR presents the results of TJKM's traffic impact analysis of the proposed Greenbriar Development. The analysis includes consideration of automobile traffic impacts on local roadway capacity and capacity on Interstate 5 (I-5) and State Route 70/99 (SR 70/99) and existing and proposed transit, bicycle, and pedestrian facilities.

Quantitative analyses of weekday a.m. and p.m. commuter hour conditions have been conducted for the following five scenarios:

- Existing Conditions
- Baseline (Existing plus Approved Projects) Conditions
- Baseline plus Project Conditions
- Cumulative (2025) Conditions
- Cumulative (2025) plus Project Conditions

These scenarios are described in greater detail in Section 6.1.4, "Impacts and Mitigation Measures," below.

PROPOSED PROJECT

The project would consist of 3,473 residential units (low density: 671; medium density: 2,215; high density: 587), 11.2 acres of village commercial, 16.3 acres of community commercial, a 10.0-acre elementary school, neighborhood parks, a lake/detention basin, and an open space/buffer. The project site is currently vacant and located on the northwestern corner of the I-5 and SR 70/99 interchange.

6.1.2 ENVIRONMENTAL SETTING

Exhibit 6.1-1 illustrates the roadway system near the project site.

ROADWAY SYSTEM – REGIONAL ACCESS

Regional access to the project site is provided by the freeway system that serves northwest Sacramento, including I-5 and SR 70/99.

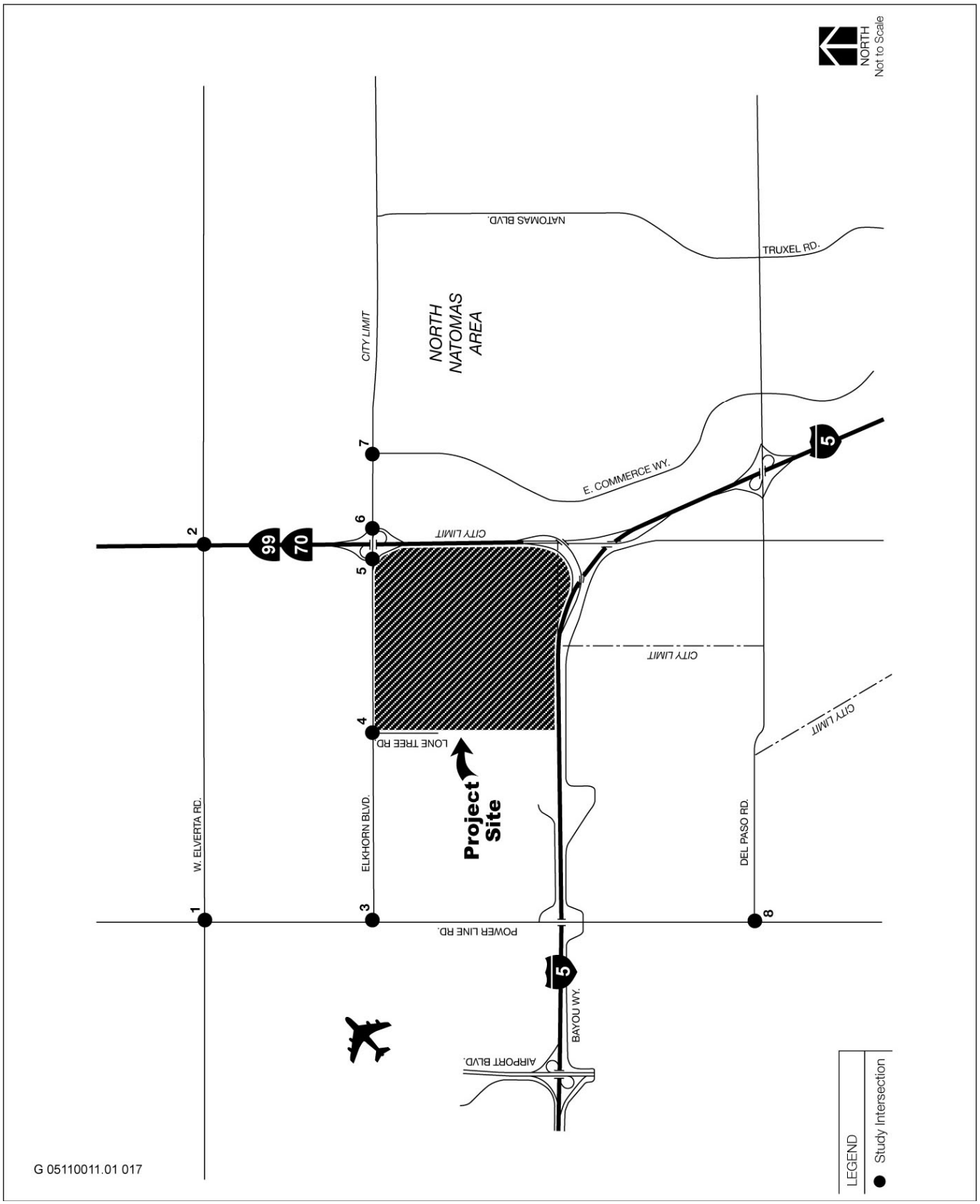
I-5 is an eight-lane freeway that runs in an east/west direction within the study area. Access to I-5 is currently via State Route 99. I-5 serves as a commute corridor between downtown Sacramento and the northern and southern portions of the City and County. It also provides access to the Sacramento International Airport west of the site and other Central Valley communities (e.g., cities of Woodland and Davis). A future interchange (I-5 / Metro Air Parkway Interchange) is planned approximately one-half mile west of the project site. This interchange would provide direct access to I-5 from the project site through the approved Metro Air Park development (adjacent and west of the project site).

SR 70/99 is a four-lane highway that runs in a north/south direction within the study area. State Route 70/99 serves as a commute corridor between the City of Sacramento and the Yuba City, Marysville, Chico areas and Sutter County to the north of the project site. SR 70/99 provides direct access to the project site via on/off-ramps at Elkhorn Boulevard. North of its interchange with Elkhorn Boulevard, SR 70 /99 continues as a divided highway with two travel lanes per direction and has a grade-level intersection with Elverta Road.

LOCAL ACCESS

Local access to the project site is provided via Elkhorn Boulevard, East Commerce Way, Elverta Road, Power Line Road and Del Paso Road, as described below.

Elkhorn Boulevard is a two-lane road that runs in an east/west direction and serves as the northern boundary to the project site. West of SR 70/99, Elkhorn Boulevard continues to Power Line Road. To the east, it continues to the Rio Linda and North Highlands areas of Sacramento County. Elkhorn Boulevard connects to SR 70/99 at the northeastern corner of the project site via on and off-ramps providing access to northbound and southbound SR 70/99.



Source: TJKM 2005

Roadways within the Project Vicinity **Exhibit 6.1-1**

East Commerce Way is an existing two-lane roadway that runs in a north/south direction parallel to and about 0.4-mile east of I-5. East Commerce Way is planned to be a six-lane arterial. East Commerce Way extends from Elkhorn Boulevard in the north to Del Paso Road to the south. It extends about 0.9-mile south of Del Paso Road where it intersects with Arena Boulevard.

Elverta Road is a two-lane roadway that runs in an east/west direction approximately one mile north of the project site. Elverta Road has a grade-level signalized intersection at State Route 70/99. Elverta Road connects with Power Line Road west of SR 70/99.

Power Line Road is a two-lane roadway that runs in a north/south direction within the project study area. It is located adjacent to the eastern boundary of the Sacramento International Airport approximately one mile west of the project site. Power Line Road extends south of Elverta Road where it crosses I-5 with a two-lane overcrossing and extends south to intersect with Del Paso Road.

Del Paso Road is a two-to-four lane east-west roadway approximately one mile south of the project site that provides access to I-5 via a full interchange. West of I-5, Del Paso Road is a two-lane roadway. Del Paso Road is a six-lane roadway between I-5 and East Commerce Way. East of East Commerce Way, Del Paso Road has three eastbound and two westbound lanes.

PEDESTRIAN AND BICYCLE FACILITIES

Currently, no pedestrian and bicycle facilities exist at the project site or along Power Line Road, Elkhorn Boulevard, or Elverta Road. On-street bike lanes exist at several locations along Del Paso Road and six-foot wide bike lanes exist on both sides of East Commerce Way.

TRANSIT SYSTEM

The Sacramento Regional Transit District (RT) operates 80 bus routes and 38 miles of light rail covering a 418 square-mile service area. Buses and light rail run 365 days a year using 97 light rail vehicles, 258 buses powered by compressed natural gas (CNG), and 17 shuttle vans. Buses operate daily from 5:00 a.m. to 11:30 p.m. every 15 to 60 minutes, depending on the route. Light rail trains operate from 4:30 a.m. to 1:00 a.m. daily with service every 15 minutes during the day and every 30 minutes in the evening. No bus or light rail service is currently provided to the project area or between the project site and the Sacramento International Airport. Transit services to the Airport area are provided by Yolobus, private limousine and taxi services.

EXISTING TRAFFIC CONDITIONS

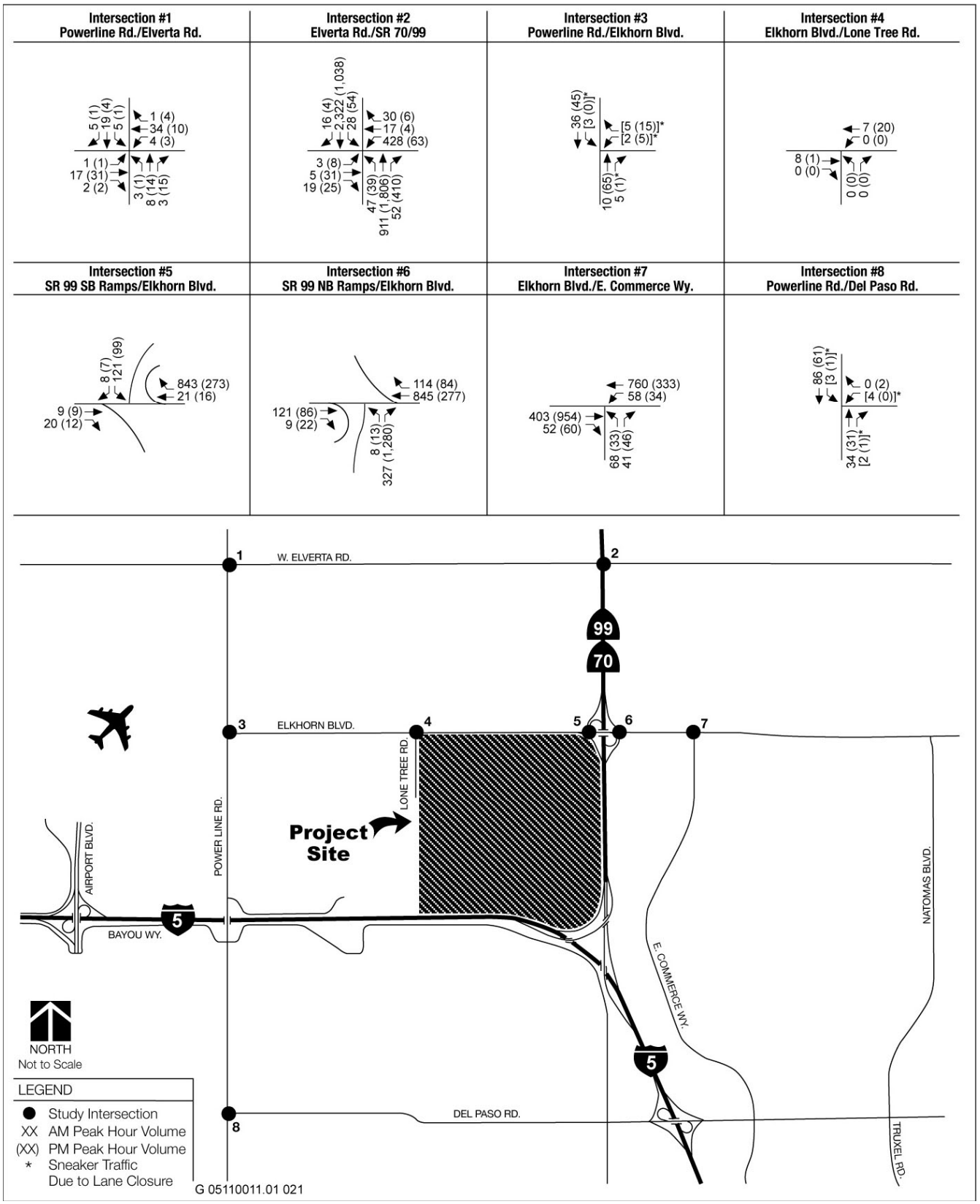
The following discussion includes a description of the existing conditions of intersections and roadways in the study area.

EVALUATION CRITERIA

Existing Intersection Traffic Volumes

Eight existing study intersections and fourteen future intersections were analyzed. The study area is near the North Natomas area of Sacramento and adjacent and west of the Sacramento International Airport (Exhibit 6.1-1). Two major highways, I-5 and SR 70/99, are within the study area. Specific study intersections, ramps, roadway and freeway segments are listed in Section 6.1.4, “Impacts and Mitigation Measures.” A total of four roadway segments, ten existing and twelve future freeway ramps, and five freeway segments were analyzed.

The existing a.m. and p.m. peak-hour traffic volume counts for seven study intersections were conducted in June 2005 by TJKM. The existing peak-hour intersection volumes are shown in Exhibit 6.1-2. The traffic count data are included in Appendix B of this document.



Source: TJKM 2005

Existing Peak-Hour Turning Movement Volumes **Exhibit 6.1-2**

Freeway Ramp and Mainline Traffic Volumes

The existing a.m. and p.m. peak-hour traffic volume counts for eight study ramps were conducted in June 2005 by TJKM. The freeway mainline counts (2005) used in the analysis were obtained from Caltrans District 3. This traffic data are also included in Appendix B of this document.

Intersection Lane Configurations

The existing lane configurations at the study intersections were determined by TJKM based on field observations. The existing intersection lane configurations are shown in Exhibit 6.1-3.

Definition of Level of Service

Level of service is a qualitative measure describing operational conditions at an intersection. The level of service generally describes these conditions in terms of average delay per vehicle. Six levels of service are defined and given letter designations from A to F, with Level of Service (LOS) A representing the best operating conditions and LOS F the worst.

Signalized Intersections

The operating conditions at the City study signalized intersections were evaluated using the Highway Capacity Manual (2000 HCM) Operations Method as incorporated into the standard traffic engineering software package SYNCHRO (version 5). Peak-hour intersection conditions are reported as average delay per vehicle with corresponding levels of service for the intersection as a whole and for each approach. The operating conditions at County study signalized intersections were evaluated using volume-to-capacity ratio based on the Intersection Capacity Utilization methodology, which is similar to the Circular 212 methodology. With both methodologies, LOS A indicates free flow conditions with little or no delay, while LOS F indicates jammed conditions with excessive delay and long back-ups. Table 6.1-1 below describes the LOS criteria for signalized intersections.

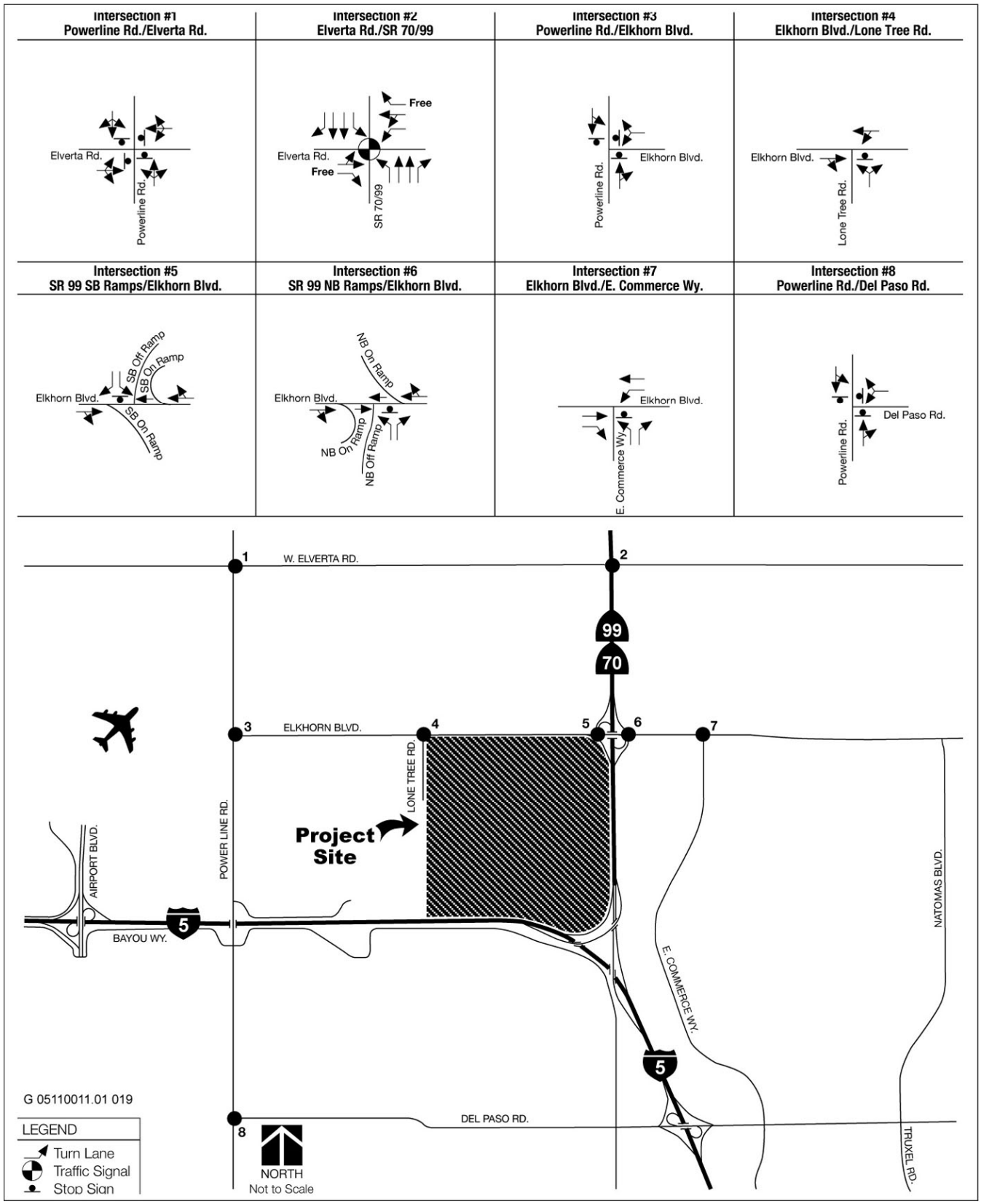
Table 6.1-1
Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds/vehicle)	Sum of Critical Lane Volumes by Signal Phasing (vehicles/critical land/hour)		
		2-Phase	3-Phase	4 or more Phase
A	≤ 10	0–990	0–930	0–900
B	> 10–20	991–1,155	931–1,085	901–1,050
C	> 20–35	1,156–1,320	1,086–1,240	1,051–1,200
D	> 35–55	1,321–1,485	1,241–1,395	1,201–1,350
E	> 55–80	1,486–1,650	1,396–1,550	1,351–1,500
F	> 80	> 1,650	> 1,550	> 1,500

Sources: *Highway Capacity Manual*, Transportation Research Board 2000
Traffic Impact Analysis Guidelines, County of Sacramento, July 2004

Unsignalized Intersections

The operating conditions at the stop (i.e., unsignalized) controlled intersections were evaluated using the 2000 HCM methodology for unsignalized intersections. This method also ranks the level of service on an A through F scale, and also uses average delay in seconds as its measure of effectiveness. Peak-hour intersection conditions are reported as delay per vehicle with corresponding LOS for the intersection as a whole and for each approach. Table 6.1-2 below lists the LOS criteria for unsignalized intersections.



Source: TJKM 2005

Existing Lane Configurations **Exhibit 6.1-3**

Table 6.1-2 Level of Service Criteria for Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (seconds/vehicle)
A	≤ 10
B	> 10–15
C	> 15–25
D	> 25–35
E	> 35–50
F	> 50
Source: *Highway Capacity Manual*, Transportation Research Board 2000.	

Roadway Segments

The arterial level of service analysis was conducted based on the Urban Street LOS methodology described in the 2000 *Highway Capacity Manual*. The maximum daily volume to achieve LOS E on an arterial with moderate access control (2–4 stops/mile, limited driveways and speeds 35–45 miles per hour) are summarized in Table 6.1-3. These values are from Exhibit A of the City of Sacramento *Traffic Impact Guidelines* (1996) and Table 2 of the County of Sacramento *Traffic Analysis Guidelines* (2004).

Table 6.1-3 Level of Service Criteria for Roadways Segments					
Number of Lanes	Maximum Volume for Given Service Level for an Arterial with moderate access control				
	LOS A	LOS B	LOS C	LOS D	LOS E
2	10,800	12,600	14,400	16,200	18,000
4	21,600	25,200	28,800	32,400	36,000
6	32,400	37,800	43,200	48,600	54,000
Sources: *Traffic Impact Guidelines*, City of Sacramento 1996; *Traffic Impact Analysis Guidelines*, County of Sacramento 2004					

Freeway Facilities

The operating conditions at the study ramps were evaluated using the 2000 HCM Operations Method as incorporated into the Highway Capacity Software (HCS 2000). Table 6.1-4 lists the freeway ramps merge and diverge LOS criteria. Tables 6.1-5 and 6.1-6 lists the LOS definitions for freeway ramps and mainline segments, respectively.

Table 6.1-4 Freeway Ramp Merge and Diverge Level of Service Criteria		
Level of Service	Description	Density[1]
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	≤ 10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 10–20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 20–28
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 28–35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35–43
F	Represents a breakdown in flow.	> 43
Notes: [1] Density in passenger cars per mile per lane. Source: *Highway Capacity Manual*, Transportation Research Board 2000		

Table 6.1-5 Freeway Ramp Level of Service Definitions						
Level of Service	Service Flow Rates for Single Lane/Two Lane Ramps Ramp Design Speed (MPH)					Definition
	≤ 20	21–30	31–40	41–50	≥ 51	
A	-	-	-	-	800/ 1,550	Conditions of free flow; speed is controlled by driver's desires, speed limits, or physical conditions.
B	-	-	-	1,150/ 2,250	1,150/ 2,350	Conditions of stable flow; operating speeds beginning to be restricted; little or no restriction on maneuverability from other vehicles.
C	-	-	1,400/ 2,600	1,600/ 3,100	1,700/ 3,350	Conditions of stable flow; speeds and maneuverability more closely restricted.
D	-	1,550/ 2,900	1,700/ 3,200	1,950/ 3,850	2,050/ 4,150	Conditions approach unstable flow; tolerable speeds can be maintained, but temporary restrictions may cause extensive delays; little freedom to maneuver; comfort and convenience low.
E	1,800/ 3,200	1,900/ 3,500	2,000/ 3,800	2,100/ 4,100	2,200/ 4,400	Conditions approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited.
F	Widely Variable					Forced flow conditions; stoppages for long periods; low operating speeds.
Notes: - Level of service not attainable because of restricted design speed. Source: *Highway Capacity Manual*, Transportation Research Board 2000						

Table 6.1-6 Freeway Mainline Level of Service Criteria		
Level of Service	Maximum Volume to Capacity Ratio	Maximum Density[1]
A	0.29	10
B	0.47	16
C	0.68	24
D	0.85	35
E	1.00	45
F	Varies	Varies
Notes: [1] Density in passenger cars per mile per lane. Source: *Highway Capacity Manual*, Transportation Research Board 2000		

Study Intersections, Roadway Segments, Freeway Ramps, and Mainline Segments

The study focused on evaluating traffic conditions at eight existing intersections and six future intersections in the project vicinity selected in collaboration with City of Sacramento staff (see Exhibit 6.1-1). The City/County limit line is essentially the centerline of Lone Tree Road, with the County of Sacramento to the west of the centerline and the City to the east.

The study intersections, roadway segments, freeway ramps and freeway mainline segments are as follows:

Existing Study Intersections

1. Power Line Road and Elverta Road (County)
2. Elverta Road and SR 70/99 (Caltrans)
3. Power Line Road and Elkhorn Boulevard (County)
4. Elkhorn Boulevard and Lone Tree Road (City/County)
5. SR 70/99 Southbound Ramps and Elkhorn Boulevard (Caltrans)
6. SR 70/99 Northbound Ramps and Elkhorn Boulevard (Caltrans)

7. Elkhorn Boulevard and East Commerce Way (City)
8. Power Line Road and Del Paso Road (County)

Future Study Intersections

2a. SR 70/99 Southbound Ramps and Elverta Road (Caltrans)
2b. SR 70/99 Northbound Ramps and Elverta Road (Caltrans)
9. Metro Air Parkway and I-5 Northbound Ramps (Caltrans)
10. Metro Air Parkway and I-5 Southbound ramps (Caltrans)
11. Elverta Road and Lone Tree Road (City/County)
12. Metro Air Parkway and Elverta Road (County)
13. Elkhorn Boulevard and Metro Air Parkway (County)
14. Meister Way and Metro Air Parkway (County)
15. Meister Way and Lone Tree Road (City/County)
16. Meister Way and East Commerce Way (City)
17. Metro Air Parkway and Bayou Road (County)
18. Elkhorn Boulevard and Project Street 1 Driveway (City)
19. Elkhorn Boulevard and Project Street 2 Driveway (City)
20. Elkhorn Boulevard and Project Street 3 Driveway (City)

Existing Roadway Segments

1. Elkhorn Boulevard west of SR 70/99 Interchange (City)
2. Lone Tree Road south of Elkhorn Boulevard (City/County)

Future Roadway Segments

1. Metro Air Parkway north of I-5 Interchange (County)
2. Meister Way west of SR 70/99 (City)

Existing Freeway Ramps

1. Elkhorn Boulevard to SR 70/99 Northbound (loop on-ramp)
2. Elkhorn Boulevard to SR 70/99 Northbound (on-ramp)
3. SR 70/99 Northbound to Elkhorn Boulevard (off-ramp)
4. SR 70/99 Southbound to Elkhorn Boulevard (off-ramp)
5. Elkhorn Boulevard to SR 70/99 Southbound (loop on-ramp)
6. Elkhorn Boulevard to SR 70/99 Southbound (on-ramp)
7. SR 70/99 Southbound to I-5 Northbound (off-ramp)
8. I-5 Southbound to SR 70/99 Northbound (off-ramp)
9. SR 70/99 Southbound to I-5 Southbound (on-ramp)
10. I-5 Northbound to SR 70/99 Northbound (off-ramp)

Future Freeway Ramps

11. I-5 Northbound to Metro Air Parkway (off-ramp)
12. Metro Air Parkway to I-5 Northbound (on-ramp)
13. Metro Air Parkway to I-5 Northbound (loop on-ramp)
14. I-5 Southbound to Metro Air Parkway (off-ramp)
15. Metro Air Parkway to I-5 Southbound (on-ramp)
16. Metro Air Parkway to I-5 Southbound (loop on-ramp)
17. Elverta Boulevard to SR 70/99 Northbound (loop on-ramp)
18. Elverta Boulevard to SR 70/99 Northbound (on-ramp)

19. SR 70/99 Northbound to Elverta Boulevard (off-ramp)
20. SR 70/99 Southbound to Elverta Boulevard (off-ramp)
21. Elverta Boulevard to SR 70/99 Southbound (loop on-ramp)
22. Elverta Boulevard to SR 70/99 Southbound (on-ramp)

Freeway Mainline Segments

1. I-5 east of Power Line Road
2. I-5 north of Del Paso Road
3. I-5 north of I-5/I-80 Interchange
4. SR 70/99 between Elverta Road and Elkhorn Boulevard
5. SR 70/99 between Elkhorn Boulevard and I-5/SR 90 Interchange

TRAFFIC SCENARIOS

Traffic conditions were evaluated for the following scenarios:

- *Existing Conditions* – This scenario documents existing conditions at study area intersections, roadways, and freeway facilities based on recent traffic counts and field surveys conducted in 2005.

- *Baseline (Existing plus Approved Projects) Conditions* – This scenario documents study intersection, roadway, and freeway conditions by adding projects approved or in process of final approval to the existing conditions scenario. Approved projects consist of developments that are under construction, are built but not fully occupied, or are not built but have final approval from decision-makers.

- *Baseline plus Project Conditions* – This scenario adds traffic from the proposed project to the Baseline Conditions. The estimated project trips are based on the trip rates provided in Trip Generation, 7th Edition, published by the Institute of Transportation Engineers (ITE).

- *Cumulative (2025) Conditions* – This scenario considers future year 2025 traffic conditions based on the North Natomas version of the SACMET Regional Travel Demand Forecasting model. The North Natomas Model assumes the build out of the North Natomas Community Plan (NNCP) and is modified to incorporate all approved projects in the North Natomas area. The following is a list of additional projects assumed in the Cumulative Conditions:

    1. Meister Way – SR 70/99 overcrossing would be operational by the build out of the NNCP (Meister Way was assumed in the Metro Air Park project)

    2. Metro Air Park project including all adopted mitigation measures and roadway improvements

    3. Placer Vineyards Specific Plan project in Placer County

    4. Placer Ranch Specific Plan in Placer County

    5. Regional University and Community Specific Plan in Sacramento County

    6. West Roseville Specific Plan in the City of Roseville

    7. Sutter County Measure M project

    8. Elverta Specific Plan

    9. Plumas Lake Specific Plan in Yuba County

- *Cumulative (2025) plus Project Conditions* – This scenario adds traffic from the proposed project to the Cumulative (2025) Conditions.

Trip Generation

Trip generation is defined as the number of vehicle trips produced by a particular land use or project. A trip is defined as a one-direction vehicle movement. The total number of trips generated by each land use includes the inbound and outbound trips. The project and approved project trip generation were estimated based on the trip rates provided in Trip Generation, 7th Edition, published by ITE.

Trip Distribution and Assignment

Trip distribution is the process of determining in what proportion vehicles would travel between the project site and various destinations within the study area. Trip assignment is the process of determining the various paths vehicles would take from the project site to each destination. Trip distribution assumptions for the proposed project and the approved projects were developed using output from the SACMET Regional Travel Demand Forecasting model, knowledge of the study area, and input from City staff.

EXISTING OPERATIONAL CONDITIONS

Existing Intersections Levels of Service

In general, the operational characteristics of a roadway network are defined by the operations of key intersections within the network. Intersections are typically considered to be the critical analysis locations, because conflicting traffic movements at intersections impose capacity constraints on the overall roadway network.

Eight study intersections were selected with input from City staff for analysis. These intersections are listed in Table 6.1-7, along with the results of the LOS analysis under existing conditions. Appendix B of this document contains the detailed LOS calculation sheets for existing conditions.

Currently, all study intersections operate at acceptable levels of service under Existing Conditions, except for the following intersections:

- Elverta Road and SR 70/99 – LOS E during the a.m. peak hour
- SR 70/99 northbound ramps and Elkhorn Boulevard – LOS F for the SR 70/99 northbound off-ramp approach during the p.m. peak hour
- Elkhorn Boulevard and East Commerce Way – LOS E and LOS D for the northbound East Commerce Way (minor approach) during the a.m. and p.m. peak hours, respectively

Table 6.1-7
Existing Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]	Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]
1	Power Line Road and Elverta Road	All Way Stop	7.2	A	-	7.0	A	-
2	Elverta Road and SR 70/99	Signal	**58.9**	**E**	**[SBT: 1,524; 2,000+]**	14.6	B	[WBL: 62, 425]
3	Power Line Road and Elkhorn Boulevard	All Way Stop	7.0	A	-	7.2	A	-
4	Elkhorn Boulevard and Lone Tree Road	One Way Stop	No Traffic on Lone Tree Road					

Table 6.1-7
Existing Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]	Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]
5	SR 70/99 Southbound Ramps and Elkhorn Boulevard	One Way Stop	(9.2)	(A)	-	(9.0)	(A)	-
6	SR 70/99 Northbound Ramps and Elkhorn Boulevard	One Way Stop	(11.6)	(B)	[NBR: 46, 485]	**(217.9)**	**(F)**	**[NBR: 1,548; 485]**
7	Elkhorn Boulevard and East Commerce Way	One Way Stop	**(36.5)**	**(E)**	**[NBL: 60; 265]**	**(29.7)**	**(D)**	**[NBL: 26, 265]**
8	Power Line Road and Del Paso Road	One Way Stop	(9.2)	(A)	-	(8.5)	(A)	-

Notes: * Seconds per Vehicle; LOS = Level of Service; (X) = LOS for minor approach
(X.X) = Delay in seconds per vehicle for minor approach
Bold = Unacceptable Intersection Operation
[1] X: Y, Z: X= Most critical approach; Y=50th Percentile Queue for unsignalized intersection or 90th Percentile Queue for signalized intersection; Z= Total Segment Length or Storage for Turn Pocket
- = Storage data not reported for those intersections with acceptable LOS conditions
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left; T = Through; R = Right
HCM 2000 Methodology does not report the overall intersection LOS for one-way stop intersections

Existing Roadway Segment Levels of Service

Existing roadway traffic volumes and level of service are illustrated in Table 6.1-8.

Currently, Elkhorn Boulevard west of SR 70/99 operates acceptably at LOS A under Existing Conditions.

Table 6.1-8
Existing Roadway Operating Conditions

Roadway Segment	Lanes (Max. ADT for acceptable LOS in vpd)	Daily Volume (vpd)	LOS
Elkhorn Boulevard west of SR 70/99 Interchange	2 (14,400)	458	A
Lone Tree Road south of Elkhorn Boulevard	No Traffic on Lone Tree Road		
Metro Air Parkway north of I-5 Interchange	NA		
Meister Way west of SR 70/99	NA		

Notes: LOS = Level of Service; vpd = vehicles per day; Max. ADT: Maximum average daily traffic
Bold = Unacceptable Roadway Segment Operation.
NA= Not existing roads

Existing Freeway Facilities

Ramp Levels of Service

Ten freeway ramps were selected with input from City staff and Caltrans for analysis. Existing a.m. and p.m. peak-hour levels of service are illustrated in Table 6.1-9.

- Currently, all the study ramps operate at acceptable levels of service (LOS E or better) under Existing Conditions. The I-5 northbound to SR 70/99 northbound (off-ramp) was mistakenly identified as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

Table 6.1-9
Existing Peak-Hour Freeway Ramp Operating Conditions

Ramp	A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	10	B	-	5	B	-
Elkhorn Boulevard to SR 70/99 northbound (On-ramp)	125	B	-	136	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	426	C	[NBR: 46; 1,270]	1,197	C	[NBR: 1,548; 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	144	C	[SBL: 12; 1,250]	109	C	[SBL: 9; 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	783	B	-	416	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	30	B	-	19	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	879	C	-	64	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	89	C	-	1,281	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	3,044	C	-	1,540	B	-
I-5 northbound to SR 70/99 northbound (off-ramp)	1,495	C	-	3,231	E	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

Existing Freeway Mainline Levels of Service

Five freeway mainline segments were selected with input from City of Sacramento and Caltrans staff for analysis. The freeway and corresponding existing a.m. and p.m. peak-hour levels of service are illustrated in Table 6.1-10.

Table 6.1-10
Existing Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	WB/NB	2,771	25.6	C	2,890	26.9	D
	EB/SB	2,557	23.5	C	3,258	31.3	D
I-5 North of Del Paso Road	NB	3,387	20.8	C	6,057	> **45**	**F**
	SB	5,512	38.5	E	3,517	21.6	C
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	3,252	20.0	C	6,381	> **45**	**F**
	SB	5,780	42.9	E	3,143	19.3	C
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	1,293	11.9	B	3,456	34.4	D
	SB	3,254	31.3	D	1,278	11.8	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	1,584	14.6	B	4,512	> **45**	**F**
	SB	3,923	44.8	E	1,604	14.8	B

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.

Currently, the following freeway segments operate unacceptably under Existing Conditions:

- I-5 north of Del Paso Road – LOS F for the northbound direction during the p.m. peak hour
- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit – LOS F for the northbound direction during the p.m. peak hour

- SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange –LOS F for the northbound direction during the p.m. peak hour

The SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 was mistakenly identified as operating unacceptably during the a.m. peak hour in the DEIR. However, this segment operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

6.1.3 REGULATORY SETTING

CALTRANS

Caltrans specifies LOS D as the minimum acceptable level of service standard for freeway segments, ramps, and ramp intersections. However, LOS E is acceptable for the five freeway segments in the vicinity of the project area and downtown Sacramento area (milepost: 10.8 to 34.7).

CITY OF SACRAMENTO

The City of Sacramento specifies LOS C as the minimum acceptable level of service standard for the intersections that fall under its jurisdiction.

COUNTY OF SACRAMENTO

The County of Sacramento specifies LOS D for rural areas and LOS E for urban areas as the minimum acceptable level of service standards for the roadways and intersections that fall under its jurisdiction. Because the project study area is considered rural, LOS D was used as the minimum acceptable LOS standard for all the study intersections that fall under the County's jurisdiction.

LAFCO

The LAFCo Policies, Procedures, and Guidelines document does not contain any policies related to transportation and circulation.

The detailed significance criteria for the City, County, and Caltrans listed under the "Thresholds of Significance" section of this report were used to determine the project-specific impacts and mitigations.

6.1.4 IMPACTS AND MITIGATION MEASURES

METHOD OF ANALYSIS

The analysis considered the impacts of the proposed project on the transportation system; vehicles, transit, bicycles, and pedestrians. The proposed project was evaluated using the significance criteria specified for the City, County, and Caltrans as applicable, to determine impacts on existing and proposed facilities.

BASELINE CONDITIONS ANALYSIS

There are seven projects in the project vicinity that are considered under Baseline Conditions as determined by the City. These projects are listed in Table 6.1-11. The locations of the baseline projects are illustrated in Exhibit 6.1-4. These projects are consistent with land uses envisioned by the general plan, have been approved by the City, and are either built out or in the process of building out in the near term (i.e., within 2–4 years). The baseline project trip generation was estimated based on trip rates provided in Trip Generation, 7th Edition, published by ITE. This scenario establishes a baseline for analyzing the traffic impacts of the proposed project. Exhibit 6.1-5 shows the Baseline Conditions peak-hour turning movement volumes.

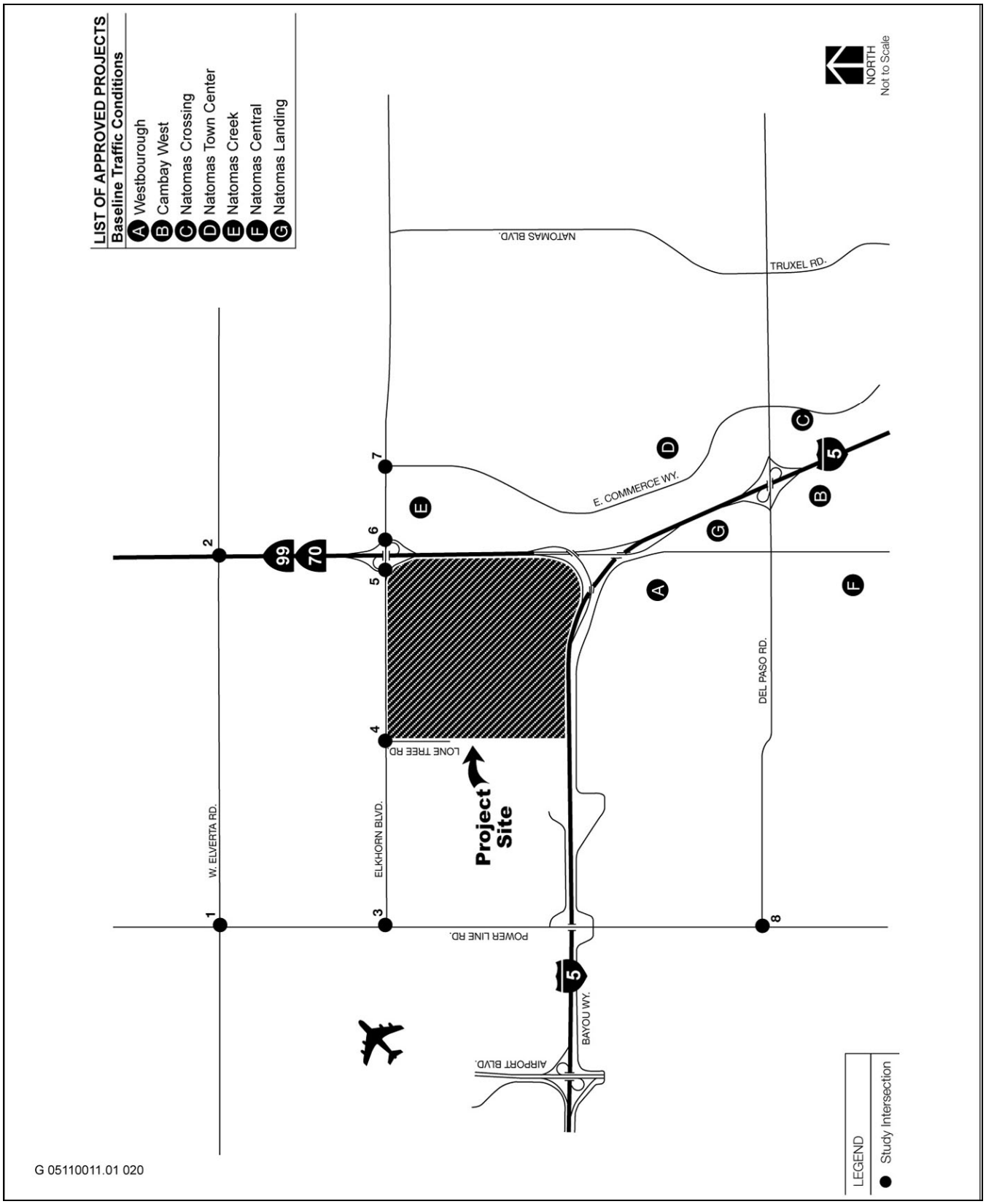
Table 6.1-11 Approved Projects Trip Generation									
Project	Land Use	Size	Daily Trips	A.M. Peak Hour			P.M. Peak Hour		
				In	Out	Total	In	Out	Total
Westborough	Single Family Residential General Office Building Light Industrial Shopping Inst. (Med./Dental office)	102 du[1] 267 em[2] 248 em 96 ksf[3] 157 ksf	15,417	664	239	903	545	943	1,488
Cambay West	General Office Building	1,070 em	3,260	451	61	512	78	378	456
Natomas Crossing	Shopping Center	2,256 ksf	51,482	619	396	1,015	2,350	2,546	4,896
Natomas Town Center	Shopping Center	188 ksf	10,233	140	89	229	456	493	949
Natomas Creek	Single Family Residential Elementary School	390 du 700 stud[4]	4,540	202	319	521	310	232	542
Natomas Central	Single Family Residential Single Family Residential Apartment General Office Building Elementary School	728 du 1,047 du 976 du 340 ksf 349 ksf	28,667	1,765	2,083	3,848	1,715	1,584	3,299
Natomas Landing	Shopping Center General Office Building	550 ksf 162 em	21,235	355	182	537	946	1,102	2,048
Total			134,834	4,196	3,369	7,565	6,400	7,278	13,678
Notes: [1] du – Dwelling Unit; [2] em – employees; [3] ksf – 1,000 square feet; [4] Stud. – Students									

Results of Level of Service Analysis

Tables 6.1-12, 6.1-13, 6.1-14, and 6.1-15 summarize the intersection, roadway segment, freeway ramp and freeway mainline segments levels of service, respectively, under the Baseline conditions. Detailed calculations are contained in Appendix B of this document.

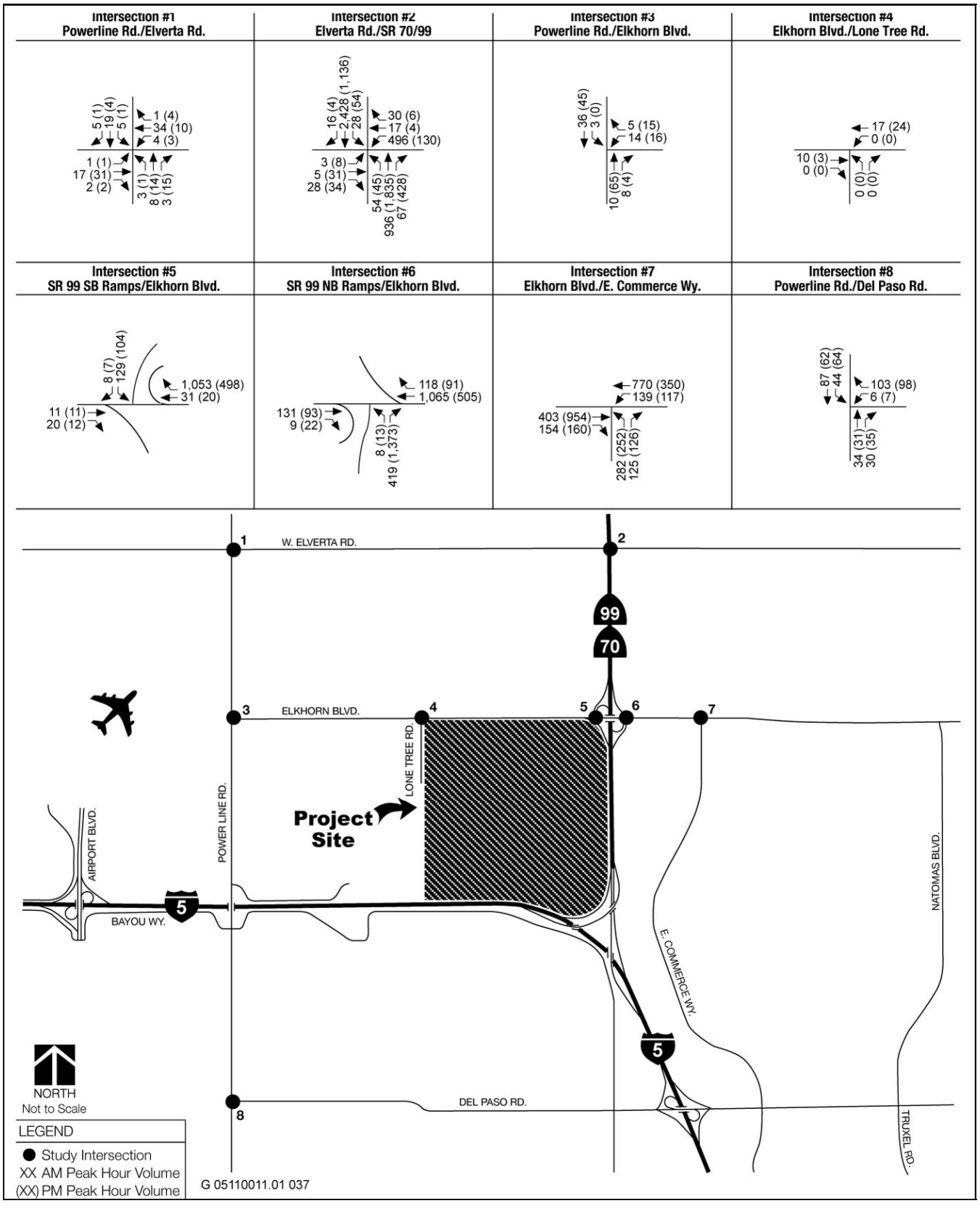
Table 6.1-12 Baseline Peak-Hour Intersection Operating Conditions								
ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]	Average Delay*	LOS	Queue Length (feet) [X, Y, Z][1]
1	Power Line Road and Elverta Road	All Way Stop	7.2	A	-	7.0	A	-
2	Elverta Road and SR 70/99	Signal	**76.3**	**E**	**[SBT: 1,625; 2,000+]**	18.2	B	[WBL: 106, 425]
3	Power Line Road and Elkhorn Boulevard	All Way Stop	7.1	A	-	7.3	A	-
4	Elkhorn Boulevard and Lone Tree Road	One Way Stop	No Traffic on Lone Tree Road					
5	SR 70/99 SB Ramps and Elkhorn Boulevard	One Way Stop	(9.3)	(A)	-	(9.1)	(A)	-
6	SR 70/99 NB Ramps and Elkhorn Boulevard	One Way Stop	(13.2)	(B)	[NBR: 72, 485]	**(270.0)**	**(F)**	**[NBR: 1,869; 485]**
7	Elkhorn Boulevard and E. Commerce Way.	One Way Stop	**(6,932.0)**	**(F)**	**[NBL: >600, 265]**	**(6,676.0)**	**(F)**	**[NBL: >600, 265]**
8	Power Line Road and Del Paso Road	One Way Stop	(9.1)	(A)	-	(9.0)	(A)	-

Notes: * Seconds per Vehicle; LOS = Level of Service; (X) = LOS for minor approach
(X.X) = Delay in seconds per vehicle for minor approach
Bold = Unacceptable Intersection Operation
[1] X:Y,Z = Most critical approach: 50th/95th Percentile Queue Length for unsignalized/signalized intersections respectively, Available Segment Length/Storage
- Storage data not reported for those intersections with acceptable LOS Conditions
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left; T = Through; R = Right
HCM 2000 Methodology does not report the overall intersection LOS for one-way stop intersections



Source: TJKM 2005

Location of Approved Projects **Exhibit 6.1-4**



Source: TJKM 2005

Baseline Peak-Hour Turning Movement Volumes **Exhibit 6.1-5**

Under Baseline Conditions, all study intersections are expected to continue to operate at acceptable levels of service, except for the following intersections:

- Elverta Road and SR 70/99 – LOS E during the a.m. peak hour
- SR 70/99 northbound ramps and Elkhorn Boulevard – LOS F for the SR 70/99 northbound off-ramp approach during the p.m. peak hour
- Elkhorn Boulevard and East Commerce Way – LOS F for the northbound East Commerce Way (minor approach) during both a.m. and p.m. peak hours

Under Baseline Conditions, Elkhorn Boulevard west of SR 70/99 is expected to continue to operate at an acceptable level of service LOS A (Table 6.1-13).

Table 6.1-13
Baseline Roadway Operating Conditions

Roadway Segment	Lanes (Max. ADT for acceptable LOS in vpd)	Daily Volume (vpd)	LOS
Elkhorn Boulevard west of SR 70/99 Interchange	2 (14,400)	2,103	A
Lone Tree Road south of Elkhorn Boulevard	No Traffic on Lone Tree Road		
Metro Air Parkway north of I-5 Interchange	NA		
Meister Way west of SR 70/99	NA		

Notes: LOS = Level of Service; vpd = vehicles per day; Max. ADT: Maximum average daily traffic
Bold = Unacceptable Roadway Segment Operation.
NA = not a baseline road

Baseline Ramp Levels of Service

Table 6.1-14 summarizes baseline a.m. and p.m. peak-hour levels of service at the study area freeway ramps.

Table 6.1-14
Baseline Peak-Hour Freeway Ramp Operating Conditions

Ramp	A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	10	B	-	5	B	-
Elkhorn Boulevard to SR 70/99 northbound (On-ramp)	129	B	-	143	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	518	C	[NBR: 72, 1,270]	1,290	C	[NBR: 1,869, 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	152	C	[SBL: 13, 1,250]	114	C	[SBL: 10, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	993	B	-	641	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	30	B	-	19	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	935	C	-	126	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	111	C	-	1,303	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	3,374	D	-	1,871	B	-
I-5 northbound to SR 70/99 northbound (off-ramp)	1,608	C	-	3,347	E	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

All the study ramps are expected to operate at acceptable levels of service (LOS E or better) under Baseline Conditions (same as Existing Conditions). The I-5 northbound to SR 70/99 northbound (off-ramp) was mistakenly identified as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error was corrected in this document.

Baseline Freeway Mainline Levels of Service

Table 6.1-15 summarizes baseline a.m. and p.m. peak-hour levels of service at the freeway mainline segments.

The following freeway segments are expected to operate unacceptably under Baseline Conditions:

- I-5 north of Del Paso Road – LOS F for the southbound direction during the a.m. peak hour and the northbound direction during the p.m. peak hour
- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard exit – LOS F for the southbound direction during the a.m. peak hour and the northbound direction during the p.m. peak hour
- SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange – LOS F for the southbound direction during the a.m. peak hour and LOS F for the northbound direction during the p.m. peak hour

Table 6.1-15
Baseline Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	NB	2,984	27.9	D	3,114	29.4	D
	SB	2,692	24.8	C	3,354	32.7	D
I-5 North of Del Paso Road	NB	3,657	22.4	C	6,335	**> 45**	**F**
	SB	5,954	**> 45**	**F**	3,922	24.1	C
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	4,465	27.8	D	7,639	**> 45**	**F**
	SB	6,894	**> 45**	**F**	4,232	26.1	D
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	1,340	12.3	B	3,509	35.3	E
	SB	3,437	34.0	D	1,451	13.4	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	1,719	15.8	B	4,650	**> 45**	**F**
	SB	4,308	**> 45**	**F**	1,997	18.4	C

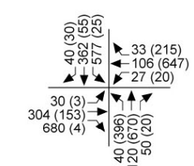
Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.

Cumulative (2025) Conditions Analysis

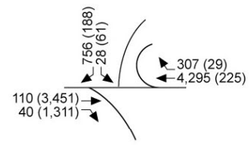
The future cumulative conditions are based on traffic projections from the SACMET Regional Travel Demand Forecasting model. It should be noted that the cumulative projects in the model included all the Baseline approved projects, the West Lakeside project, and buildout of the NNCP. Based on the City's input, three additional local projects were incorporated into the model for the cumulative scenario: North Natomas Shopping Center, Metro Air Park, and Panhandle. The Metro Air Park project is an approved project and is expected to be built by the year 2025. The West Lakeside, Natomas Shopping Center, and Panhandle projects are under review by the City.

Based on comments received on the DEIR, seven regional projects were also added to the model: Placer Vineyards Specific Plan (Placer County), Placer Ranch Specific Plan (Placer County), Regional University and Community Specific Plan, West Roseville Specific Plan (City of Roseville), Sutter County Measure M, Elverta Specific Plan, and Plumas Lake. Exhibit 6.1-6 shows the Cumulative (2025) peak-hour turning movement volumes. Exhibit 6.1-7 illustrates the lane configurations and controls assumed for the Cumulative Conditions (2025). The Meister Way – SR 70/99 overpass is assumed to be constructed by Year 2025.

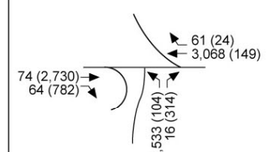
Intersection #1
Powerline Rd./Elverta Rd.



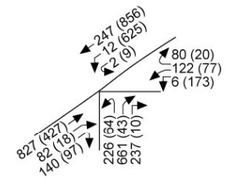
Intersection #2a
Elverta Rd./SR 70/99 SB Ramps



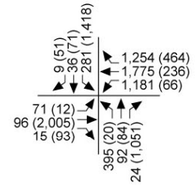
Intersection #2b
Elverta Rd./SR 70/99 N Ramps



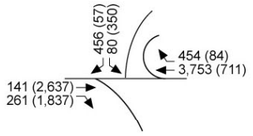
Intersection #3
Powerline Rd./Elkhorn Blvd. Redesigned



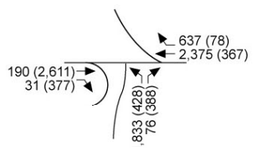
Intersection #4
Elkhorn Blvd./Lone Tree Rd.



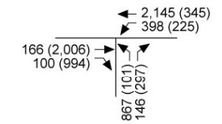
Intersection #5
SR 99 SB Ramps/Elkhorn Blvd.



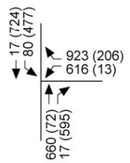
Intersection #6
SR 99 NB Ramps/Elkhorn Blvd.



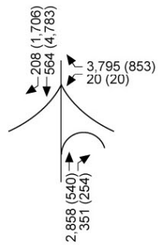
Intersection #7
Elkhorn Blvd./E. Commerce Wy.



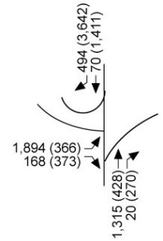
Intersection #8
Powerline Rd./Del Paso Rd.



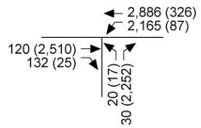
Intersection #9
I-5 NB Ramps/Metro Air Pkwy.



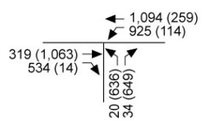
Intersection #10
I-5 SB Ramps/Metro Air Pkwy.



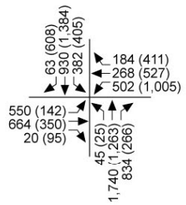
Intersection #11
Elverta Rd./Lone Tree Rd.



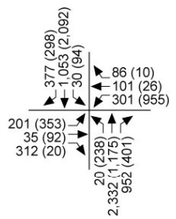
Intersection #12
Metro Air Pkwy./Elverta Rd.



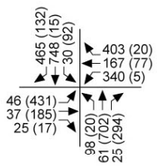
Intersection #13
Metro Air Pkwy./Elkhorn Blvd.



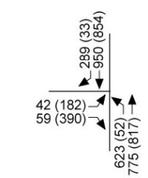
Intersection #14
Metro Air Pkwy./Meister Wy.



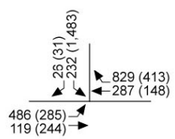
Intersection #15
Meister Wy./Lone Tree Rd.



Intersection #16
Meister Wy./E. Commerce Wy.



Intersection #17
Metro Air Pkwy./S. Bayou Rd.



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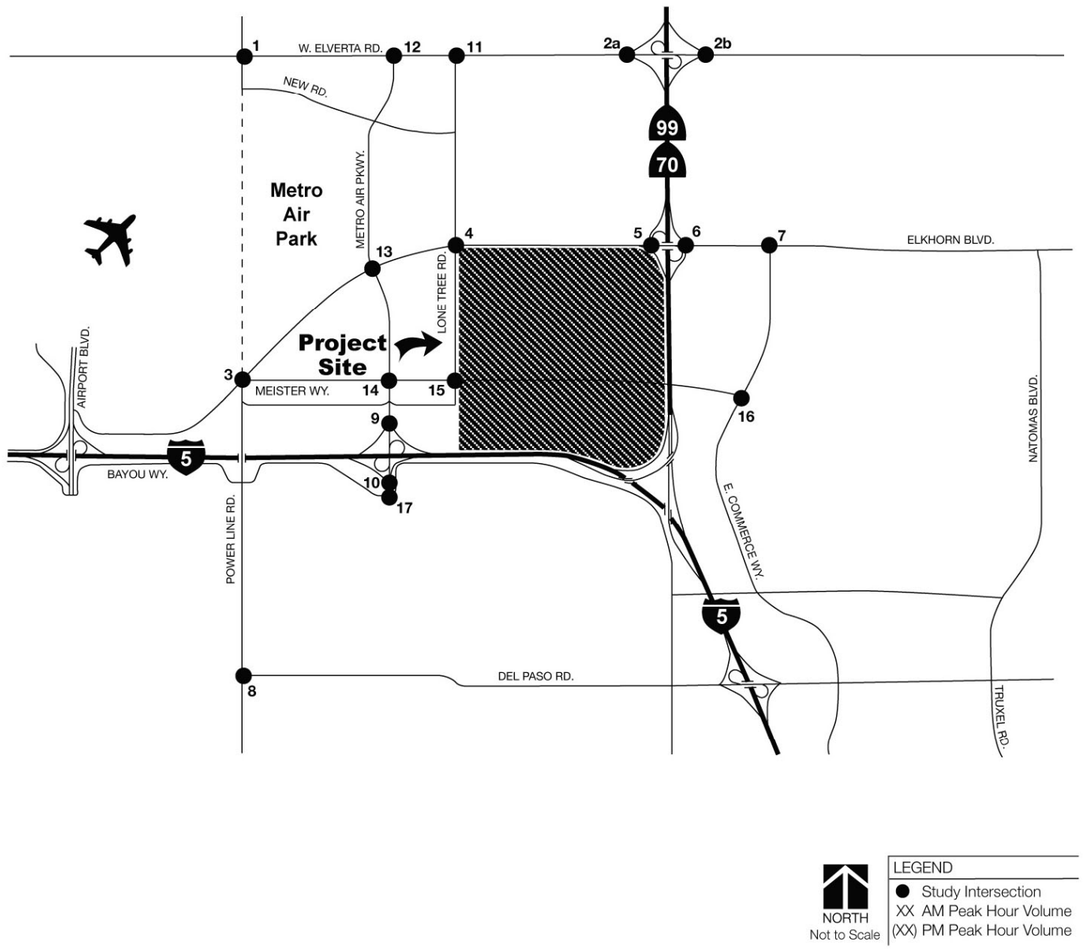
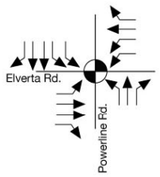


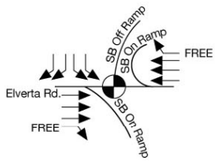
Source: TJKM 2005

Cumulative (2025) Peak-Hour Turning Movement Volumes **Exhibit 6.1-6**

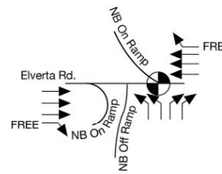
Intersection #1
Powerline Rd./Elverta Rd.



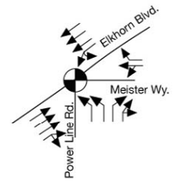
Intersection #2a
Elverta Rd./SR 70/99 SB Ramps



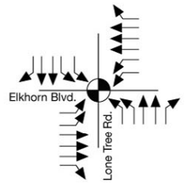
Intersection #2b
Elverta Rd./SR 70/99 N Ramps



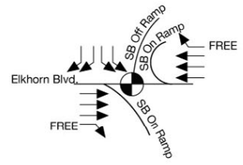
Intersection #3
Powerline Rd./Elkhorn Blvd. Realigned



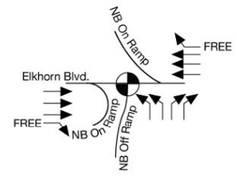
Intersection #4
Elkhorn Blvd./Lone Tree Rd.



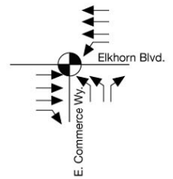
Intersection #5
SR 99 SB Ramps/Elkhorn Blvd.



Intersection #6
SR 99 NB Ramps/Elkhorn Blvd.

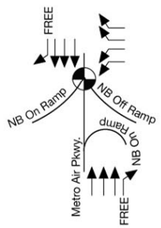


Intersection #7
Elkhorn Blvd./E. Commerce Wy.

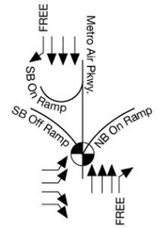


Intersection #8
Powerline Rd./Del Paso Rd.

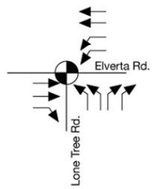
Intersection #9
I-5 NB Ramps/Metro Air Pkwy.



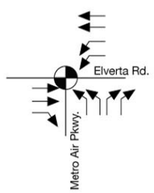
Intersection #10
I-5 SB Ramps/Metro Air Pkwy.



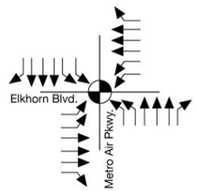
Intersection #11
Elverta Rd./Lone Tree Rd.



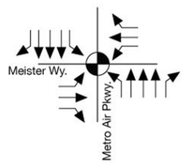
Intersection #12
Metro Air Pkwy./Elverta Rd.



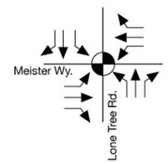
Intersection #13
Metro Air Pkwy./Elkhorn Blvd.



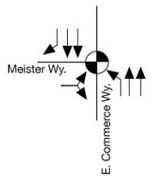
Intersection #14
Metro Air Pkwy./Meister Wy.



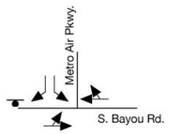
Intersection #15
Meister Wy./Lone Tree Rd.

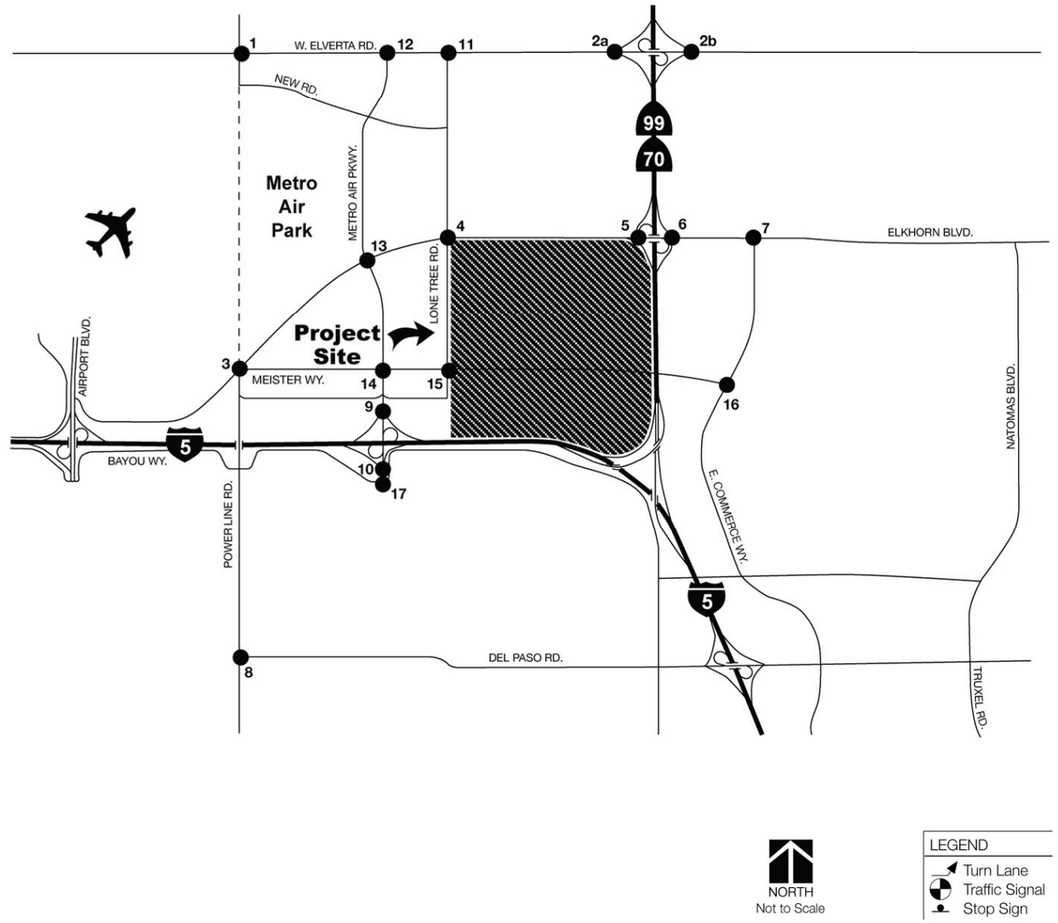


Intersection #16
Meister Wy./E. Commerce Wy.



Intersection #17
Metro Air Pkwy./S. Bayou Rd.





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Source: TJKM 2005

Cumulative (2025) Lane Configurations **Exhibit 6.1-7**

Results of Level of Service Analysis

Tables 6.1-16, 6.1-17, 6.1-18, and 6.1-19 summarize the intersection, roadway segment, freeway ramp and freeway mainline segment levels of service under Cumulative Conditions. Detailed calculations are contained in Appendix B of this document.

Table 6.1-16
Cumulative (2025) Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay or V/C*	LOS	Queue Length (feet) [X: Y][1]	Average Delay or V/C*	LOS	Queue Length (feet) [X: Y][1]
1	Power Line Road and Elverta Road (County)	Signal	0.70	B	-	0.82	D	-
2a	SR 70/99 SB Ramps and Elverta Road	Signal	**140.6**	**F**	**[WBT: 2,154]**	7.7	A	[EBT: 520]
2b	SR 70/99 NB Ramps and Elverta Road	Signal	**120.1**	**F**	**[WBT: 1,348]**	12.4	B	[EBT: 445]
3	Power Line Road and Elkhorn Boulevard and Meister Way (County)	Signal	0.75	C	-	0.79	C	-
4	Elkhorn Boulevard and Lone Tree Road	Signal	**37.4**	**D**	**[WBR: 1,484]**	**219.0**	**F**	**[SBL: 957]**
5	SR 70/99 SB Ramps and Elkhorn Boulevard	Signal	44.5	D	-	10.8	B	-
6	SR 70/99 NB Ramps and Elkhorn Boulevard	Signal	**96.4**	**F**	**[WBT: 1,029]**	13.8	B	[EBT: 467]
7	Elkhorn Boulevard and E. Commerce Way	Signal	17.4	B	-	16.2	B	-
8	Power Line Road and Del Paso Road (County).	Signal	0.89	D	-	0.51	A	-
9	I-5 NB Ramps and Metro Air Parkway	Signal	**256.6**	**F**	**[WBR: 2,655]**	**92.1**	**F**	**[SBT: 2,278]**
10	I-5 SB Ramps and Metro Air Parkway	Signal	31.2	C	-	7.8	A	-
11	Elverta Road and Lone Tree Road (County)	Signal	**0.97**	**E**	[WBT: 1,675]	**1.68**	**F**	**[NBR: 1,495]**
12	Elverta Road and Metro Air Parkway (County)	Signal	0.71	C	-	0.65	B	-
13	Elkhorn Boulevard and Metro Air Parkway (County)	Signal	0.85	D	-	0.85	D	-
14	Meister Way and Metro Air Parkway (County).	Signal	0.81	D	[WBL: 477]	**1.32**	**F**	**[WBL: 1,264]**
15	Meister Way and Lone Tree Road	Signal	22.4	C	-	30.4	C	-
16	Meister Way and E. Commerce Way	Signal	20.6	C	-	13.3	B	-
17	Bayou Road and Metro Air Parkway	One Way Stop	**(8,993.0)**	**(F)**	**[SBL: >600]**	**(9,795.0)**	**(F)**	**[SBL: >600]**

Notes: * volume/capacity for County intersections; Seconds per Vehicle; LOS = Level of Service; (X) = LOS for minor approach
(X.X) = Delay in seconds per vehicle for minor approach
Bold = Unacceptable Intersection Operation
[1] X: Y = Most critical approach: 50th/95th Percentile Queue Length for unsignalized/signalized intersections respectively
- Queue length not reported for those intersections with acceptable LOS conditions
Storage length not available for future lane configurations/study intersections
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left; T = Through; R = Right
HCM 2000 Methodology does not report the overall intersection LOS for one-way stop intersections

Under Cumulative Conditions, the following study intersections are expected to operate unacceptably:

- SR 70/99 Southbound Ramps and Elverta Road (LOS F during the a.m. peak)
- SR 70/99 Northbound Ramps and Elverta Road (LOS F during the a.m. peak)
- Elkhorn Boulevard and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- SR 70/99 Northbound Ramps and Elkhorn Boulevard (LOS F during the a.m. peak)

- Metro Air Parkway and I-5 Northbound Ramps (LOS F during the a.m. and p.m. peaks)
- Elverta Road and Lone Tree Road (LOS E and LOS F during the a.m. and p.m. peak, respectively)
- Meister Way and Metro Air Parkway (LOS F during the p.m. peak)
- Metro Air Parkway and Bayou Road (LOS F during the a.m. and p.m. peaks)

It should be noted that the cumulative scenario lane configuration includes all planned improvements provided in the environmental impact report for the Metro Air Park General Plan Amendment and Rezone project (1993) in addition to all roads and freeway improvements as of the 2025 Metropolitan Transportation Plan (MTP) (SACOG 2002) and NNCP (1994).

As shown in Table 6.1-17, under Cumulative Conditions the following roadway segments are expected to operate unacceptably:

- Elkhorn Boulevard west of SR 70/99 Interchange – LOS F
- Metro Air Parkway north of I-5 Interchange – LOS F

Table 6.1-17
Cumulative (2025) Roadway Operating Conditions

Roadway Segment	Lanes (Max. ADT for acceptable LOS in vpd)	Daily Volume (vpd)	LOS
Elkhorn Boulevard west of SR 70/99 Interchange	6 (43,200)	**59,364**	**F**
Lone Tree Road south of Elkhorn Boulevard	4 (28,800)	15,992	A
Metro Air Parkway north of I-5 Interchange	6 (48,600)	**89,289**	**F**
Meister Way west of SR 70/99	2 (14,400)	11,508	B

Notes: LOS = Level of Service; vpd = vehicles per day; Max. ADT: Maximum average daily traffic
Bold = Unacceptable Roadway Segment Operation.

As shown in Table 6.1-18, the following ramps are expected to operate unacceptably under Cumulative (2025) Conditions:

- SR 70/99 northbound to Elkhorn Boulevard off-ramp – LOS F during the a.m. peak hour
- I-5 northbound to Metro Air Parkway off-ramp – LOS F during the a.m. peak hour
- Metro Air Parkway to I-5 southbound loop on-ramp – LOS F during the p.m. peak hour

As shown in Table 6.1-19, the following freeway segments are expected to operate unacceptably under Cumulative (2025) Conditions:

- I-5 East of Power Line Road – LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour

- I-5 north of Del Paso Road – LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour

- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit – LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour

Table 6.1-18
Cumulative (2025) Peak-Hour Freeway Ramp Operating Conditions

Ramp	A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	37	B	-	426	B	-
Elkhorn Boulevard to SR 70/99 northbound (On-ramp)	283	B	-	140	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	**2,077**	**F**	**[NBL: 1,156, 1,270]**	1,045	C	[NBL: 218, 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	707	C	[SWR: 383, 1,250]	370	C	[SWL: 90, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	224	B	-	63	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	652	B	-	1,570	C	-
Elverta Boulevard to SR 70/99 northbound (Loop on-ramp)	180	B	-	944	B	-
Elverta Boulevard to SR 70/99 northbound (On-ramp)	215	B	-	111	B	-
SR 70/99 northbound to Elverta Boulevard (off-ramp)	1,077	C	[NBL: 1,008, 1,270]	995	C	[NBR: 395, 1,270]
SR 70/99 southbound to Elverta Boulevard (off-ramp)	1,282	C	[SWR: 707, 1,250]	512	C	[SWL: 140, 1,250]
Elverta Boulevard to SR 70/99 southbound (loop on-ramp)	641	B	-	241	B	-
Elverta Boulevard to SR 70/99 southbound (on-ramp)	435	B	-	757	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	350	C	-	212	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	192	C	-	496	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	2,597	C	-	3,204	D	-
I-5 northbound to SR 70/99 northbound (off-ramp)	3,795	E	-	2,585	C	-
I-5 northbound to Metro Air Parkway (off-ramp)*	**3,905**	**F**	**[WBR: 1846, 1270]**	1,207	C	[WBR: 941, 1270]
Metro Air Parkway to I-5 northbound (On-ramp)*	432	B	-	1,983	E	-
Metro Air Parkway to I-5 northbound (loop on-ramp)*	385	B	-	195	B	-
I-5 southbound to Metro Air Parkway (off-ramp)*	1,975	E	[SEL: 767, 1250]	821	C	[SER: 77, 1250]
Metro Air Parkway to I-5 southbound (On-ramp)*	300	B	-	363	B	-
Metro Air Parkway to I-5 southbound (loop on-ramp)*	967	B	-	**4,546**	**F**	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
* Future ramps
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

Table 6.1-19
Cumulative (2025) Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	NB	**6,202**	**> 45**	**F**	3,873	43.4	E
	SB	3,755	40.4	E	**7,288**	**> 45**	**F**
I-5 North of Del Paso Road	NB	**9,648**	**> 45**	**F**	6,246	29.5	D
	SB	6,150	29.0	D	**9,997**	**> 45**	**F**
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	**10,294**	**> 45**	**F**	7,621	41.7	E
	SB	7,201	37.0	E	**11,146**	**> 45**	**F**
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	2,231	20.5	C	2,606	24.0	C
	SB	2,778	25.7	C	2,154	19.8	C
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	3,988	24.5	C	3,081	18.9	C
	SB	2,947	18.1	C	3,417	21.0	C

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.

Project Trip Generation – Baseline Conditions

The project trip generation was estimated based on the trip rates provided in Trip Generation, 7th Edition, published by ITE.

The Pre-Census Travel Behavior Report Analysis of the 2000 Sacramento Area Council of Government (SACOG) Household Travel Survey (SACOG 2001) was used to estimate project trips by various modes of travel. It is expected that project trips would predominantly be by autos, with a few by transit, walking, biking and other means of transportation.

As shown in Table 6.1-20, the proposed project is expected to generate a total of 43,109 new daily trips with 2,724 trips occurring during the a.m. peak hour and 4,311 trips occurring during the p.m. peak hour.

The external trips were derived by adjusting the ITE trip generation estimates. ITE trip generation estimates are based on empirical data collected at suburban locations throughout the United States. Adjustment to the ITE trip generation estimates were made to account for transit rider-ship, higher level s of walking and bicycles use and interaction of land uses in a mixed use development areas. Adjustments for the use of transit and walk, bike were based on information contained in the Pre-Census Travel Behavior Report Analysis of the 2000 SACOG Household Travel Survey.

After the adjustments were made for transit, walk and bike, an adjustment was made to account for internal trips between the different types of land uses within the project site. The internal trip adjustments were performed using procedures recommended by the Institute of Transportation Engineers for multi-use developments (Trip Generation Handbook). Internal trips are trips that would occur between different land uses on the same site without accessing the external street system.

The projected trips were discounted (shown in parenthesis in Table 6.1-20) to account for internal trips between the different land uses and trips that would likely occur by transit, walking, and biking. Accounting for discounted trips, the project is expected to generate a net total of 39,947 daily auto trips, with 2,451 auto trips occurring during the a.m. peak hour and 4,073 auto trips occurring during the p.m. peak hour.

As described previously, the DEIR assumed an 11% discount for use of LRT services at the site; however, these services would not likely be in place at the time the project is built out. Therefore, this trip discount was removed from the revised trip generation estimate. In revising the trip generation estimate, an error in the calculation formula for the school land uses was discovered and corrected. Additionally, the trip generation calculation was revised to use the ITE equations instead of the trip rates used in the DEIR because the ITE Trip Generation Handbook recommends the use of regression equations when available. Taken together, the removal of the 11% trip discount, the error correction and the use of ITE equations resulted in a new trip generation estimate that is approximately 1,200 daily trips less than that presented in the DEIR. Because the analysis performed for the DEIR used a higher (more conservative) trip generation estimate than what is shown in Table 6.1-20, the traffic analysis performed in the Baseline Scenario is a conservative representation of the traffic impacts that would occur under Baseline Conditions and Existing Plus Project Conditions. As such, remodeling of these scenarios is not required for this Second RDEIR.

The residential, village and community commercial portion of the project is estimated to generate 996 daily non-auto trips (walk, bike and transit trips) with 62 trips occurring during the a.m. peak hour and 68 trips during the p.m. peak hour. The majority of residential, village and community commercial non-auto trips are expected to be by walking in the vicinity of the project area. Walking is expected to account for 372 daily non-auto trips (about 46% of projected daily non-auto trips).

Table 6.1-20
Proposed Project Trip Generation

Land Use	Size	Daily Rate	Daily Trips	A.M. Peak Hour In	A.M. Peak Hour Out	A.M. Total	P.M. Peak Hour In	P.M. Peak Hour Out	P.M. Total
Single Family Residential (Low Density Housing)	671 DU[1]		5,991	174	496	670	381	214	595
Single Family Residential (Medium Density Housing)	2,215 DU		8,933	111	504	615	488	274	762
Multi Family Residential (High Density Housing)	587 DU		3,678	58	233	291	221	119	341
Total Residential Trips Generated			**18,603**	**344**	**1,234**	**1,576**	**1,090**	**608**	**1,697**
Elementary School	800 Students		1,032	163	133	296	92	112	204
Village and Community Commercial									
- Retail	263 Ksf		12,732	171	109	280	569	616	1,185
- Retail/Major Grocery	67 Ksf		5,877	151	157	308	360	319	680
Meister Retail	29.7 Ksf		3,085	46	29	75	135	146	281
Meister Retail/Restaurant	14 Ksf	127.15	1,780	98	91	189	145	118	263
Total Project Trips Generated			**43,109**	**972**	**1,754**	**2,724**	**2,390**	**1,920**	**4,311**
Trip discount[2]									
Residential Travel Mode Discount									
Transit (1%)			(186)	(3)	(12)	(15)	(11)	(6)	(17)
Walk (2%)			(372)	(7)	(26)	(32)	(22)	(12)	(34)
Bike (1%)			(186)	(3)	(12)	(15)	(11)	(6)	(17)
Other Travel Mode Discount									
Village and Community Commercial - Transit Ridership (0.3%)			(56)		Negligible			Negligible	
Meister Retail and Restaurant - Transit Ridership (0.3%)			(15)		Negligible			Negligible	
Sub Total			**(815)**	**(13)**	**(49)**	**(62)**	**(44)**	**(24)**	**(68)**
Residential Linked Trip by Purpose Discount									
Elementary School (8%) A.M. only				(27)	(99)	(126)			
Village and Community Commercial (10%)			(2,347)	(47)	(38)	(85)	(109)	(61)	(170)
Sub Total			**(2,347)**	**(74)**	**(137)**	**(211)**	**(109)**	**(61)**	**(170)**
Total Auto Trips			**39,947**	**884**	**1,567**	**2,451**	**2,238**	**1,835**	**4,073**

Notes:
[1] DU - Dwelling Unit, [2] AC - Acre [3] Ksf - 1000 Square Feet.
[2] Mode split based on Pre-Census Behavior Report Analysis of the 2000 SACOG Household Travel Survey, SACOG 2001, Weighted Results for Tables A7,A26 and A27.
88% of Residential trips are by auto during the a.m. peak hour, 1% by Transit,2% by Walk and 1% by Bike with 8% trips made to the Elementary School by other means besides auto.
96% of Residential trips are expected to be made by auto during the p.m. peak hour. 10% of the Residential auto trips are expected to be linked to Village and Community Commercial trips.
0.3 % of non residential trips are expected to be made to the Village and Community Commercial by transit.
Source: ITE Trip Generation, 7th Edition (trip calculation sheets included in Appendix B of this document)

A significant number of residential trips are expected to be internal trips between the different land uses: about 126 a.m. peak hour trips to/from the proposed elementary school and 2,347 daily trips to/from the village and community commercial. The majority of the residential trips to the elementary school are expected to occur only in the a.m. peak hour. Also, the majority of the residential trips to the village and community commercial are expected to occur during the p.m. peak hour.

PROJECT TRIP DISTRIBUTION

The project trip distributions for a.m. and p.m. peak hours are shown in Exhibits 6.1-8, 6.1-9, 6.1-10, and 6.1-11. Trips to and from the proposed Greenbriar Project and approved projects were assigned to the study intersections based on the execution of the SACMET model and the trip distribution assumptions shown in the exhibits.

Baseline Scenario

Trips distribution assumptions for the a.m. peak hour are as follows:

- 55% to/from the south on I-5
- 15% to/from the north on SR 70/99
- 15% to/from the east on Elkhorn Boulevard
- 10% to/from the west on Elkhorn Boulevard
- 5% to/from the west on I-5

Trips distribution assumptions for the p.m. peak hour are as follows:

- 45% to/from the south on I-5
- 20% to/from the west on Elkhorn Boulevard
- 15% to/from the north on SR 70/99
- 15% to/from the east on Elkhorn Boulevard
- 5% to/from the west on I-5

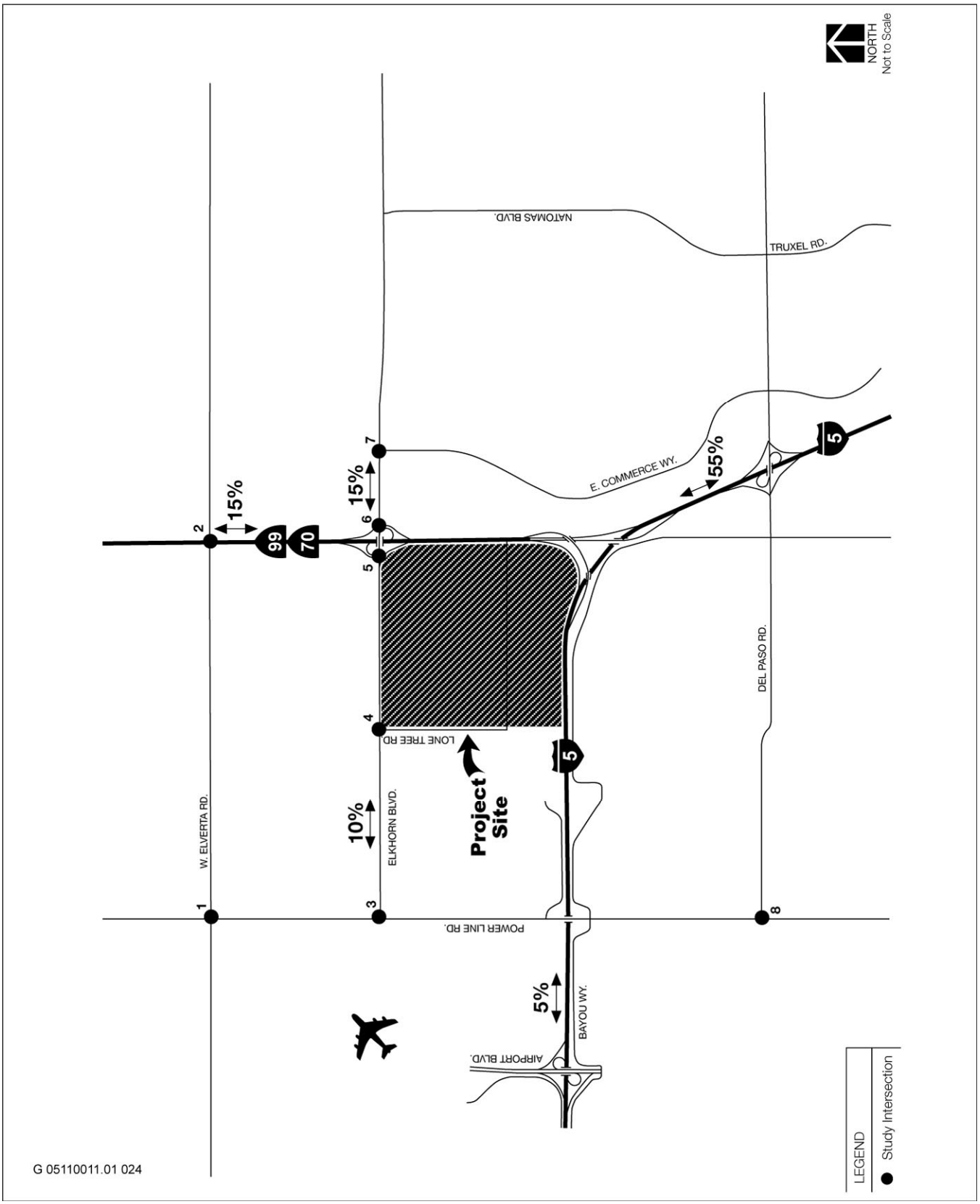
Cumulative Conditions (assumes the Meister Way Overpass is constructed)

Trips distribution assumptions for the a.m. peak hour are as follows:

- 45% to/from the south on I-5
- 20% to/from the east on Meister Way over SR 70/99
- 15% to/from the east on Elkhorn Boulevard
- 10% to/from the north on SR 70/99
- 5% to/from the west on Elkhorn Boulevard
- 5% to/from the west on I-5

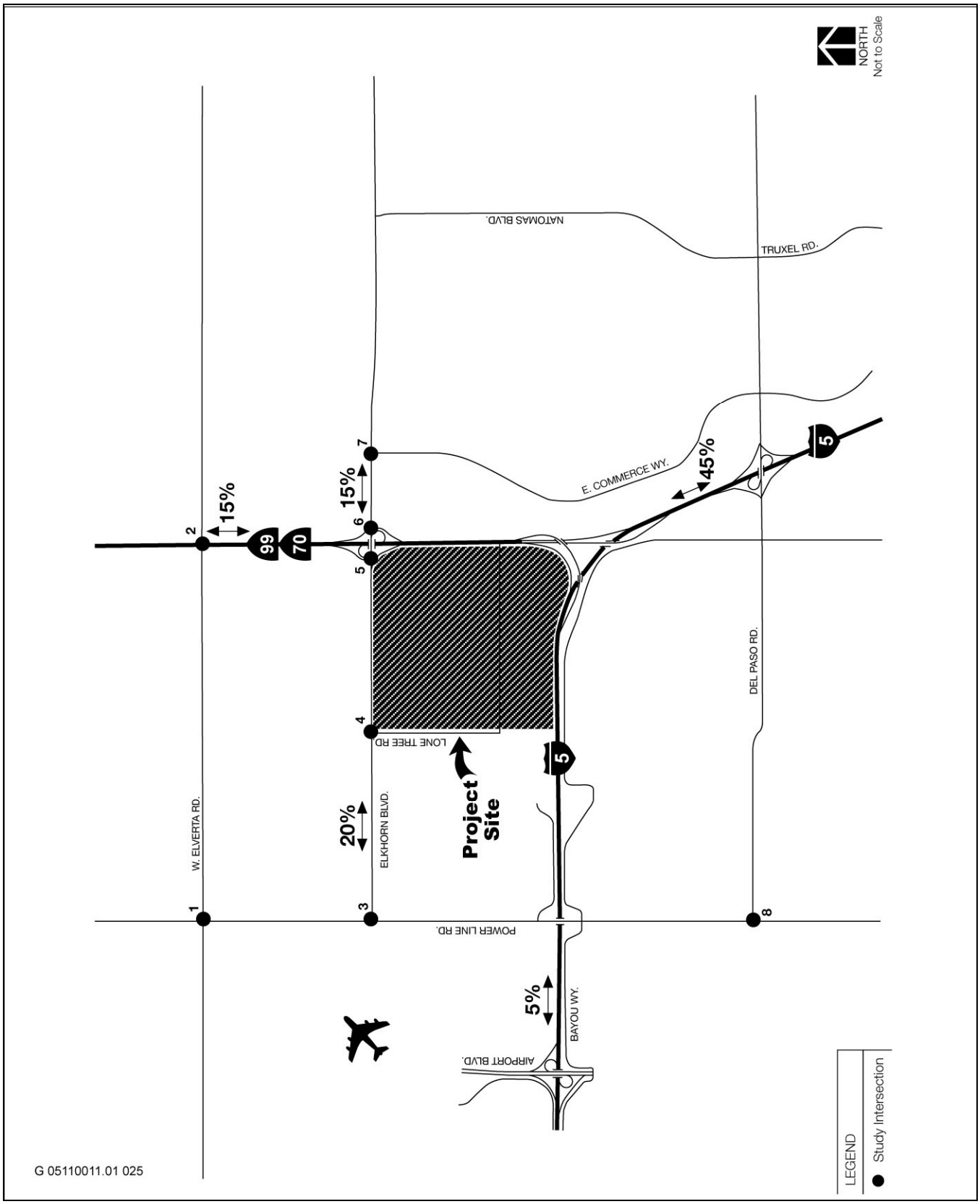
Trips distribution assumptions for the p.m. peak hour are as follows:

- 35% to/from the south on I-5
- 30% to/from the east on Meister Way over SR 70/99
- 10% to/from the east on Elkhorn Boulevard
- 10% to/from the north on SR 70/99
- 10% to/from the west on Elkhorn Boulevard
- 5% to/from the west on I-5



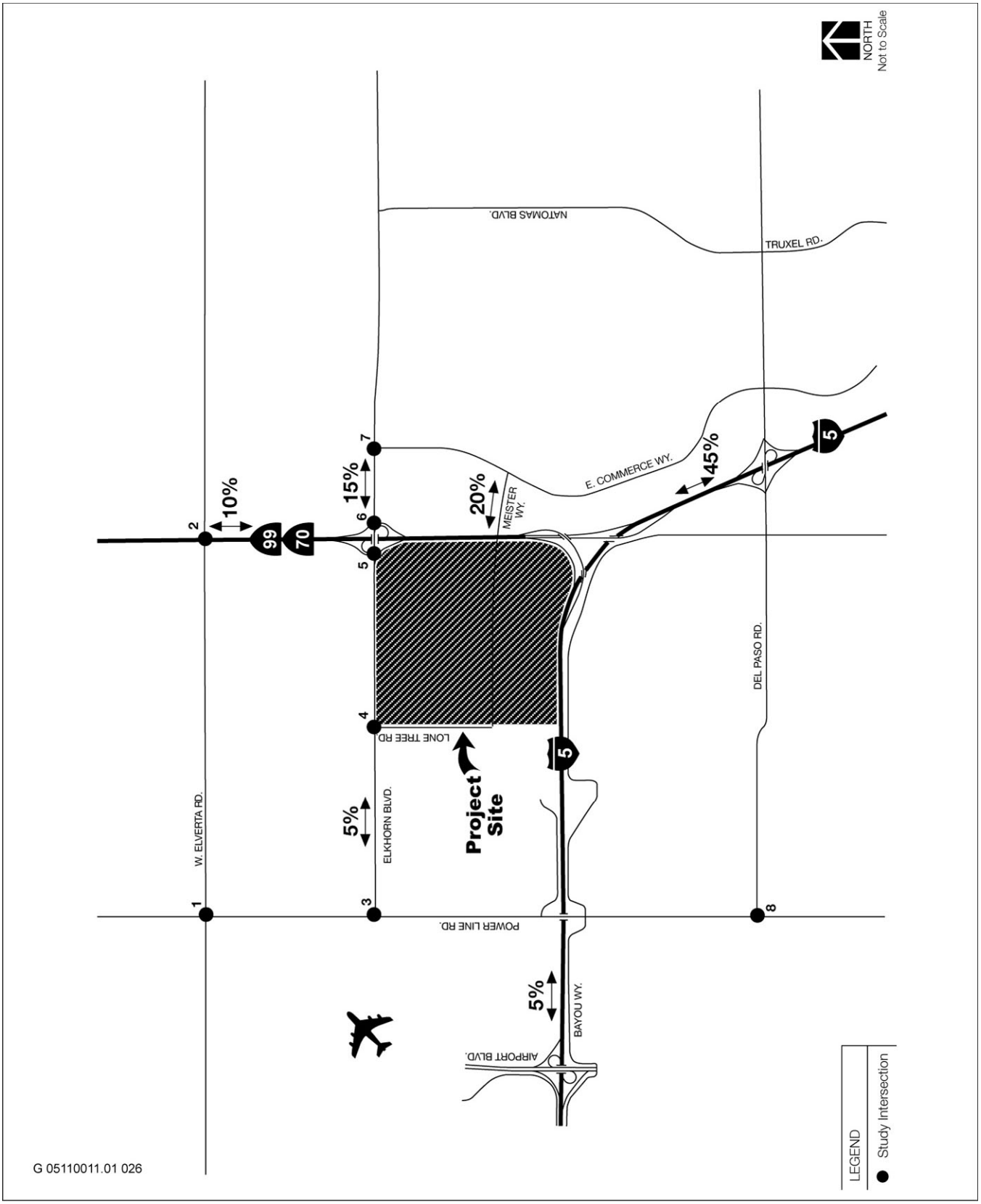
Source: TJKM 2005

A.M. Peak-Hour Project Trip Distribution without Meister Way Overpass **Exhibit 6.1-8**



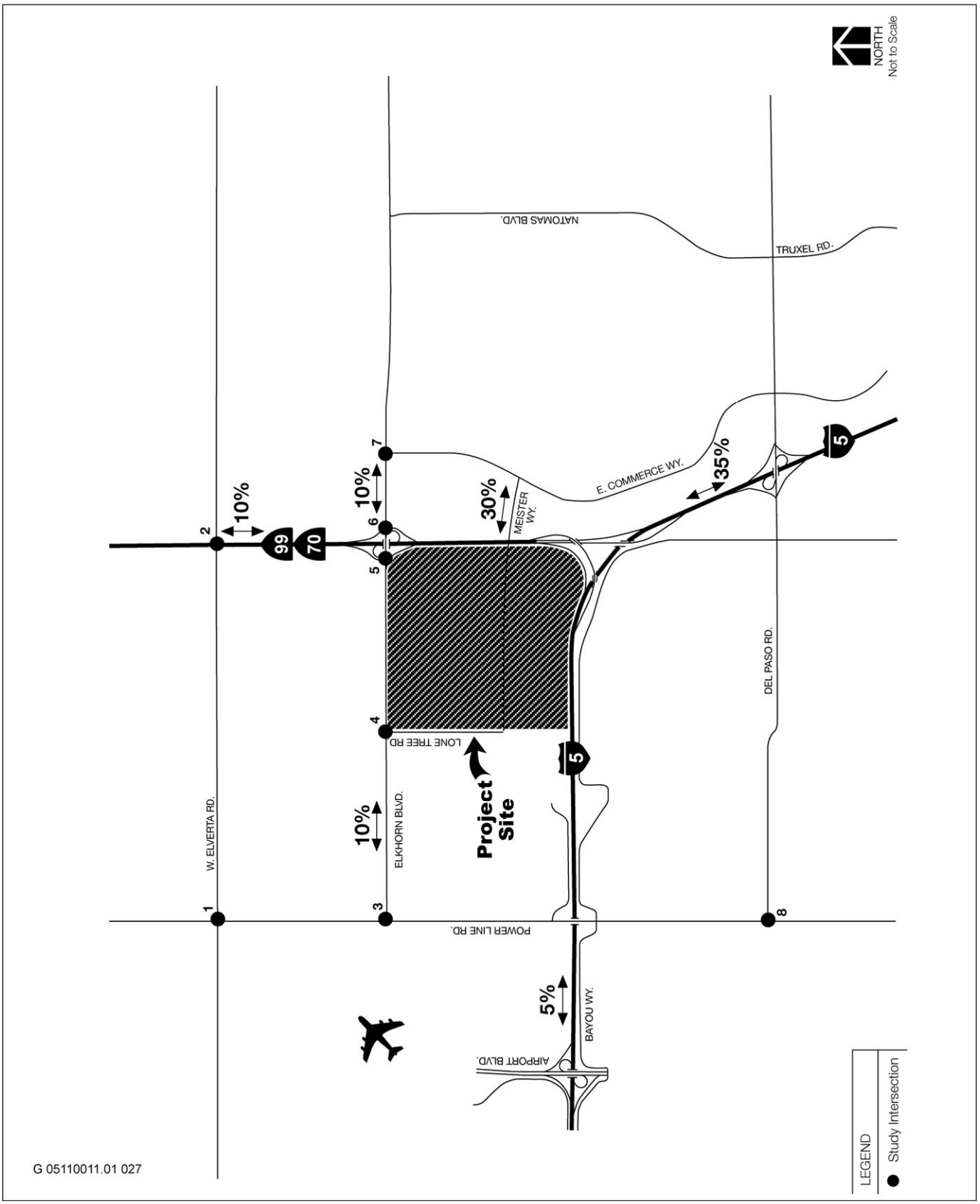
Source: TJKM 2005

P.M. Peak-Hour Project Trip Distribution without Meister Way Overpass **Exhibit 6.1-9**



Source: TJKM 2005

A.M. Peak-Hour Project Trip Distribution with Meister Way Overpass **Exhibit 6.1-10**



Source: TJKM 2005

P.M. Peak-Hour Project Trip Distribution with Meister Way Overpass **Exhibit 6.1-11**

Baseline plus Project Conditions Analysis

The Baseline plus Project Conditions analysis adds traffic from the proposed project to the Baseline traffic conditions.

Exhibit 6.1-12 shows the Baseline plus Project peak-hour turning movement volumes. The Baseline plus Project lane configurations are shown in Exhibit 6.1-13.

Results of Level of Service Analysis

Tables 6.1-21, 6.1-22, 6.1-23, and 6.1-24 summarize the intersection, roadway segment, freeway ramp and freeway mainline segment levels of service under the Baseline plus Project Conditions. Detailed calculations are contained in Appendix B of this document.

Table 6.1-21
Baseline plus Project Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]	Average Delay*	LOS	Queue Length (feet) [X: Y, Z][1]
1	Power Line Road and Elverta Road	All Way Stop	7.1	A	-	8.0	A	-
2	Elverta Road and SR 70/99	Signal	**111.4**	**F**	[SBT: 1820; 2,000+]	33.6	C	[WBL: 151, 425]
3	Power Line Road and Elkhorn Boulevard	All Way Stop	11.3	B	-	**94.9**	**F**	-
4	Elkhorn Boulevard and Lone Tree Road	One Way Stop	**5,569.3**	**(F)**	**[NBLR: >600; 1,200+]**	**7,805.5**	**(F)**	**[NBLR: >600; 1,200+]**
5	SR 70/99 SB Ramps and Elkhorn Boulevard	One Way Stop	(26.4)	(D)	[SBL: 76, 450]	**(67.1)**	**(F)**	**[SBR: 137, 450]**
6	SR 70/99 NB Ramps and Elkhorn Boulevard	One Way Stop	**5,372.8**	**(F)**	**[NBL: >600, 485]**	**3,973.2**	**(F)**	**[NBL: >600, 485]**
7	Elkhorn Boulevard and E. Commerce Way	One Way Stop	**6,955.1**	**(F)**	**[NBL: >600, 265]**	**6,775.9**	**(F)**	**[NBL: >600, 265]**
8	Power Line Road and Del Paso Road	One Way Stop	(9.2)	(A)	-	(10.8)	(B)	-
18	Elkhorn Boulevard and Project Street 1	One Way Stop	**473.1**	**(F)**	**[NBLR: 448, --]**	**903.5**	**(F)**	**[NBLR: 559, --]**
19	Elkhorn Boulevard and Project Street 2	One Way Stop	**256.9**	**(F)**	**[NBLR: 324, --]**	**382.4**	**(F)**	**[NBLR: 386, --]**
20	Elkhorn Boulevard and Project Street 3	One Way Stop	**231.5**	**(F)**	**[NBLR: 334, --]**	**428.2**	**(F)**	**[NBLR: 435, --]**

Notes: * Seconds per Vehicle; LOS = Level of Service; (X) = LOS for minor approach
(X.X) = Delay in seconds per vehicle for minor approach
Bold = Unacceptable Intersection Operation
[1] X:Y,Z = Most critical approach: 50th/95th Percentile Queue Length for unsignalized/signalized intersections respectively , Available Segment Length/Storage
- Queue length not reported for those intersections with acceptable LOS Conditions or all-way stop control
-- Storage length not available for future lane configurations/study intersections
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left; T = Through; R = Right
HCM 2000 Methodology does not report the overall intersection LOS for one-way stop intersections

As shown in Table 6.1-21, under Baseline plus Project Conditions the following study intersections are expected to operate unacceptably:

- Elverta Road and SR 70/99 – LOS F during the a.m. peak hour

- Power Line Road and Elkhorn Boulevard – LOS F during the p.m. peak hour
- Elkhorn Boulevard and Lone Tree Road – LOS F during the a.m. and p.m. peak hours
- SR 70/99 Southbound Ramps and Elkhorn Boulevard – LOS F during the p.m. peak hour
- SR 70/99 Northbound Ramps and Elkhorn Boulevard – LOS F during the a.m. and p.m. peak hours
- Elkhorn Boulevard and E. Commerce Way – LOS F during the a.m. and p.m. peak hours
- Elkhorn Boulevard and Project Street 1 – LOS F during the a.m. and p.m. peak hours
- Elkhorn Boulevard and Project Street 2 – LOS F during the a.m. and p.m. peak hours
- Elkhorn Boulevard and Project Street 3 – LOS F during the a.m. and p.m. peak hours

As shown in Table 6.1-22, Elkhorn Boulevard west of SR 70/99 interchange and Lone Tree Road south of Elkhorn Boulevard are expected to operate unacceptably (LOS F) under Baseline plus Project Conditions.

Table 6.1-22
Baseline plus Project Roadway Operating Conditions

Roadway Segment	Lanes (Max. ADT for acceptable LOS in vpd)	Daily Volume (vpd)	LOS
Elkhorn Boulevard west of SR 70/99 Interchange	2 (14,400)	**22,170**	**F**
Lone Tree Road south of Elkhorn Boulevard	2 (14,400)	**25,440**	**F**
Metro Air Parkway north of I-5 Interchange	**Future Roadway**		

Notes: LOS = Level of Service; vpd = vehicles per day; Max. ADT: Maximum average daily traffic
Bold = Unacceptable Roadway Segment Operation.

As shown in Table 6.1-23, all the study ramps are expected to continue to operate at acceptable levels of service under Baseline plus Project Conditions except for the following:

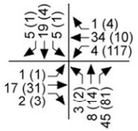
- SR 70/99 Northbound to Elkhorn Boulevard off-ramp – LOS F during the p.m. peak hour
- SR 70/99 Southbound to I-5 Southbound on-ramp – LOS F during the a.m. peak hour
- I-5 Northbound to SR 70/99 Northbound off-ramp – LOS F during the p.m. peak hour

Table 6.1-23
Baseline plus Project Peak-Hour Freeway Ramp Operating Conditions

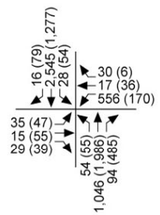
Ramp	A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	147	B	-	220	B	-
Elkhorn Boulevard to SR 70/99 northbound (On-ramp)	129	B	-	146	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	995	C	[NBL: >600, 1,270]	**2070**	**F**	**[NBL: > 600, 1,270]**
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	330	C	[SBL: 76, 1,250]	300	C	[SBR: 137, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	993	B	-	641	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	889	B	-	704	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	982	C	-	174	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	141	C	-	1,335	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	**4,186**	**F**	-	2,508	C	-
I-5 northbound to SR 70/99 northbound (off-ramp)	2,055	C	-	**4,095**	**F**	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

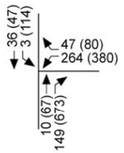
Intersection #1
Powerline Rd./Elverta Rd.



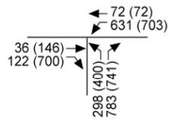
Intersection #2
Elverta Rd./SR 70/99



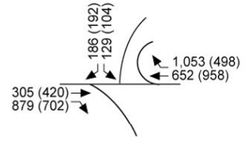
Intersection #3
Powerline Rd./Elkhorn Blvd.



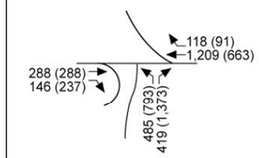
Intersection #4
Elkhorn Blvd./Lone Tree Rd.



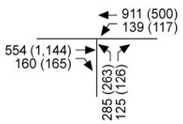
Intersection #5
SR 99 SB Ramps/Elkhorn Blvd.



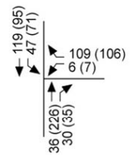
Intersection #6
SR 99 NB Ramps/Elkhorn Blvd.



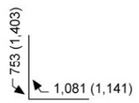
Intersection #7
Elkhorn Blvd./E. Commerce Wy.



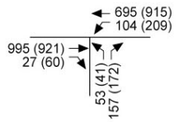
Intersection #8
Powerline Rd./Del Paso Rd.



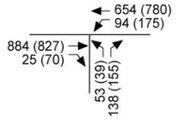
Intersection #15
Meister Wy./Lone Tree Rd.



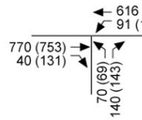
Intersection #18
Elkhorn Blvd./Project Street 1

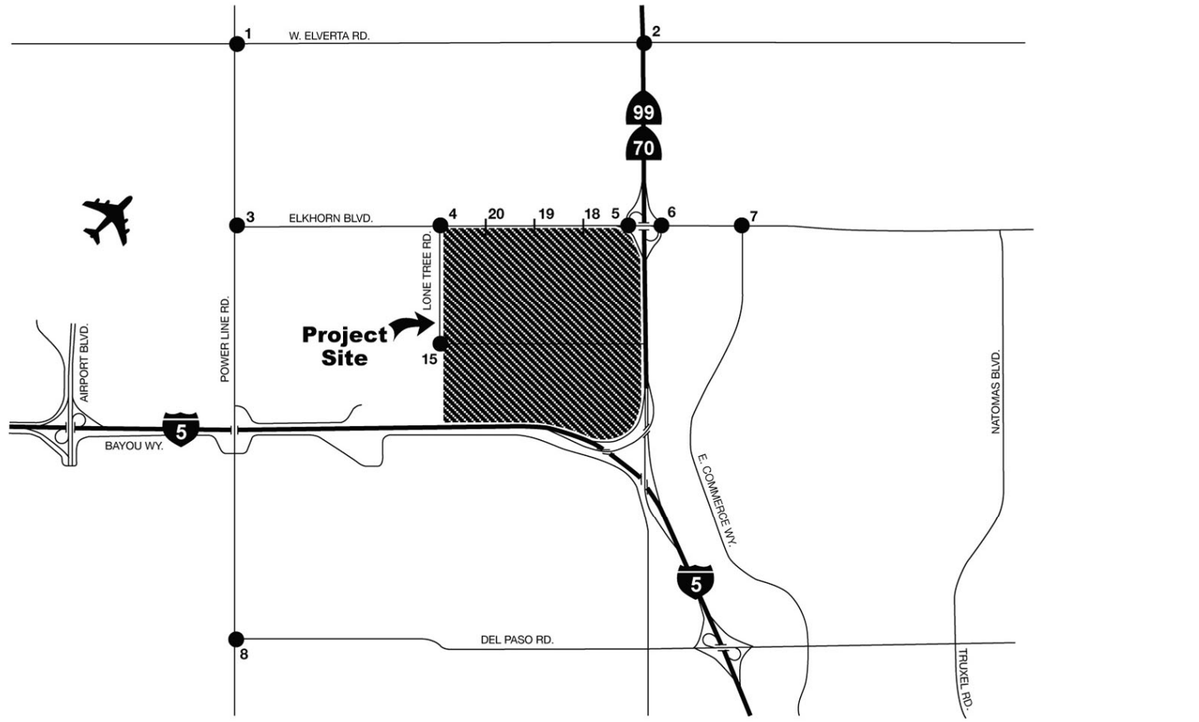


Intersection #19
Elkhorn Blvd./Project Street 2



Intersection #20
Elkhorn Blvd./Project Street 3



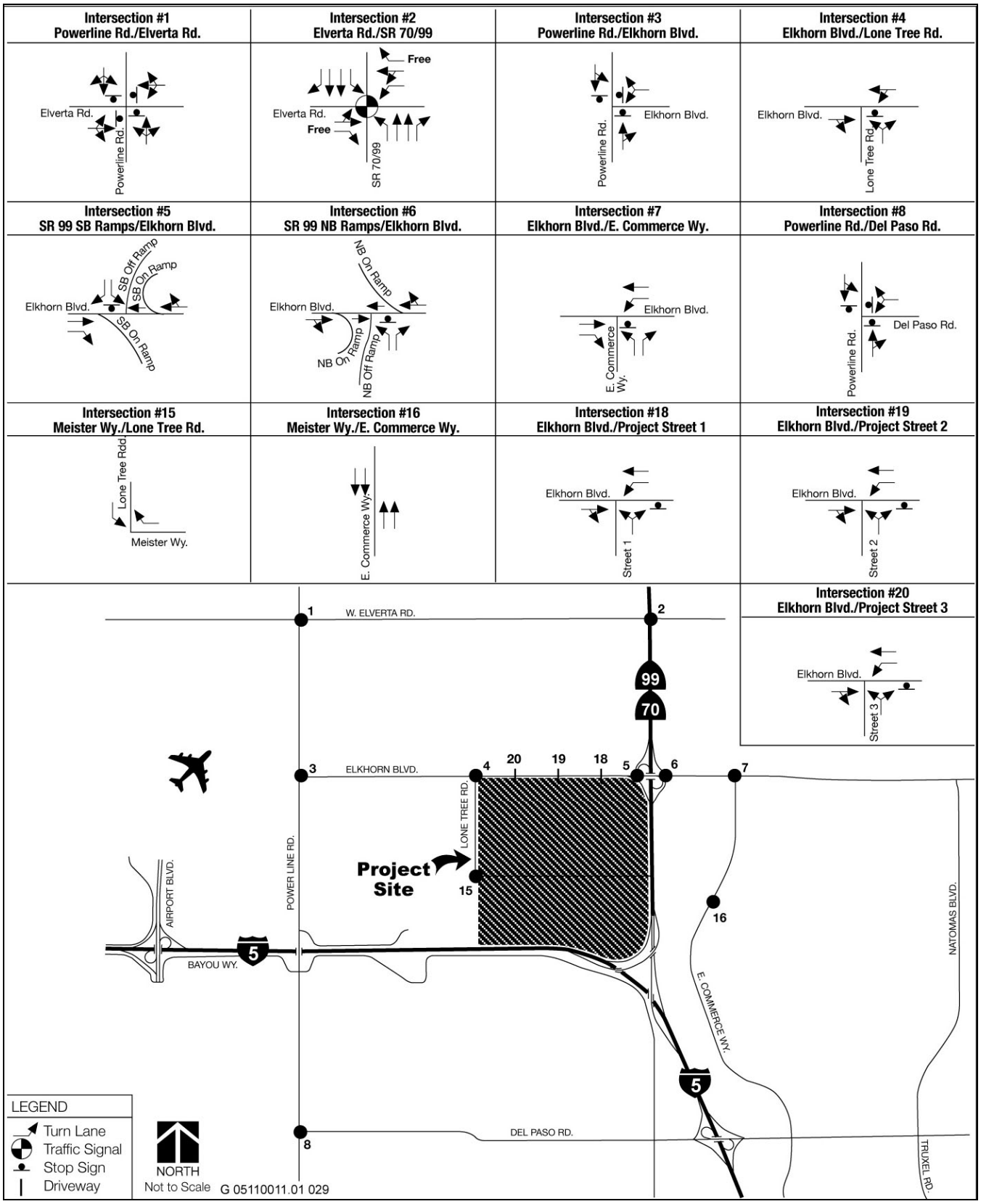


G 05110011.01 032

Source: TJKM 2005

Baseline Plus Project Peak-Hour Turning Movement Volumes (without the Meister Way-SR 70/99 Overpass)

Exhibit 6.1-12



Source: TJKM 2005

Baseline Plus Project Lane Configurations (without the Meister Way-SR 70/99 Overpass Exhibit 6.1-13

As shown in Table 6.1-24, the following freeway segments are expected to operate unacceptably (LOS E or worse) under Baseline plus Project Conditions:

- I-5 north of Del Paso Road – LOS F for the southbound direction during the a.m. peak hour and the northbound direction during the p.m. peak hour
- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit – LOS F for the southbound direction during the a.m. peak hour and the northbound direction during the p.m. peak hour
- SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange – LOS F for the southbound direction during the a.m. peak hour and the northbound direction during the p.m. peak hour

SR 70/99 between Elverta Road and Elkhorn Boulevard was mistakenly identified as operating unacceptably in the DEIR. However, this intersection operates at LOS E during the a.m. (southbound approach) and p.m. (northbound approach), which is acceptable based on Caltrans standards. This error has been corrected in this document.

Table 6.1-24
Baseline plus Project Conditions Peak-Hour Freeway Mainline Operating Conditions

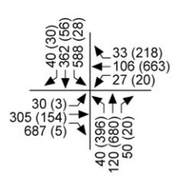
Freeway Segment	Direction	A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	WB/NB	3,031	28.4	D	3,162	30.0	D
	EB/SB	2,722	25.1	C	3,386	33.2	D
I-5 North of Del Paso Road	NB	4,104	25.3	C	**7,083**	**> 45**	**F**
	SB	**6,766**	**> 45**	**F**	4,559	28.5	D
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	4,851	31.0	D	**8,459**	**> 45**	**F**
	SB	**7,722**	**> 45**	**F**	4,926	31.7	D
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	1,477	13.6	B	3,727	39.7	E
	SB	3,615	37.3	E	1,637	15.1	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	2,196	20.2	C	**5,430**	**> 45**	**F**
	SB	**5,167**	**> 45**	**F**	2,682	24.7	C

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.

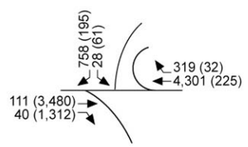
Cumulative (2025) plus Project Conditions Analysis

The Cumulative (2025) plus Project conditions analysis adds traffic from the proposed project to the Cumulative (2025) traffic conditions without project. This scenario presents the expected long term traffic impacts of the project on the study intersections, roadway segments, and freeway facilities. Exhibit 6.1-14 presents the Cumulative plus Project peak-hour turning movement volumes. Exhibit 6.1-15 presents Cumulative plus Project lane configurations. The Meister Way – SR 70/99 overpass is assumed to be constructed by year 2025.

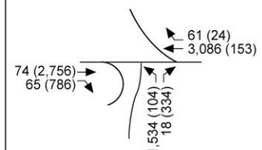
Intersection #1
Powerline Rd./Elverta Rd.



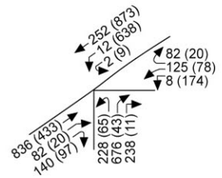
Intersection #2a
Elverta Rd./SR 70/99 SB Ramps



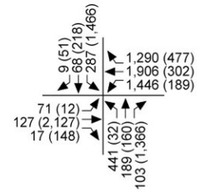
Intersection #2b
Elverta Rd./SR 70/99 N Ramps



Intersection #3
Powerline Rd./Elkhorn Blvd. Redesigned



Intersection #4
Elkhorn Blvd./Lone Tree Rd.



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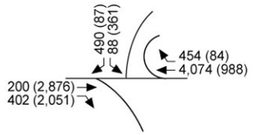
SR 99 SB Ramps/Elkhorn Blvd.



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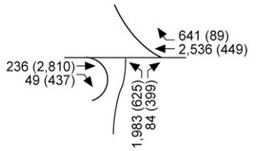
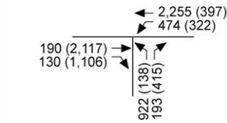
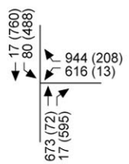
SR 99 NB Ramps/Elkhorn Blvd.



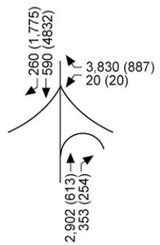
Intersection #7
Elkhorn Blvd./E. Commerce Wy.



Intersection #8
Powerline Rd./Del Paso Rd.



Intersection #9
I-5 NB Ramps/Metro Air Pkwy.



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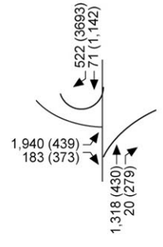
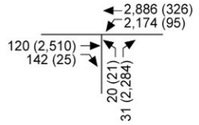
I-5 SB Ramps/Metro Air Pkwy.



Intersection #11
Elverta Rd./Lone Tree Rd.



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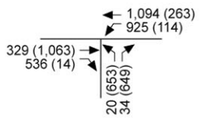
Metro Air Pkwy./Elverta Rd.



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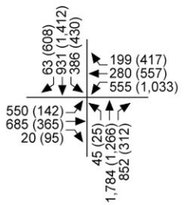
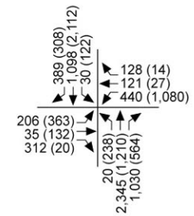
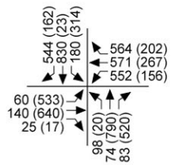
Metro Air Pkwy./Elkhorn Blvd.



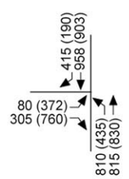
Intersection #14
Metro Air Pkwy./Meister Wy.



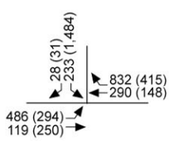
Intersection #15
Meister Wy./Lone Tree Rd.



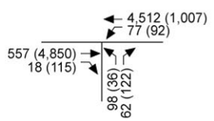
Intersection #16
Meister Wy./E. Commerce Wy.



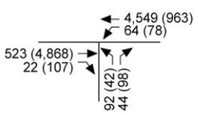
Intersection #17
Metro Air Pkwy./S. Bayou Rd.



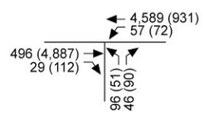
Intersection #18
Elkhorn Blvd./Project Street 1

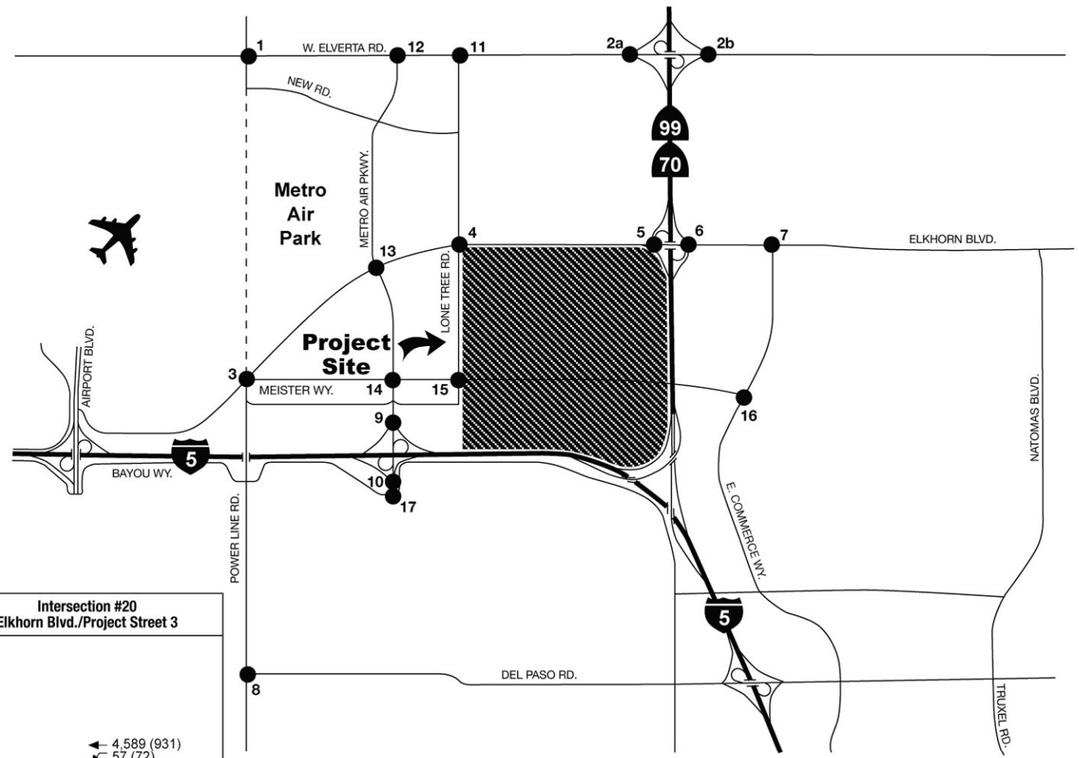


Intersection #19
Elkhorn Blvd./Project Street 2



Intersection #20
Elkhorn Blvd./Project Street 3

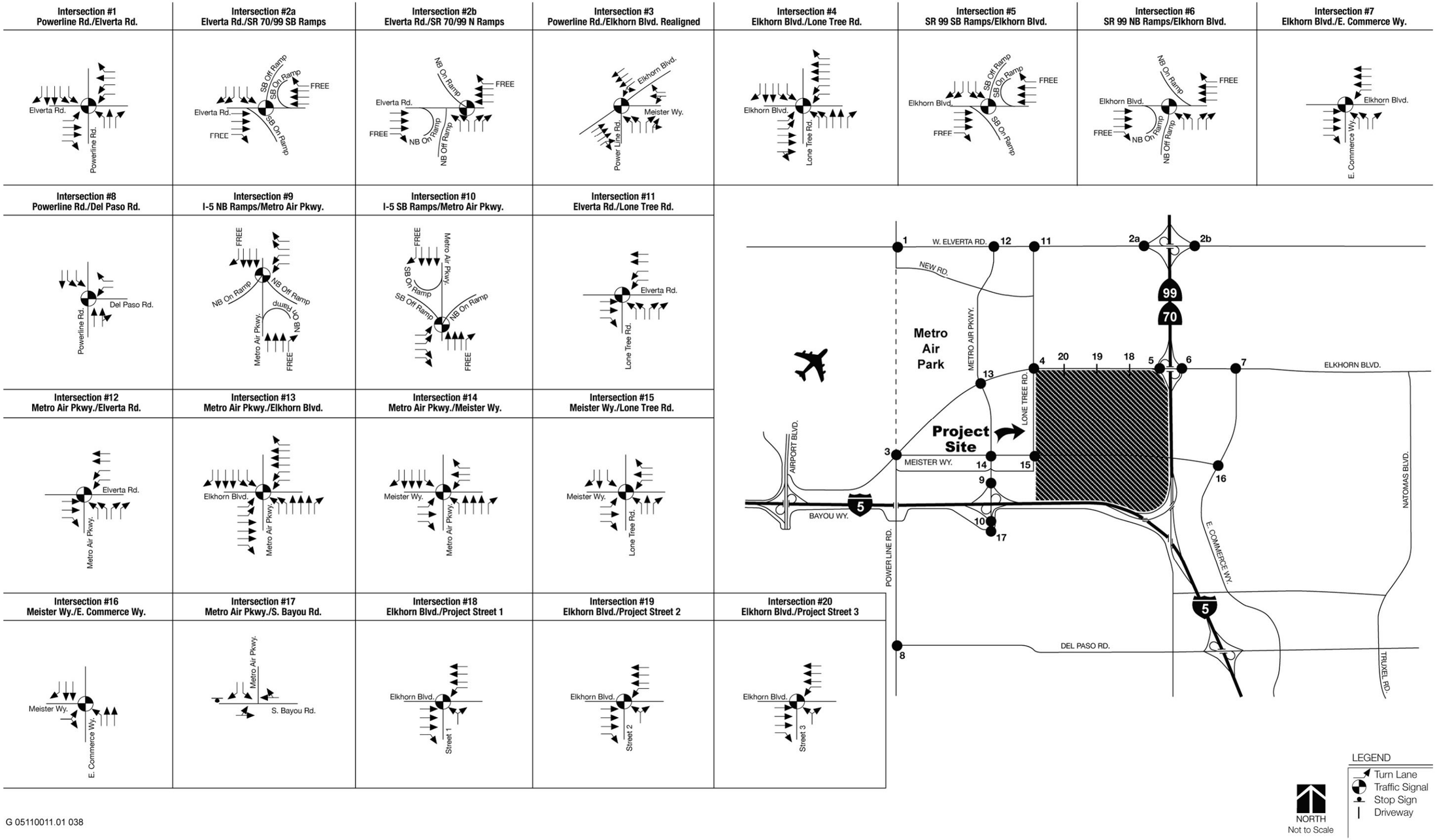




G 05110011.01 030

Source: TJKM 2005

Cumulative (2025) Plus Project Peak-Hour Turning Movement Volumes **Exhibit 6.1-14**



Source: TJKM 2005

Cumulative (2025) Plus Project Lane Configurations **Exhibit 6.1-15**

Results of Level of Service Analysis

Tables 6.1-25, 6.1-26, 6.1-27, and 6.1-28 summarize the intersection, roadway segment, freeway ramp and freeway mainline segment levels of service under Cumulative (2025) plus Project conditions. Detailed calculations are contained in Appendix B of this document. Under Cumulative (2025) plus Project conditions, the following study intersections are expected to operate unacceptably (Table 6.1-25):

- SR 70/99 Southbound Ramps and Elverta Road (LOS F during the a.m. peak)
- SR 70/99 Northbound Ramps and Elverta Road (LOS F during the a.m. peak)
- Elkhorn Boulevard and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- SR 70/99 Southbound Ramps and Elkhorn Boulevard (LOS E during the a.m. peak)
- SR 70/99 Northbound Ramps and Elkhorn Boulevard (LOS F during the a.m. peak)
- Metro Air Parkway and I-5 Northbound Ramps (LOS F during the a.m. and p.m. peaks)
- Elverta Road and Lone Tree Road (LOS E and LOS F during the a.m. and p.m. peaks, respectively)
- Meister Way and Metro Air Parkway (LOS F during the p.m. peak)
- Meister Way and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- Meister Way and E. Commerce Way (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- Metro Air Parkway and Bayou Road (LOS F during the a.m. and p.m. peaks)
- Elkhorn Boulevard and Project Street 1 (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- Elkhorn Boulevard and Project Street 2 (LOS D and LOS F during the a.m. and p.m. peaks, respectively)
- Elkhorn Boulevard and Project Street 3 (LOS D and LOS F during the a.m. and p.m. peaks, respectively)

The intersection of Meister Way and Metro Air Parkway was mistakenly identified as operating unacceptably during the a.m. peak hour in the DEIR. However, this intersection operates at LOS D during the a.m. peak hour, which is acceptable based on County standards. This error has been corrected in this document.

As shown in Table 6.1-26, under Cumulative plus Project conditions the following segments are expected to operate unacceptably:

- Elkhorn Boulevard west of SR 70/99 Interchange – LOS F
- Metro Air Parkway north of I-5 Interchange – LOS F
- Meister Way west of SR 70/99 – LOS F

As shown in Table 6.1-27 the following ramps are expected to operate unacceptably under Cumulative (2025) plus Project conditions:

- SR 70/99 northbound to Elkhorn Boulevard off-ramp – LOS F during the a.m. peak hour
- I-5 northbound to SR 70/99 northbound off-ramp – LOS F during the a.m. peak hour
- I-5 northbound to Metro Air Parkway off-ramp – LOS F during the a.m. peak hour
- Metro Air Parkway to I-5 southbound loop on-ramp – LOS F during the p.m. peak hour

As shown in Table 6.1-28, the following freeway segments are expected to operate unacceptably under Cumulative (2025) plus Project conditions:

- I-5 East of Power Line Road – LOS F for the northbound direction during the a.m. peak hour and the southbound direction during the p.m. peak hour

- I-5 north of Del Paso Road – LOS F for the northbound direction during both a.m. and p.m. peak hours and the southbound direction during the p.m. peak hour

- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit – LOS F for the northbound direction during the p.m. peak hour and the southbound direction during the p.m. peak hour

Table 6.1-25
Cumulative (2025) plus Project Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	A.M. Peak Hour			P.M. Peak Hour		
			Average Delay or V/C*	LOS	Queue Length (feet) [X: Y][1]	Average Delay or V/C*	LOS	Queue Length (feet) [X, Y][1]
1	Power Line Road and Elverta Road (County)	Signal	0.71	C	-	0.84	D	-
2a	SR 70/99 SB Ramps and Elverta Road	Signal	**141.3**	**F**	**[WBT: 2,160]**	8.1	A	[EBT: 547]
2b	SR 70/99 NB Ramps and Elverta Road	Signal	**120.0**	**F**	**[WBT: 1,349]**	13.1	B	[EBT: 469]
3	Power Line Road and Elkhorn Boulevard and Meister Way (County)	Signal	0.76	C	-	0.79	C	-
4	Elkhorn Boulevard and Lone Tree Road	Signal	**48.4**	**D**	**[WBR: 1,906]**	**226.2**	**F**	**[SBL: 1,034]**
5	SR 70/99 SB Ramps and Elkhorn Boulevard	Signal	**78.0**	**E**	**[WBT: 1,893]**	10.9	B	[EBT: 596]
6	SR 70/99 NB Ramps and Elkhorn Boulevard	Signal	**125.0**	**F**	**[WBT: 1,163]**	16.3	B	[EBT: 519]
7	Elkhorn Boulevard and E. Commerce Way	Signal	20.2	C	-	33.4	C	-
8	Power Line Road and Del Paso Road (County)	Signal	0.90	D	-	0.54	A	-
9	I-5 NB Ramps and Metro Air Parkway	Signal	**256.6**	**F**	**[WBR: 2,694]**	**102.9**	**F**	**[SBT: 2,371]**
10	I-5 SB Ramps and Metro Air Parkway	Signal	34.5	C	-	8.0	A	-
11	Elverta Road and Lone Tree Road (County)	Signal	**0.97**	**E**	[WBT: 1,675]	**1.69**	**F**	**[NBR: 1,524]**
12	Elverta Road and Metro Air Parkway (County)	Signal	0.71	C	-	0.66	B	-
13	Elkhorn Boulevard and Metro Air Parkway (County)	Signal	0.88	D	[WBL: 311]	0.87	D	[WBL: 551]
14	Meister Way and Metro Air Parkway (County)	Signal	0.89	D	**[WBL: 725]**	**1.45**	**F**	**[WBL: 1,460]**
15	Meister Way and Lone Tree Road (City/County)	Signal	**49.4**	**D**	**[WBL: 929]**	**116.5**	**F**	**[EBL: 586]**
16	Meister Way and E. Commerce Way	Signal	**53.5**	**D**	**[NBL: 928]**	**109.3**	**F**	**[EBLR: 1,021]**
17	Bayou Road and Metro Air Parkway	One Way Stop	**8,994.0**	**(F)**	**[SBL: >600]**	**9795**	**(F)**	**[SBL: >600]**
18	Elkhorn Boulevard and Project Street 1	Signal	**40.3**	**D**	**[WBT: 2,069]**	**99.6**	**F**	**[EBT: 2,329]**
19	Elkhorn Boulevard and Project Street 2	Signal	**41.7**	**D**	**[WBT: 2,099]**	**95.5**	**F**	**[EBT: 2,342]**
20	Elkhorn Boulevard and Project Street 3	Signal	**45.9**	**D**	**[WBT: 2,128]**	**97.4**	**F**	**[EBT: 2,100]**

Notes: * Volume/Capacity for County intersections; Seconds per Vehicle; LOS = Level of Service; (X) = LOS for minor approach
(X.X) = Delay in seconds per vehicle for minor approach
Bold = Unacceptable Intersection Operation.
[1] X: Y = Most critical approach: 50th/95th Percentile Queue Length for unsignalized/signalized intersections respectively
- Queue length not reported for those intersections with acceptable LOS conditions
Storage length not available for future lane configurations/study intersections
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; L = Left; T = Through; R = Right
HCM 2000 Methodology does not report the overall intersection LOS for one-way stop intersections

Table 6.1-26
Cumulative (2025) plus Project Roadway Operating Conditions

Roadway Segment	Lanes (Max. ADT for acceptable LOS in vpd)	Daily Volume (vpd)	LOS
Elkhorn Boulevard west of SR 70/99 Interchange	6 (43,200)	**66,272**	**F**
Lone Tree Road south of Elkhorn Boulevard	4 (28,800)	22,320	B
Metro Air Parkway north of I-5 Interchange	6 (48,600)	**90,391**	**F**
Meister Way west of SR 70/99	2 (14,400)	**18,460**	**F**

Notes: LOS = Level of Service; vpd = vehicles per day; Max. ADT: Maximum average daily traffic
Bold = Unacceptable Roadway Segment Operation.

Table 6.1-27
Cumulative (2025) plus Project Peak-Hour Freeway Ramp Operating Conditions

Ramp	A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	71	B	-	467	B	-
Elkhorn Boulevard to SR 70/99 northbound (On-ramp)	289	B	-	149	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	**2,259**	**F**	**[NBL: 1,528, 1,270]**	1,276	C	[NBL: 466, 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	737	C	[SWR: 543, 1,250]	425	C	[SWL: 119, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	225	B	-	63	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	824	B	-	1,762	D	-
Elverta Boulevard to SR 70/99 northbound (Loop on-ramp)	182	B	-	1,010	B	-
Elverta Boulevard to SR 70/99 northbound (On-ramp)	215	B	-	111	B	-
SR 70/99 northbound to Elverta Boulevard (off-ramp)	1,091	D	[NBL: 580, 1,270]	1,017	C	[NBR: 513, 1,270]
SR 70/99 southbound to Elverta Boulevard (off-ramp)	1,292	C	[SWR: 950, 1,250]	519	C	[SWL: 150, 1,250]
Elverta Boulevard to SR 70/99 southbound (loop on-ramp)	654	B	-	260	B	-
Elverta Boulevard to SR 70/99 southbound (on-ramp)	437	B	-	762	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	362	C	-	219	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	196	C	-	611	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	2,757	C	-	3,410	D	-
I-5 northbound to SR 70/99 northbound (off-ramp)	**3,975**	**F**	-	2,801	D	-
I-5 northbound to Metro Air Parkway (off-ramp)*	**3,922**	**F**	**[WBR: 1,854, 1,270]**	1,223	C	[WBR: 986, 1270]
Metro Air Parkway to I-5 northbound (On-ramp)*	470	B	-	2,012	E	-
Metro Air Parkway to I-5 northbound (loop on-ramp)*	387	B	-	195	B	-
I-5 southbound to Metro Air Parkway (off-ramp)*	2,000	E	[SEL: 638, 1,250]	858	C	[SEL: 86, 1,250]
Metro Air Parkway to I-5 southbound (On-ramp)*	311	B	-	381	B	-
Metro Air Parkway to I-5 southbound (loop on-ramp)*	970	B	-	**4,566**	**F**	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
* Future ramps
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

Table 6.1-28
Cumulative (2025) plus Project Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	NB	**6,231**	**>45**	**F**	3,896	43.0	E
	SB	3,772	40.5	E	**6,130**	**>45**	**F**
I-5 North of Del Paso Road	NB	**9,845**	**>45**	**F**	**7,340**	**>45**	**F**
	SB	6,334	19.4	C	**10,240**	**>45**	**F**
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	10,527	35.3	E	**7,858**	**>45**	**F**
	SB	7,412	38.1	E	**11,398**	**>45**	**F**
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	2,272	20.9	C	2,756	25.5	C
	SB	2,828	26.29	D	1,706	15.7	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	4,171	25.5	C	3,312	20.3	C
	SB	3,119	19.1	C	3,629	22.3	C

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service; **Bold** = Unacceptable Freeway Segment Operation.

Thresholds of Significance

City of Sacramento

Signalized and Unsignalized Intersections

As stated in the City's Traffic Impact Analysis Guidelines, a significant traffic impact would occur under the following conditions:

- The addition of traffic generated by a project degrades peak period level of service (LOS) of a facility from A, B, or C (without project) to D, E, or F (with project); or,
- The LOS (without project) is D, E, or F and project generated traffic increases the peak period average vehicle delay by five seconds or more.

The City of Sacramento General Plan, specifically section 5-11 – Goal D, states that the City will "work towards achieving a Level of Service C on the City's local and major street system. However, because of the constraints associated with existing development in the City, and because of other environmental concerns, this goal cannot always be met." It is important to note that the study intersections under Caltrans jurisdiction were evaluated using the aforementioned criteria.

Roadway Facilities

An impact is considered significant for roadways if the proposed project would:

- Generate traffic that would degrade peak period LOS C or better (without project) to LOS D or worse (with the project); or
- For facilities that are worse than LOS C without the project, if the project increases the Volume/Capacity (V/C) ratio by 0.02 or more on a roadway.

Pedestrian Facilities

A significant pedestrian circulation impact would occur if a project would:

- Result in unsafe conditions for pedestrians, including an unsafe increase in pedestrian/bicycle or pedestrian/motor vehicle conflicts.

Bicycle Facilities

A significant bikeway impact would occur if:

- The project would hinder or eliminate an existing designated bikeway, or if the project would interfere with the implementation of a proposed bikeway, or

- The project would result in unsafe conditions for bicyclists, including unsafe bicycle/pedestrian or bicycle/motor vehicle conflicts.

Transit Facilities

An impact to the transit system would be significant if the proposed project would:

- Generate an increase in ridership, when added to existing or future ridership, which exceeds available or planned system capacity. Capacity is defined as the total number of passengers that the system of buses and light rail vehicles can carry during the peak hours of operation.

Parking

A significant parking impact would occur if the anticipated parking demand of the project exceeds the available or planned parking supply.

Sacramento County

Roadways/Signalized Intersections

As stated in the County's Traffic Impact Analysis Guidelines, a project is considered to have a significant impact if it would:

- Result in a roadway or a signalized intersection at an acceptable LOS D to deteriorate to an unacceptable LOS E or

- Increase the V/C ratio by more than 0.05 at a roadway or at a signalized intersection that is operating at an unacceptable LOS without the project

Unsignalized Intersections

A project would have a significant impact if it would:

- Result in an unsignalized intersection movement/approach operating at an acceptable LOS D to deteriorate to an unacceptable LOS E and also cause the intersection to meet a traffic signal warrant; or

- For an unsignalized intersection that meets a signal warrant, increase the delay by more than 5 seconds at a movement/approach that is operating at an unacceptable LOS E without the project

Caltrans (California Department of Transportation)

Freeway Facilities

A significant impact to the freeway system would occur if the project would:

- Result in off-ramps with vehicle queues that extend into the ramp's deceleration area onto the freeway.
- Result in an increase in traffic that would cause any ramp's merge/diverge level of service to be worse than the freeway's level of service.
- Result in project traffic increases that cause the freeway level of service to deteriorate beyond level of service D. However, LOS E is acceptable for the I-5 freeway segments in the vicinity of the project area and downtown Sacramento area (milepost: 10.8 to 34.7).

In addition, a significant impact would occur if the expected queue were greater than the storage capacity.

Impacts and Mitigation Measures

Baseline plus Project Conditions

IMPACT 6.1-1

Impacts to Study Intersections. *Traffic volumes associated with the project would cause several study area intersections (i.e., Elverta Road and SR 70/99, Elkhorn Boulevard and Lone Tree Road, SR 70/99 NB Ramps and Elkhorn Boulevard, Elkhorn Boulevard and East Commerce Way, Elkhorn Boulevard and Project Street 1, Elkhorn Boulevard and Project Street 1, and Elkhorn Boulevard and Project Street 1) to operate unacceptably and exceed City and County thresholds of significance for intersection operations. Because study area intersections would operate unacceptably as a result of the project, this would be a* ***significant*** *impact.*

As described above, new project trip generation estimates were developed to remove the 11% trip discount for LRT services and to correct prior errors in the spreadsheet formulas. These changes resulted in a net reduction total project trips by approximately 1,200 trips. As such, the analysis provided in the DEIR slightly overestimates the projects impact to local intersections. Therefore, the analysis provided below has not changed from that presented in the DEIR.

The project would result in the generation of 41,119 daily vehicle trips, 3,153 a.m. peak-hour trips (1,214 inbound/1,939 outbound) and 4,467 p.m. peak-hour trips (2,494 inbound/1,973 outbound). Please refer to Table 6.1-20 for a breakdown of project-generate trips by land use type.

As shown in Table 6.1-29, the intersections of Elverta Road and SR 70/99 (a.m. peak hour), SR 70/99 northbound ramps and Elkhorn Boulevard (p.m. peak hour), and Elkhorn Boulevard and East Commerce Way (a.m. and p.m. peak hours) currently operate unacceptably.

Table 6.1-29
Baseline Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	Average Delay* (Level of Service)			
			No Project		Plus Project	
			AM	PM	AM	PM
1	Power Line Road and Elverta Road	All Way Stop	7.2 (A)	7.0 (A)	7.1 (A)	8.0 (A)
2	Elverta Road and SR 70/99	Signal	**76.3 (E)**	18.2 (B)	**111.4 (F)**	33.6 (C)
3	Power Line Road and Elkhorn Boulevard	All Way Stop	7.1 (A)	7.3 (A)	11.3 (B)	**94.9 (F)**
4	Elkhorn Boulevard and Lone Tree Road	One Way Stop	No Traffic on Lone Tree Road		**5,569 (F)**	**7,805 (F)**
5	SR 70/99 SB Ramps and Elkhorn Boulevard	One Way Stop	9.3 (A)	9.1 (A)	26.4 (D)	**67.1 (F)**
6	SR 70/99 NB Ramps and Elkhorn Boulevard	One Way Stop	13.2 (B)	**270 (F)**	**5,372 (F)**	**3,973 (F)**
7	Elkhorn Boulevard and E. Commerce Way	One Way Stop	**6,932 (F)**	**6,676 (F)**	**6,955 (F)**	**6,775 (F)**
8	Power Line Road and Del Paso Road	One Way Stop	9.1 (A)	9.0 (A)	9.2 (A)	10.8 (B)
18	Elkhorn Boulevard and Project Street 1	One Way Stop	No Project Traffic		**473 (F)**	**903 (F)**
19	Elkhorn Boulevard and project Street 2	One Way Stop	No Project Traffic		**256 (F)**	**382 (F)**
20	Elkhorn Boulevard and Project Street 3	One Way Stop	No Project Traffic		**231 (F)**	**428 (F)**

Notes: * Seconds per Vehicle; LOS = Level of Service; **Bold** = Unacceptable Intersection Operation

With implementation of the project, the intersection of Elverta Road and SR 70/99 would degrade from LOS E to LOS F during the a.m. peak hour and would increase delay by more than 35 seconds. The intersection of SR 70/99 northbound ramps and Elkhorn Boulevard would degrade from LOS B to LOS F during the a.m. peak hour and would continue to operate at LOS F during the p.m. peak hour with average delay increased by more than 5 seconds.

With implementation of the project, the project would cause the intersections of Elkhorn Boulevard and Lone Tree Road (a.m. and p.m. peak hours); SR 70/99 southbound ramps and Elkhorn Boulevard (p.m. peak hour); Elkhorn Boulevard and Project Street 1 (a.m. and p.m. peak hours); Elkhorn Boulevard and Project Street 2 (a.m. and p.m. peak hours); and Elkhorn Boulevard and Project Street 3 (a.m. and p.m. peak hours) to degrade to unacceptable service levels.

Because the project would either cause an intersection that currently operates unacceptably to exceed the City or County's applicable thresholds or would cause intersections that currently operate acceptably to degrade to an unacceptable condition, the project would result in significant impacts to study area intersections.

Mitigation Measure 6.1-1a: Develop a Financial Plan (City of Sacramento and LAFCo)

The applicant shall be required to develop the Greenbriar Finance Plan for review and approval by the City before annexation. The plan shall identify the financing mechanisms for all feasible transportation improvements defined as mitigation measures including, but not limited to, new roadways, roadway widening, traffic signals, and public transit. The project applicant shall coordinate the preparation of the finance plan with the City of

Sacramento, Sacramento County, and the Metro Air Park Public Facilities Financing Plan. All mitigation measures with "fair share" contributions would be implemented through the proposed financing mechanism(s) indicated in the finance plan or by some other mechanism as determined by the City of Sacramento in consultation with the Sacramento County. The City shall adopt the Greenbriar Finance Plan at the time the project is considered for approval. A copy of the Draft Greenbriar Finance Plan is included in Appendix C of the DEIR.

Mitigation Measure 6.1-1b: Meister Way Overpass (City of Sacramento)

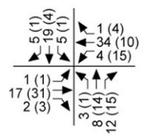
The project applicant in coordination with the City shall ensure that the Meister Way overpass is constructed and in operation on or before 65% buildout of the project based on total project trips. With implementation of this improvement, operating conditions at study area intersections would substantially improve as shown in Table 6.1-30 below. Exhibit 6.1-16 shows the Baseline plus Project peak-hour turning movement volumes with the Meister Way overpass and Exhibit 6.1-17 shows the Baseline plus Project lane configurations with Meister Way overpass.

Table 6.1-30
Baseline Peak-Hour Intersection Operating Conditions

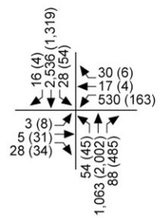
ID	Intersections	Traffic Control	Average Delay* (Level of Service)			
			No Project		Plus Project (with the Meister Way- SR 70/99 Overpass)	
			AM	PM	AM	PM
1	Power Line Road and Elverta Road	All Way Stop	7.2 (A)	7.0 (A)	7.2 (A)	7.1 (A)
2	Elverta Road and SR 70/99	Signal	**76.3 (E)**	18.2 (B)	**86.1 (F)**	26.8 (C)
	With Mitigation				36.8 (D)	19.0 (B)
3	Power Line Road and Elkhorn Boulevard	All Way Stop	7.1 (A)	7.3 (A)	7.9 (A)	9.4 (A)
4	Elkhorn Boulevard and Lone Tree Road	One Way Stop	No Traffic on Lone Tree Road		**55.9 (F)**	**505 (F)**
	With Mitigation	Signal			6.3 (A)	32.3 (C)
5	SR 70/99 SB Ramps and Elkhorn Boulevard	One Way Stop	9.3 (A)	9.1 (A)	14.2 (B)	26.3 (D)
6	SR 70/99 NB Ramps and Elkhorn Boulevard	One Way Stop	13.2 (B)	**120+ 270 (F)**	**243 (F)**	**502 (F)**
	With Mitigation	Signal			25.3 (C)	26.2 (C)
7	Elkhorn Boulevard and E. Commerce Way	One Way Stop	**120+ 6,932 (F)**	**120+ 6,676 (F)**	**6,943 (F)**	**6,711 (F)**
	With Mitigation	Signal			9.5 (A)	34.4 (C)
8	Power Line Road and Del Paso Road	One Way Stop	9.1 (A)	9.0 (A)	9.1 (A)	9.2 (A)
16	Meister Way And E. Commerce Way	Signal	No Meister Way overpass		8.1 (A)	23.0 (C)
18	Elkhorn Boulevard and Project Street 1	One Way Stop	No Project Traffic		**30.0 (D)**	**68.9 (F)**
	With Mitigation	Signal			8.5 (A)	8.2 (A)
19	Elkhorn Boulevard and Project Street 2	One Way Stop	No Project Traffic		21.8 (C)	**36.3 (E)**
	With Mitigation	Signal			5.6 (A)	7.4 (A)
20	Elkhorn Boulevard and Project Street 3	One Way Stop (Full Access)	No Project Traffic		18.0 (C)	**30.0 (D)**
	With Mitigation	One Way Stop (Right in/Right out Access Only)			13.4 (B)	14.3 (B)

Notes: * Seconds per Vehicle; LOS = Level of Service; **Bold** = Unacceptable Intersection Operation

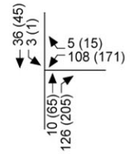
Intersection #1
Powerline Rd./Elverta Rd.



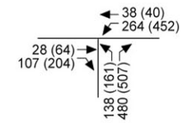
Intersection #2
Elverta Rd./SR 70/99



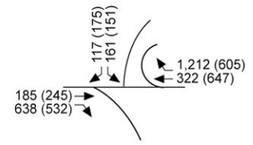
Intersection #3
Powerline Rd./Elkhorn Blvd.



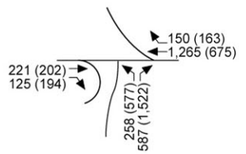
Intersection #4
Elkhorn Blvd./Lone Tree Rd.



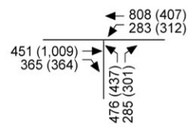
Intersection #5
SR 99 SB Ramps/Elkhorn Blvd.



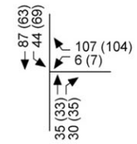
Intersection #6
SR 99 NB Ramps/Elkhorn Blvd.



Intersection #7
Elkhorn Blvd./E. Commerce Wy.

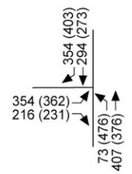


Intersection #8
Powerline Rd./Del Paso Rd.

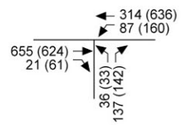


Intersection #15
Meister Wy./Lone Tree Rd.

Intersection #16
Meister Wy./E. Commerce Wy.

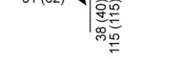


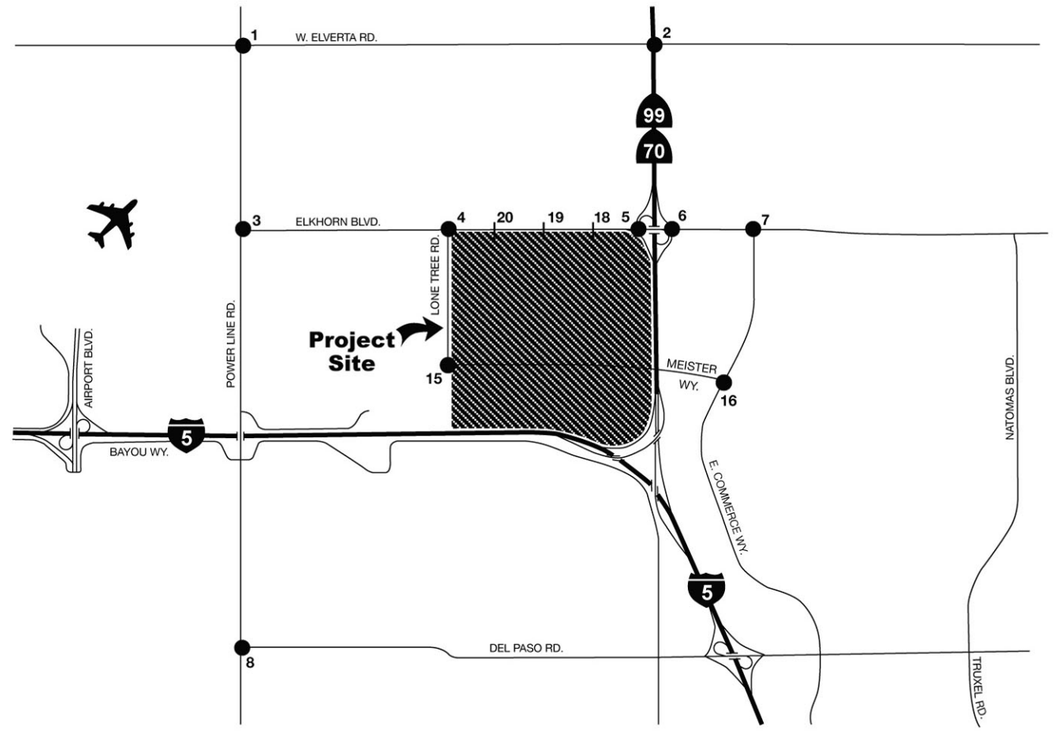
Intersection #18
Elkhorn Blvd./Project Street 1



Intersection #19
Elkhorn Blvd./Project Street 2

Intersection #20
Elkhorn Blvd./Project Street 3





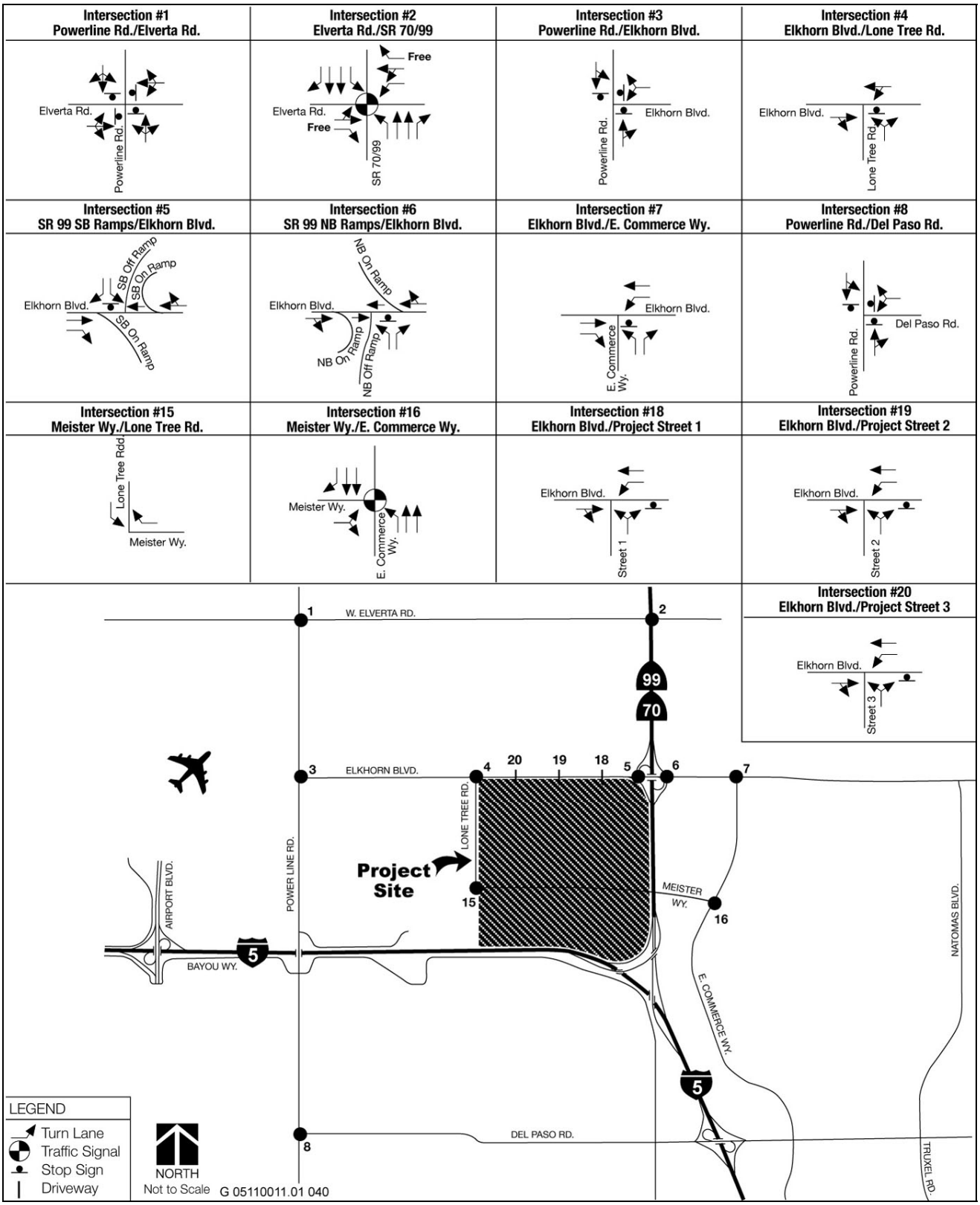
G 05110011.01 039

NORTH
Not to Scale

LEGEND
- Study Intersection
- XX AM Peak Hour Volume
- (XX) PM Peak Hour Volume
- Driveway

Source: TJKM 2005

Baseline Plus Project Peak-Hour Turning Movement Volumes (with the Meister Way – SR 70/99 Overpass) **Exhibit 6.1-16**



Source: TJKM 2005

Baseline Plus Project Lane Configurations (with the Meister Way – SR 70/99 Overpass) Exhibit 6.1-17

Table 6.1-30 compares the peak-hour intersection operating conditions for Baseline No Project conditions with that of Baseline plus Project conditions with the Meister Way – SR 70/99 overpass.

Construction of this improvement would primarily occur on the project site; therefore, site-specific environmental impacts have been evaluated throughout this DEIR. However, this improvement would also extend east of SR 70/99 to East Commerce Way. Areas east of the project site are developed or are currently developing with urban land uses. The City has recently purchased the right-of-way for this improvement. Impacts associated with construction of this improvement would generally consist of construction-related air, noise, and traffic impacts and operational traffic impacts (e.g., re-distribution of local traffic trips). Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. Operational impacts associated with this improvement have been evaluated and are described in Table 6.1-30 and throughout this EIR (i.e., air, noise, and biological resources). Because land for this improvement has been secured by the City, a financing mechanism would be established to ensure the funding (see Mitigation Measure 6.1-1a) and construction of this improvement, and no new significant environmental impacts not already identified or evaluated in this DEIR would occur, this improvement would be considered feasible.

Although this improvement would substantially reduce the project's impacts to study area intersections, some intersections would continue to operate unacceptably and additional mitigation would be required to improve these intersections to an acceptable operation level. Further, other traffic improvements are necessary to ensure the safe operation of the local roadway network. As described in Table 6.1-30, with implementation of this recommended measure, the intersection of SR 70/99 southbound ramps and Elkhorn Boulevard would improve to LOS D during the p.m. peak hour and the intersection of Elkhorn Boulevard and Project Street 1 would improve to LOS D during the a.m. peak hour. The following mitigation measures would further reduce impacts to remaining study area intersections.

Mitigation Measure 6.1-1c: Elverta Road and SR 70/99 (City of Sacramento, Caltrans, County)

Before issuance of the first occupancy permit, the project applicant shall restripe the westbound Elverta Road approach to provide two left turn lanes and a shared through-right turn lane (currently, a left turn lane, a shared left turn-through lane, and a right turn lane). Available right-of way currently exists at this intersection to implement this mitigation measure. Construction outside existing right-of-way would not be required. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, operation of this intersection would improve to LOS D, which is acceptable based on Caltrans and County standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-1d: Elkhorn Boulevard and Lone Tree Road (City of Sacramento and County)

On or before 50% buildout of the project based on total project trip generation, the project applicant shall construct a traffic signal at the Elkhorn Boulevard and Lone Tree Road intersection. Existing right-of-way is available to accommodate this improvement. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, the operation of this intersection would improve to LOS B under Baseline plus Project conditions, which is acceptable based on City and County standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-1e: SR 70/99 Northbound Ramps and Elkhorn Boulevard (City of Sacramento and Caltrans)

Before project approval, the project applicant in coordination with the City, prepare a City Council-approved Finance Plan to fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City) toward the installation of a traffic signal at the SR 70/99 Northbound Ramps and Elkhorn Boulevard intersection and shall install the traffic signal before recordation of the first map. The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement including funds collected through the Metro Air Park Finance Plan and the North Natomas Public Facilities Finance Plan. Existing right-of-way is available to accommodate this improvement. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, the operation of this intersection would improve to LOS D under Baseline plus Project conditions, which is acceptable based on City, and Caltrans standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-1f: Elkhorn Boulevard and E. Commerce Way (City of Sacramento)

Before project approval, the project applicant shall, in coordination with the City, prepare a City Council-approved Finance Plan to fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City) toward the installation of a traffic signal at the Elkhorn Boulevard/East Commerce Way intersection. The Draft Greenbriar Finance Plan identifies 100% of the funding needed to implement this improvement. Existing right-of-way is available to accommodate this improvement. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, the operation of this intersection would improve to LOS C under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-1g: Elkhorn Boulevard and Project Street 1 (City of Sacramento)

On or before the issuance of the first occupancy permit, the project applicant shall install a traffic signal at the Elkhorn Boulevard/Project Street 1 intersection. With implementation of this mitigation measure the operation of this intersection would improve to LOS A under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-1h: Elkhorn Boulevard and Project Street 2 (City of Sacramento)

On or before the issuance of the first occupancy permit, the project applicant shall install a traffic signal at the Elkhorn Boulevard/Project Street 2 intersection. With implementation of this mitigation measure the operation of this intersection would improve to LOS A under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-i: Elkhorn Boulevard and Project Street 3 (City of Sacramento)

On or before issuance of the first occupancy permit, the project applicant shall make revisions to the project plans so that this intersection will be restricted to right in/ right out access only. With implementation of this mitigation measure the operation of this intersection would improve to LOS B under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Significance After Mitigation

With implementation of the above mitigation measures, all of the project's study intersections would operate at acceptable levels and these impacts would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-2

Impacts to Study Area Roadway Segments. *The proposed project would increase traffic volumes on study area roadway segments (i.e., Elkhorn Boulevard west of SR 70/99 Interchange and Meister Way west of SR 70/99) and would cause these segments to degrade from an acceptable operating condition (i.e., LOS A) to an unacceptable operating condition (i.e., LOS F). Because study area roadway segments would operate unacceptably as a result of the project, this would be a* ***significant*** *impact.*

Traffic associated with proposed land uses would increase traffic volumes on local roadway segments. Table 6.1-31 summarizes the roadway segment operating conditions for Baseline No Project conditions and Baseline plus Project conditions.

Implementation of the project would result in the project's study roadway segments degrading from LOS A to LOS F, which is unacceptable based on City operating standards. Therefore, this would be a ***significant*** impact.

Table 6.1-31
Baseline Roadway Segment Operating Conditions

Roadway Segment	Lanes	Level of Service (V/C)	
		No Project	Plus Project
Elkhorn Boulevard west of SR 70/99 Interchange	2	A (0.12)	**F (1.23)**
Lone Tree Road south of Elkhorn Boulevard	2	**No Traffic on Lone Tree Road**	**F (1.41)**
Metro Air Parkway north of I-5 Interchange	Future Roadway*		
Meister Way west of SR 70/99	**No Meister Way Overpass under Baseline Conditions**		

Notes: LOS = level of service; V/C: Volume/ Capacity ratio
*Evaluated under cumulative plus project conditions
Bold = Unacceptable Ramp Operation
Reference: Highway Capacity Manual 2000 Edition.

Mitigation Measure 6.1-2a: Meister Way Overpass (City of Sacramento)

The project applicant shall implement Mitigation Measure 6.1-1b above (i.e., construct Meister Way overpass). Table 6.1-32 summarizes the roadway segment operation conditions for Baseline No Project conditions and Baseline plus Project conditions with the Meister Way overpass. As shown in the table, even with implementation of the Meister Way overpass, two of the project's study roadway segments (i.e., Elkhorn Boulevard west of SR 70/99 Interchange and Meister Way west of SR 70/99) would continue to operate unacceptably under Baseline plus Project conditions. Therefore, additional measures are required for these roadway segments.

Table 6.1-32 Baseline Roadway Segment Operating Conditions			
Roadway Segment	Lanes	Level of Service (V/C)	
		No Project	Plus Project (with Meister Way – SR 70/99 Overpass)
Elkhorn Boulevard west of SR 70/99 Interchange	2	A (0.12)	**D (0.87)**
With Mitigation	4		A (0.44)
Lone Tree Road south of Elkhorn Boulevard	2	No Traffic on Lone Tree Road	C (0.74)
Metro Air Parkway north of I-5 Interchange	Future Roadway*		
Meister Way west of SR 70/99	2	No Meister Way Overpass	**D (0.82)**
With Mitigation	4		A (0.41)
Notes: LOS = level or service; V/C = Volume/Capacity ratio * Evaluated under cumulative project conditions **Bold** = Unacceptable Ramp Operation Reference: Highway Capacity Manual 2000 Edition.			

Mitigation Measure 6.1-2b: Elkhorn Boulevard west of SR 70/99 Interchange (City of Sacramento and County)

On or before 60% total buildout of the project based on trip generation, the project applicant shall widen Elkhorn Boulevard from west of SR 70/99 interchange to Lone Tree Road to provide two travel lanes in each direction. Right-of-way for the recommended widening is currently available and has been secured by the City. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With the implementation of this mitigation measure, this roadway segment would improve to LOS A under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-2c: Meister Way west of SR 70/99 (City of Sacramento)

On or before 66% total buildout of the project based on trip generation, the project applicant shall widen Meister Way west of SR 70/99 to provide two travel lanes in each direction from the first street intersection of SR 70/99 west to Lone Tree Road. Right-of-way for the recommended widening is currently available on-site. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, this roadway segment would improve to LOS D under Baseline plus Project conditions, which is acceptable based on City standards. Therefore, impacts to this intersection would be reduced to a ***less-than-significant*** level.

Significance After Mitigation

With implementation of the above mitigation measures, all of the project's study roadway segments would operate at acceptable levels and these impacts would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-3

Impacts to the Freeway Ramps. *The proposed project would increase traffic volumes on the freeway system and would cause three study freeway ramps (i.e., SR 70/99 NB/Elkhorn Boulevard off-ramp, SR 70/99 SB/I-5 SB off-ramp, and I-5 NB/SR 70/99 NB off-ramp) to operate unacceptably under Baseline plus Project conditions. This would be a* ***significant*** *impact.*

With implementation of the project, traffic volumes on the local freeway system would increase. Table 6.1-33 compares the peak-hour operating conditions for the study ramps under Baseline No Project conditions with that of Baseline plus Project conditions. As shown in Table 6.1-33, all the study ramps are expected to operate acceptably under Baseline plus Project and Baseline plus Project conditions, except for the following ramps:

- SR 70/99 Northbound to Elkhorn Boulevard off-ramp
- SR 70/99 Southbound to I-5 Southbound on-ramp
- I-5 Northbound to SR 70/99 Northbound off-ramp

With implementation of the project, the above study freeway ramps would degrade to LOS F, which is unacceptable based on Caltrans standards. Therefore, this would be a ***significant*** impact.

Mitigation Measure 6.1-3a: Meister Way Overpass (City of Sacramento)

The project applicant shall implement Mitigation Measure 6.1-1b above (i.e., construct the Meister Way overpass). Table 6.1-34 summarizes the peak-hour operating conditions for the study ramps under Baseline No Project conditions and Baseline plus Project conditions with the Meister Way overpass. As shown in the table, even with implementation of the Meister Way overpass, all three study freeway ramps (i.e., SR 70/99 NB/Elkhorn Boulevard off-ramp, SR 70/99 SB/I-5 SB off-ramp, and I-5 NB/SR 70/99 NB off-ramp) would continue to operate unacceptably under Baseline plus Project conditions. Therefore, additional measures are required for these ramps.

Mitigation Measure 6.1-3b: SR 70/99 Northbound to Elkhorn Boulevard off-ramp (City of Sacramento and Caltrans)

a. The project applicant shall implement mitigation measure 6.1-1e, which would require the installation of a traffic signal at the SR 70/99 Northbound Ramps and Elkhorn Boulevard intersection.

b. Before project approval, the project applicant shall in coordination with the City, prepare a City Council-approved Finance Plan to fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City and Caltrans) toward the widening the off-ramp from one lane to two lanes. The Draft Greenbriar Finance Plan identifies 100% of funding needed to construct this improvement. This improvement is included in the Metro Air Park Financing Plan (MAPFP) and the North Natomas Public Facilities Finance Plan. Existing right-of-way is available to accommodate this improvement. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur.

Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, the operation of this freeway ramp would improve to LOS C under Baseline plus Project conditions, which is acceptable based on Caltrans standards. Therefore, impacts to this ramp would be reduced to a ***less-than-significant*** level.

Table 6.1-33
Baseline Peak-Hour Freeway Ramp Operating Conditions

Ramp	Level of Service											
	No Project						Plus Project					
	A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z]1	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z]1	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z]1	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z]1
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	10	B	-	5	B	-	147	B	-	220	B	-
Elkhorn Boulevard to SR 70/99 northbound (Slip on-ramp)	129	B	-	143	B	-	129	B	-	146	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	518	C	[NER: 72, 1,270]	1290	C	[NER: 1869, 1,270]	995	C	[NEL: >1270, 1,270]	**2,070**	**F**	**[NEL: > 1270, 1,270]**
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	152	C	[SBL: 13, 1,250]	114	C	[SBL: 10, 1,250]	330	C	[SBL: 76, 1,250]	300	C	[SBR: 137, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	993	B	-	641	B	-	993	B	-	641	B	-
Elkhorn Boulevard to SR 70/99 southbound (slip on-ramp)	30	B	-	19	B	-	889	B	-	704	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	935	C	-	126	C	-	982	C	-	174	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	111	C	-	1,303	C	-	141	C	-	1,335	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	3,374	D	-	1,871	B	-	**4,186**	**F**	-	2,508	C	-
I-5 northbound to SR 70/99 northbound (off-ramp)	1,608	C	-	3,347	E	-	2,055	C	-	**4,095**	**F**	-

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the Slip ramps.

Table 6.1-34
Baseline Peak-Hour Freeway Ramp Operating Conditions

Ramp	Level of Service											
	No Project						Plus Project ("with" the Meister Way – SR 70/99 overpass)					
	A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	10	B	-	5	B	-	126	B	-	177	B	-
Elkhorn Boulevard to SR 70/99 northbound (Slip on-ramp)	129	B	-	143	B	-	161	B	-	215	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	518	C	[NBR: 72, 1,270]	1,290	C	[NBR: 1,869, 1,270]	936	C	[NBL: 625, 1,270]	**2,003**	**F**	**[NBR: 2,748, 1,270]**
With Mitigation								B	[NBL: 390, 1,270]		C	[NBR: 676, 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	152	C	[SBL: 13, 1,250]	114	C	[SBL: 10, 1,250]	294	C	[SBL: 39, 1,250]	330	C	[SBL: 85, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	993	B	-	641	B	-	1,152	C	-	748	B	-
Elkhorn Boulevard to SR 70/99 southbound (slip on-ramp)	30	B	-	19	B	-	648	B	-	551	B	-
SR 70/99 southbound to I-5 northbound (off-ramp)	935	C	-	126	C	-	1,002	C	-	187	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	111	C	-	1,303	C	-	153	C	-	1,345	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	3,374	D	-	1,871	B	-	4,084	E	-	2,449	C	-
I-5 northbound to SR 70/99 northbound (off-ramp)	1,608	C	-	3,347	E	-	1,984	C	-	**4,018**	**F**	-
With Mitigation								B			D	

Notes: LOS – Level of Service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.
The SR 70/99 southbound to SR 70/99 northbound off-ramp was mistakenly identified (i.e., bolded) as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

Mitigation Measure 6.1-3c: I-5 Northbound to SR 70/99 Northbound off-ramp (City of Sacramento and Caltrans)

Widening I-5 Northbound to SR 70/99 Northbound off-ramp to provide an additional lane is required to mitigate this impact. With implementation of this mitigation measure, this freeway ramp would operate at LOS D. Caltrans District 3 Draft DSMP does not include adding a lane to the existing two-lane on-ramp for SR 70/99 southbound to I-5 southbound by the year 2010. To implement this mitigation measure, additional right-of-way would be required and is not currently available. Additionally, this improvement is not included in any of Caltrans' funding mechanisms. Because this mitigation measure is beyond the control of the project applicant, outside the jurisdiction of the City, and there is no established funding mechanism available for contribution, this mitigation measure is considered infeasible and the impact is considered ***significant and unavoidable***.

As described in Table 6.1-34, no mitigation is needed for the SR 70/99 southbound to I-5 southbound on-ramp because this freeway ramp operates acceptably based on Caltrans standards. Therefore, mitigation for this freeway ramp has been removed from EIR.

Significance After Mitigation

With implementation of the above mitigation measures, the SR 70/99 Northbound to Elkhorn Boulevard off-ramp would operate at acceptable levels and this impact would be reduced to a less-than-significant level. However, this ramp is not under the jurisdiction of the City of Sacramento (i.e., subject to Caltrans jurisdiction). While the project would contribute funds that would implement measures that would fully mitigate impacts to this ramp to a less-than-significant level, it is unknown whether these measures would be implemented because they are not subject to the control of the City. As a result, for purposes of CEQA impacts to the SR 70/99 Northbound to Elkhorn Boulevard off-ramp (Impact 6.1-3b) would remain ***significant and unavoidable***. Further, no feasible mitigation is available to reduce the project's impacts to the I-5 Northbound to SR 70/99 Northbound off-ramp because recommended mitigation is beyond the control of the project applicant, outside the jurisdiction of the City, and there is no established funding mechanism available for contribution to recommended improvements. Therefore, impacts to these ramps are considered ***significant and unavoidable***.

IMPACT 6.1-4

Freeway Mainline Segment Impacts. *The proposed project would increase traffic volumes on the freeway system and would cause three study freeway mainline segments (i.e., I-5 north of Del Paso Road, I-5 north of I-5/I-80 interchange between I-80 and Arena Boulevard, and SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 interchange) to operate unacceptably under Baseline plus Project Conditions. This would be a* ***significant*** *impact.*

With implementation of the project, traffic volumes on the local freeway system would increase. Table 6.1-35 compares the peak-hour operating conditions for the freeway mainline segments under Baseline No Project conditions with that of Baseline plus Project conditions. As shown in Table 6.1-35, all the study mainlines are expected to operate acceptably under Baseline No Project and Baseline plus Project conditions, except for the following mainline segments:

- Interstate 5 – North of Del Paso Road
- Interstate 5 – North of I-5/I-80 Interchange – between I-80 and Arena Boulevard Exit

Table 6.1-35
Baseline Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	Level of Service											
		No Project						Plus Project					
		A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density pc/m/l)	LOS	Volume(vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	WB/NB	2,984	27.9	D	3,114	29.4	D	3,031	28.4	D	3,162	30	D
	EB/SB	2,692	24.8	C	3,354	32.7	D	2,722	25.1	C	3,386	33.2	D
I-5 North of Del Paso Road	NB	3,657	22.4	C	6,335	> **45**	**F**	4,104	25.3	C	**7,083**	> **45**	**F**
	SB	5,954	> **45**	**F**	3,922	24.1	C	**6,766**	> **45**	**F**	4,559	28.5	D
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	4,465	27.8	D	7,639	> **45**	**F**	4,851	31	D	**8,459**	> **45**	**F**
	SB	6,894	> **45**	**F**	4,232	26.1	D	**7,722**	> **45**	**F**	4,926	31.7	D
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	1,340	12.3	B	3,509	35.3	E	1,477	13.6	B	3,727	39.7	E
	SB	3,437	34	D	1,451	13.4	B	3,615	37.3	E	1,637	15.1	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	1,719	15.8	B	4,650	> **45**	**F**	2,196	20.2	C	**5,430**	> **45**	**F**
	SB	4,308	> **45**	**F**	1,997	18.4	C	**5,167**	> **45**	**F**	2,682	24.7	C

Notes: vph – vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.
The SR 70/99 freeway mainline segment between Elverta Road and Elkhorn Boulevard was mistakenly identified (i.e., bolded) as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

- State Route 70/99 – between Elkhorn Boulevard and I-5/SR 70/99 Interchange.

Although the above segments would operate unacceptably (i.e., LOS F) without the project, the project would add additional traffic to a mainline segment that is currently operating unacceptably under Baseline No Project conditions, which is unacceptable based on Caltrans standards. Therefore, this would be a ***significant*** impact.

The SR 70/99 freeway mainline segment between Elverta Road and Elkhorn Boulevard was mistakenly identified (i.e., bolded) as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

Mitigation Measure 6.1-4a: Meister Way Overpass (City of Sacramento)

The project applicant shall implement Mitigation Measure 6.1-1b above (i.e., construct the Meister Way overpass). Table 6.1-36 summarizes the peak-hour operating conditions for the study mainline segments under Baseline No Project conditions and Baseline plus Project conditions with the Meister Way overpass. As shown in the table, even with implementation of the Meister Way overpass, three of four study mainline segments (i.e., I-5 north of Del Paso Road, I-5 north of I-5/I-80 interchange between I-80 and Arena Boulevard, and SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 interchange) would continue to operate unacceptably under Baseline plus Project conditions. Therefore, additional measures are required for these mainline segments.

Mitigation Measure 6.1-4b: I-5 North of Del Paso Road (City of Sacramento and Caltrans)

Because this mainline segment of I-5 currently operates unacceptably, the only mitigation that could improve the operating conditions of this segment during peak conditions would be the widening of this segment of I-5 mainline to eight lanes (currently six lanes). While widening of I-5 would improve the operating conditions of this mainline segment to acceptable conditions, Caltrans currently has no plans to expand this segment of I-5 beyond its current capacity nor are any funding mechanisms established to collect monies to fund improvements such as this. Further, because of the developing nature of properties to the east and west of I-5, additional right-of-way is not available for the expansion of this freeway segment. Because no feasible mitigation is available to reduce the project's impacts to this mainline segment, this impact would remain ***significant and unavoidable***.

Mitigation Measure 6.1-4c: I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit (City of Sacramento and Caltrans)

Because this mainline segment of I-5 currently operates unacceptably, the only mitigation that could improve the operating conditions of this segment during peak conditions would be the widening of this segment of I-5 mainline to eight lanes (currently six lanes). While widening of I-5 would improve the operating conditions of this mainline segment to acceptable conditions, Caltrans currently has no plans to expand this segment of I-5 beyond its current capacity nor are any funding mechanisms established to collect monies to fund improvements such as this. Further, because of the developing nature of properties to the east and west of I-5, additional right-of-way is not available for the expansion of this freeway segment. Because no feasible mitigation is available to reduce the project's impacts to this mainline segment, this impact would remain ***significant and unavoidable***.

As described in Table 6.1-35, no mitigation is needed for the SR 70/99 freeway mainline segment between Elverta Road and Elkhorn Boulevard because this mainline segment operates acceptably based on Caltrans standards. Therefore, mitigation for this freeway ramp has been removed from EIR.

Table 6.1-36
Baseline Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	Level of Service											
		No Project						Plus Project ("with" the Meister Way – SR 70/99 overpass)					
		A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	WB/NB	2,984	27.9	D	3,114	29.4	D	3,051	28.7	D	3,175	30.2	D
	EB/SB	2,692	24.8	C	3,354	32.7	D	2,734	25.3	C	3,396	33.4	C
I-5 North of Del Paso Road	NB	3,657	22.4	C	**6,335**	**> 45**	**F**	4,033	24.8	C	**7,006**	**> 45**	**F**
	With Mitigation									B			E
	SB	**5,954**	**> 45**	**F**	3,922	24.1	C	**6,664**	**> 45**	**F**	4,500	28.1	D
	With Mitigation									E			C
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	4,465	27.8	D	**7,639**	**> 45**	**F**	4,839	30.9	D	**8,595**	**> 45**	**F**
	With Mitigation									B			E
	SB	**6,894**	**> 45**	**F**	4,232	26.1	D	**7,679**	**> 45**	**F**	4,909	31.5	D
	With Mitigation									E			B
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	1,340	12.3	B	3,509	35.3	E	1,488	13.7	B	3,753	40.3	E
	SB	3,437	34	D	1,451	13.4	B	3,579	36.6	E	1,667	15.3	B
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	1,719	15.8	B	**4,650**	**> 45**	**F**	2,137	19.7	C	**5,363**	**> 45**	**F**
	With Mitigation									B			E
	SB	**4,308**	**> 45**	**F**	1,997	18.4	C	**5,085**	**> 45**	**F**	2,636	24.3	C
	With Mitigation									E			B

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation**.**
The SR 70/99 freeway mainline segment between Elverta Road and Elkhorn Boulevard was mistakenly identified (i.e., bolded) as operating unacceptably in the DEIR. However, this intersection operates at LOS E, which is acceptable based on Caltrans standards. This error has been corrected in this document.

Mitigation Measure 6.1-4e: SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange (City of Sacramento)

Because this mainline segment of SR 70/99 currently operates unacceptably, the only mitigation that could improve the operating conditions of this segment during peak conditions would be the widening of this segment of SR 70/99 mainline to six lanes (currently 4 lanes) between Elkhorn Boulevard and Elverta Road. While widening of SR 70/99 would improve the operating conditions of this mainline segment to acceptable conditions, Caltrans currently has no plans to expand this segment of SR 70/99 beyond its current capacity nor are any funding mechanisms established to collect monies to fund improvements such as this. Because no feasible mitigation is available to reduce the project's impacts to this mainline segment, this impact would remain ***significant and unavoidable***.

Significance After Mitigation

Because no feasible mitigation is available to reduce the project's impacts to study area freeway segments, impacts to I-5 north of Del Paso Road, I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit and SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange freeway segments would remain ***significant and unavoidable***.

Cumulative Impacts and Mitigation Measures (Cumulative plus Project)

IMPACT 6.1-5

Cumulative Traffic Impacts to Study Area Intersections. *Traffic volumes associated with the project in combination with other reasonably foreseeable cumulative projects would cause several study area intersections to operate unacceptably and exceed City County, and Caltrans thresholds of significance for intersection operations. This would be a* ***significant*** *cumulative impact and the project's contribution to this impact would be cumulatively considerable.*

The project in combination with other approved and reasonably foreseeable projects would result in an increase in local traffic volumes. Table 6.1-37 summarizes the peak-hour operating conditions for the study intersections under Cumulative Conditions (with and without the project). Because the Meister Way overpass was proposed as part of the Metro Airpark project, the overpass was assumed to be constructed by 2025 without project; therefore, the Meister Way overpass was assumed in the Cumulative No Project scenario.

Fourteen of the study intersections would operate unacceptably under Cumulative plus Project conditions as described below:

- *SR 70/99 Southbound Ramps and Elverta Road:* This intersection would continue to operate at LOS F during the a.m. peak hour. However, the project would not cause the average delay of this intersection to increase by more than 5 seconds.

- *SR 70/99 Northbound Ramps and Elverta Road*: This intersection would continue to operate at LOS F during the a.m. peak hour. However, the project would not cause the average delay of this intersection to increase by more than 5 seconds.

- *Elkhorn Boulevard and Lone Tree Road:* This intersection would continue to operate at LOS D during the a.m. peak hour and LOS F during the p.m. peak hour. The project would cause the average delay at this intersection to increase by more than 5 seconds during the a.m. and p.m. peak hour.

Table 6.1-37
Cumulative Peak-Hour Intersection Operating Conditions

ID	Intersections	Traffic Control	Average Delay or V/C* (Level of Service)			
			No Project		Plus Project	
			AM	PM	AM	PM
1	Power Line Road and Elverta Road (County)	Signal	0.70 (B)	0.82 (D)	0.71 (C)	0.84 (D)
2a	SR 70/99 SB Ramps and Elverta Road	Signal	**140.6 (F)**	7.7 (A)	**141.3 (F)**	8.1 (A)
2b	SR 70/99 NB Ramps and Elverta Road	Signal	**120.1 (F)**	12.4 (B)	**120.1 (F)**	13.1 (B)
3	Power Line Road and Elkhorn Boulevard (County)	Signal	0.75 (C)	0.79 (C)	0.76(C)	0.79 (C)
4	Elkhorn Boulevard and Lone Tree Road	Signal	**37.4 (D)**	**219 (F)**	**48.4 (D)**	**226.2 (F)**
	With Mitigation				23.4 (C)	**221.8 (F)**
5	SR 70/99 SB Ramps and Elkhorn Boulevard	Signal	44.5 (D)	10.8 (B)	**78.0 (E)**	10.9 (B)
	With Mitigation				**49.9 (D)**	10.8 (B)
6	SR 70/99 NB Ramps and Elkhorn Boulevard	Signal	**96.4 (F)**	13.8 (B)	**125 (F)**	16.3 (B)
	With Mitigation				**55.2 (E)**	16.1 (B)
7	Elkhorn Boulevard and E. Commerce Way	Signal	17.4 (B)	16.2 (B)	20.2 (C)	33.4 (C)
8	Power Line Road and Del Paso Road (County)	Signal	0.89 (D)	0.51 (A)	0.90 (D)	0.54 (A)
9	I-5 NB Ramps and Metro Air Parkway	Signal	**256.6 (F)**	**92.1 (F)**	**256.6 (F)**	**102.9 (F)**
	With Mitigation				**179.9 (F)**	**77.4 (E)**
10	I-5 SB Ramps and Metro Air Parkway	Signal	31.2 (C)	7.8 (A)	34.5 (C)	8.0 (A)
11	Elverta Road and Lone Tree Road (County)	Signal	**0.97 (E)**	**1.68 (F)**	**0.97 (E)**	**1.69 (F)**
12	Elverta Road and Metro Air Parkway (County)	Signal	0.71 (C)	0.65 (B)	0.71 (C)	0.66 (B)
13	Elkhorn Boulevard and Metro Air Parkway (County)	Signal	0.85 (D)	0.85 (D)	0.88 (D)	0.87 (D)
14	Meister Way and Metro Air Parkway (County)	Signal	0.81 (D)	**1.32 (F)**	0.89 (D)	**1.45 (F)**
	With Mitigation				0.87 (D)	**1.13 (F)**
15	Meister Way And Lone Tree Road	Signal	22.4 (C)	30.4 (C)	**49.4 (D)**	**116.5 (F)**
	With Mitigation				26.3 (C)	28.8 (C)
16	Meister Way And E. Commerce Way	Signal	20.6 (C)	13.3 (B)	**53.5 (D)**	**109.3 (F)**
	With Mitigation				16.1 (B)	25.8 (C)
17	Bayou Road and Metro Air Parkway	One way Stop	**8,993 (F)**	**9,795 (F)**	**8,994 (F)**	**9,795 (F)**
18	Elkhorn Boulevard and Project Street 1	Signal	No Project Traffic		**40.3 (D)**	**99.6 (F)**
	With Mitigation				11.5 (B)	23.6 (C)
19	Elkhorn Boulevard and Project Street 2	Signal	No Project Traffic		**41.7 (D)**	**95.5 (F)**
	With Mitigation				11.3 (B)	21.1 (C)
20	Elkhorn Boulevard and Project Street 3	One Way Stop (Right In/ Right Out Only)	No Project Traffic		9.5 (A)	18.4 (B)

Notes: * Seconds per Vehicle and volume/capacity for County intersections; **Bold** = Unacceptable Intersection Operation

- *SR 70/99 Southbound Ramps and Elkhorn Boulevard*: This intersection would degrade from LOS D to LOS E under cumulative plus project conditions.

- *SR 70/99 Northbound Ramps and Elkhorn Boulevard*: This intersection would continue to operate at LOS F during the a.m. peak hour. The project would cause the average delay at this intersection to increase by more than 5 seconds.

- *Metro Air Parkway and I-5 Northbound Ramps*: This intersection would continue to operate at LOS F during the a.m. and p.m. peak hours. The project would cause the average delay of this intersection to increase by more than 5 seconds in the pm peak hour.

- *Elverta Road and Lone Tree Road*: This intersection would continue to operate at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour. However, the project would not increase the volume to capacity ratio by more than 0.05 during the a.m. and p.m. peak hours.

- *Meister Way and Metro Air Parkway*: This intersection would continue to operate at LOS F during the p.m. peak hour. The project would cause the volume to capacity ratio at this intersection to increase by more than 0.05.

- *Meister Way and Lone Tree Road*: This intersection would degrade from LOS C during the a.m. and p.m. peak hours to LOS D during the a.m. peak hour and LOS F during the p.m. peak hour.

- *Meister Way and E. Commerce Way*: This intersection would degrade from LOS C to LOS D during the a.m. peak hour and LOS B to LOS F during the p.m. peak hour.

- *Metro Air Parkway and Bayou Road:* This intersection would continue to operate at LOS F during the a.m. and p.m. peak hours. However, the project would not cause the average delay of this intersection to increase by more than 5 seconds.

- *Elkhorn Boulevard and Project Street* 1: The project would cause this intersection to operate at LOS D during the a.m. peak hour and LOS F during the p.m. peak hour.

- *Elkhorn Boulevard and Project Street 2*: The project would cause this intersection to operate at LOS D during the a.m. peak hour and LOS F during the p.m. peak hour.

- *Elkhorn Boulevard and Project Street 3:* The project would cause this intersection to operate at LOS D during the a.m. peak hour and LOS F during the p.m. peak hour.

Because the project in combination with cumulative projects would either cause intersections that operate unacceptably under Cumulative No Project conditions to exceed the City or County applicable average delay thresholds under Cumulative plus Project conditions or would cause intersections that would operate acceptably under Cumulative No Project conditions to degrade to an unacceptable level under Cumulative plus Project conditions, the project would result in ***significant*** cumulative impacts to study area intersections.

Mitigation Measure 6.1-5a: Elkhorn Boulevard and Lone Tree Road (City of Sacramento and County)

The project applicant shall provide an expanded intersection with a right turn pocket length of 200 feet for vehicles turning right onto northbound Lone Tree Road from the westbound Elkhorn Boulevard approach. With implementation of this mitigation measure, the project would increase the average delay at this intersection by only 2.8 seconds, which is below City standards (i.e., 5 seconds). Construction associated with this mitigation

measure would require the acquisition of additional right-of-way. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site and therefore no new environmental impacts would occur. The applicant in consultation with the City shall coordinate with County to secure additional right-of-way for this improvement. However, because this intersection is located within the County and is not subject to the City's jurisdiction, implementation of this measure can not be guaranteed. Therefore, this impact would be considered ***significant and unavoidable***.

Mitigation Measure 6.1-5b: SR 70/99 Southbound Ramps and Elkhorn Boulevard (City of Sacramento and Caltrans)

Before project approval, the project applicant shall in coordination with the City, prepare a City Council-approved Finance Plan to fully fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City and Caltrans) toward the restriping of the SR 70/99 southbound off-ramp approach to provide a left-turn lane, a shared left turn-right turn lane, and two right-turn lanes (cumulative base lane geometry assumes two left turn and two right turn lanes). The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement. Sufficient right-of-way would be available with the future intersection configuration to accommodate these improvements without resulting in substantial alteration or expansion of this intersection. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, this intersection would operate at LOS D and this impact would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-5c: SR 70/99 Northbound Ramps and Elkhorn Boulevard (City of Sacramento and Caltrans)

Before project approval, the project applicant shall coordination with the City, prepare a City Council-approved Finance Plan to fully fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City) toward the restriping of the SR 70/99 northbound off-ramp approach to provide two left-turn lanes, a shared left turn-right turn lane, and a right-turn lane (cumulative base lane geometry assumes two left turn and two right turn lanes). The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement. Sufficient right-of-way would be available with the future intersection lane configuration to accommodate these improvements without resulting in substantial alteration or expansion of this intersection. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, this intersection would operate at LOS E in the a.m. peak hour and this impact would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-5d: Metro Air Parkway and I-5 Northbound Ramps (City of Sacramento and Caltrans)

Before project approval, the project applicant shall coordinate with the City, prepare a City Council-approved Finance Plan to fully fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City) toward the restriping of the I-5 northbound off-ramp approach to provide a left-turn lane, a shared left turn-right turn lane and two right-turn lanes (cumulative base lane geometry assumes two left turn and two right turn lanes). The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement. This

improvement would not require any additional right-of-way and would not in substantial alteration or expansion of this intersection. With implementation of this mitigation measure, this intersection would operate at LOS F in the a.m. and LOS E in the p.m. peak hour and this impact would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-5e: Meister Way and Metro Air Parkway (City of Sacramento and Sacramento County)

Adding a left-turn lane and restriping the westbound Meister Way approach to provide two left-turn lanes and a shared, through right-turn lane (cumulative base lane geometry assumes a left turn lane, a through lane, and a right turn lane) would mitigate this impact to a less-than-significant level. However, construction of this mitigation measure would require the acquisition of additional right-of-way which is not controlled by the applicant. Although implementation of this measure would reduce the project's cumulative impacts to this intersection to a less-than-significant level, it is unknown whether additional right-of-way could be secured and whether this measure would be implemented. Therefore, for purposes of CEQA this impact is considered ***significant and unavoidable***.

Mitigation Measure 6.1-5f: Meister Way and Lone Tree Road (City of Sacramento)

Adding a left-turn lane for the eastbound and westbound Meister Way approaches, and southbound Lone Tree Road approach would improve the operations of this intersection to LOS C and would reduce this impact to a less-than-significant level. Sufficient right-of-way could be secured by the applicant for the westbound approach; however, right-of-way along eastbound and southbound approach is controlled by the County and not within the City's jurisdiction. Although implementation of this measure would reduce the project's cumulative impacts to this intersection to a less-than-significant level, it is unknown whether additional right-of-way could be secured and whether this measure would be implemented. Therefore, for purposes of CEQA, this impact is considered ***significant and unavoidable***.

Mitigation Measure 6.1-5g: Meister Way and E. Commerce Way (City of Sacramento)

On or before 65% buildout of the project based on the project's total trips, the project applicant shall revise the improvement plan to provide a left-turn lane for the northbound East Commerce Way approach, an additional lane for the eastbound Meister Way approach, and restripe the eastbound Meister Way approach to provide a left-turn lane and a right-turn lane (base cumulative lane geometry assumed to have a shared left turn-right turn lane for the eastbound approach). Sufficient right-of-way is currently available to accommodate these improvements without resulting in substantial alteration or expansion of this intersection. Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. With implementation of this mitigation measure, this intersection would operate at LOS C and this impact would be reduced to a ***less-than-significant*** level.

Mitigation Measure 6.1-5h: Elkhorn Boulevard and Project Street 1 (City of Sacramento)

Construction of an additional through lane for the eastbound and westbound Elkhorn Boulevard approaches (cumulative base lane geometry assumes three through lanes in each direction on Elkhorn Boulevard) would reduce this impact to a less-than-significant level. However, this measure would require the acquisition of additional right-of-way beyond the maximum right-of-way proposed by the City/County for this roadway. No other feasible measures are available to reduce this impact because of limited right-of-way. Therefore, this impact is considered ***significant and unavoidable***.

Mitigation Measure 6.1-5i: Elkhorn Boulevard and Project Street 2 (City of Sacramento)

Construction of an additional through lane for the eastbound and westbound Elkhorn Boulevard approaches (cumulative base lane geometry assumes three through lanes in each direction on Elkhorn Boulevard) would

reduce this impact to a less-than-significant level. However, this measure would require the acquisition of additional right-of-way beyond the maximum right-of-way proposed by the City/ County for this roadway. No other feasible measures are available to reduce this impact because of limited right-of-way. Therefore, this impact is considered ***significant and unavoidable***.

Mitigation Measure 6.1-5j: Elkhorn Boulevard and Project Street 3 (City of Sacramento)

Construction of an additional through lane for the eastbound and westbound Elkhorn Boulevard approaches (cumulative base lane geometry assumes three through lanes in each direction on Elkhorn Boulevard) would reduce this impact to a less-than-significant level. However, this measure would require the acquisition of additional right-of-way beyond the ultimate right-of-way proposed by the City for this roadway. To improve the operations of this intersection under cumulative conditions, before buildout of the project, the project applicant shall restrict the left turn in/out movement at this intersection so that it will be right in/ right out movement only with a stop sign control on the side street. Although the operation of this intersection would improve, it would not cause this intersection to operate at an acceptable level (e.g., LOS D or better). No other mitigation is available to reduce this impact. As a result, this impact would remain ***significant and unavoidable***.

Significance After Mitigation

With implementation of the above mitigation measures, the SR 70/99 Southbound Ramps and Elkhorn Boulevard, SR 70/99 Northbound Ramps and Elkhorn Boulevard, Metro Air Parkway and I-5 Northbound Ramps, and Meister Way and E. Commerce Way intersections would operate at acceptable levels under cumulative conditions and the project's cumulative impacts would be reduced to a less-than-significant level.

No feasible mitigation is available or implementation of feasible mitigation can not be guaranteed because it is not subject to the control of the City for the intersections of Elkhorn Boulevard and Lone Tree Road, Meister Way and Metro Air Parkway, Meister Way and Lone Tree Road, Elkhorn Boulevard and Project Street 1, Elkhorn Boulevard and Project Street 2, and Elkhorn Boulevard and Project Street 3. Therefore, the project's cumulative impacts to these intersections are considered ***significant and unavoidable***.

IMPACT 6.1-6

Cumulative Impacts to Study Area Roadway Segments. *The proposed project in combination with cumulative projects would increase traffic volumes on study area roadway segments and would cause these segments (i.e., Elkhorn Boulevard west of SR 70/99 Interchange, Metro Air Parkway north of I-5 Interchange, and Meister Way west of SR 70/99) to degrade from an acceptable operating condition (i.e., LOS A) to an unacceptable operating condition (i.e., LOS F). Because study area roadway segments would operate unacceptably as a result of the project, this would be a* ***significant*** *impact.*

On a cumulative basis, traffic associated with proposed land uses and cumulative projects would increase traffic volumes on local roadway segments. Table 6.1-38 compares the roadway segment operating conditions for Cumulative No Project conditions with that of Cumulative plus Project conditions.

Implementation of the project in combination with cumulative projects would cause three study area segments to operate unacceptably as described below:

- *Elkhorn Boulevard west of SR 70/99 Interchange:* The project would cause this segment to continue operating at LOS F under Cumulative plus Project conditions and would increase the volume-to-capacity ratio by more than 0.05.
- *Metro Air Parkway north of I-5 Interchange:* The project would cause this segment to continue operating at LOS F under Cumulative plus Project conditions. However, the project

would not cause the volume-to-capacity ratio of this segment to increase by more than 0.05.

- *Meister Way west of SR 70/99:* The project would cause this segment to degrade from LOS B to LOS F under Cumulative plus Project Conditions.

Table 6.1-38
Cumulative Roadway Segment Operating Conditions

Roadway Segment	Lanes	Level of Service (V/C)	
		No Project	Plus Project
Elkhorn Boulevard west of SR 70/99 Interchange	6	**F (1.10)**	**F (1.23)**
(With Meister Way overpass)	8		**E (0.92)**
Lone Tree Road south of Elkhorn Boulevard	4	A (0.44)	B (0.62)
Metro Air Parkway north of I-5 Interchange	6	**F (1. 65)**	**F (1.67)**
(with Meister Way overpass)	8		**F (1.26)**
Meister Way west of SR 70/99	2	B (0.64)	**F (1.03)**
(with Meister Way overpass)	4		A (0.51)

Notes: LOS = level or service; V/C = Volume/Capacity ratio
Bold = Unacceptable Ramp Operation
Reference: Highway Capacity Manual 2000 Edition.

The project would result in less-than-significant cumulative impacts to the Lone Tree Road south of Elkhorn Boulevard segment because it would operate at LOS B, which is acceptable based on City and County standards. Further, the project's cumulative impact to the Metro Air Parkway north of I-5 segment would be less-than-significant because the project would not cause the volume-to-capacity of this segment to increase by more than 0.05. However, because the project would cause the Elkhorn Boulevard west of SR 70/99 Interchange segment to continue operating at LOS F and would increase the volume-to-capacity ratio of this segment by more than 0.05, and the Meister Way segment west of SR 70/99 to degrade from LOS B to LOS F under Cumulative plus Project conditions, impacts to these roadway segments would be a cumulatively ***significant*** impact.

Mitigation Measure 6.1-6a: Elkhorn Boulevard west of SR 70/99 Interchange (City of Sacramento)

Widening Elkhorn Boulevard to eight lanes (4 in each direction) would reduce this impact to a less-than-significant level. The City includes widening of Elkhorn Boulevard to six lanes within its General Plan; widening to eight lanes is neither feasible nor planned by the City. Therefore, before project approval, the project applicant shall, in coordination with the City, establish a funding mechanism to fully fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs towards widening Elkhorn Boulevard to six lanes west of the SR 70/99 Interchange (the number of lanes planned by the City of Sacramento). The City and developers of the MAP project have identified 100% of the funding necessary to widen the Elkhorn Boulevard/SR 70/99 overpass to six lanes. No other feasible mitigation is available to reduce this impact. Therefore, while reduced, this impact would remain ***significant and unavoidable***.

Mitigation Measure 6.1-6b: Meister Way west of SR 70/99 (City of Sacramento)

The project applicant shall implement Mitigation measure 6.1-2c. With implementation of this mitigation measure, this segment would operate at LOS B and this impact would be reduced to a ***less-than-significant*** level.

Significance After Mitigation

With implementation of the above mitigation measures, the Meister Way west of SR 70/99 segment would operate at acceptable levels under cumulative conditions and the project's cumulative impacts would be reduced to a ***less-than-significant*** level.

However, no feasible mitigation is available to reduce the project's cumulative impacts to the Elkhorn Boulevard west of SR 70/99 interchange segment. Therefore, the project's cumulative impact to this intersection is considered ***significant and unavoidable***.

IMPACT 6.1-7

Cumulative Impacts to Study Area Freeway Ramps. *The proposed project in combination with cumulative projects would increase traffic volumes on the freeway system and would cause four study freeway ramps (i.e., SR 70/99 Northbound to Elkhorn Boulevard off ramp, I-5 Northbound to SR 70/99 Northbound off ramp, I-5 Northbound to Metro Air Parkway off-ramp and Metro Air Parkway to I-5 Southbound loop on ramp) to operate unacceptably under Cumulative plus Project conditions and exceed Caltrans thresholds of significance for freeway ramp operations. This would be a* ***significant*** *cumulative impact and the project's contribution to this impact would be cumulatively considerable.*

With implementation of the project and cumulative projects, traffic volumes on the local freeway system would increase. Table 6.1-39 compares the peak-hour operating conditions for the study ramps under Cumulative No Project conditions with that of Cumulative plus Project conditions.

As shown in Table 6.1-39, all the study ramps are expected to operate acceptably under Cumulative plus Project conditions, except for the following ramps:

- *SR 70/99 Northbound to Elkhorn Boulevard off-ramp:* Under Cumulative No Project conditions, this freeway ramp would operate at LOS F. Under Cumulative plus Project conditions, this freeway ramp would continue to operate at LOS F; however, the project would contribute additional traffic during the a.m. peak hour to a ramp that would operate unacceptably.

- *I-5 Northbound to SR 70/99 Northbound off-ramp:* The project would cause this freeway ramp to degrade from LOS E to LOS F under Cumulative plus Project conditions.

- *I-5 Northbound to Metro Air Parkway off-ramp:* Under Cumulative No Project conditions, this freeway ramp would operate at LOS F. Under Cumulative plus Project conditions, this freeway ramp would continue to operate at LOS F; however, the project would contribute additional traffic during the a.m. peak hour to a ramp that would operate unacceptably.

- *Metro Air Parkway to I-5 Southbound loop on-ramp:* Under Cumulative No Project conditions, this freeway ramp would operate at LOS F. Under Cumulative plus Project conditions, this freeway ramp would continue to operate at LOS F; however, the project would contribute additional traffic during the p.m. peak hour to a ramp that would operate unacceptably.

Because the project would cause four study area freeway ramps to either degrade from an acceptable operating condition to an unacceptable operating condition or would contribute traffic to a freeway ramp that would operate unacceptably under Cumulative no Project conditions, the project's impacts to these ramps would be cumulatively ***significant***.

Table 6.1-39
Cumulative Peak-Hour Freeway Ramp Operating Conditions

Ramp	Level of Service											
	No Project						Plus Project ("with" the Meister-SR 70/99 overpass)					
	A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Elkhorn Boulevard to SR 70/99 northbound (Loop on-ramp)	37	B	-	426	B	-	71	B	-	467	B	-
Elkhorn Boulevard to SR 70/99 northbound (on-ramp)	283	B	-	140	B	-	289	B	-	149	B	-
SR 70/99 northbound to Elkhorn Boulevard (off-ramp)	**2,077**	**F**	**[NBL: 1,084, 1,270]**	1,045	C	[NBL: 218, 1,270]	**2,259**	**F**	**[NBL: 1,528, 1,270]**	1,276	C	[NBL: 466, 1,270]
With Mitigation (widening off-ramp from one lane to two lanes)								C	[NBL: 932, 1,270]		B	[NBL: 267, 1,270]
SR 70/99 southbound to Elkhorn Boulevard (off-ramp)	707	C	[SWR: 508, 1,250]	370	C	[SWL: 90, 1,250]	737	C	[SWR: 543, 1,250]	425	C	[SWL: 119, 1,250]
Elkhorn Boulevard to SR 70/99 southbound (loop on-ramp)	224	B	-	63	B	-	225	B	-	63	B	-
Elkhorn Boulevard to SR 70/99 southbound (on-ramp)	652	B	-	1,570	C	-	824	B	-	1,762	D	-
Elverta Boulevard to SR 70/99 northbound (Loop on-ramp)	180	B	-	994	B	-	182	B	-	1,010	B	-
Elverta Boulevard to SR 70/99 northbound (on-ramp)	215	B	-	111	B	-	215	B	-	111	B	-
SR 70/99 northbound to Elverta Boulevard (off-ramp)	1,077	D	[NBL: 593, 1,270]	995	C	[NBR: 99, 1,270]	1,091	C	[NBL: 580, 1,270]	1,017	C	[NBR: 513, 1,270]

Table 6.1-39
Cumulative Peak-Hour Freeway Ramp Operating Conditions

Ramp	Level of Service											
	No Project						Plus Project ("with" the Meister-SR 70/99 overpass)					
	A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
SR 70/99 southbound to Elverta Boulevard (off-ramp)	1,282	C	[SWR: 938, 1,250]	512	C	[SWL: 35, 1,250]	1,292	C	[SWR: 950, 1,250]	519	C	[SWL: 150, 1,250]
Elverta Boulevard to SR 70/99 southbound (loop on-ramp)	641	B	-	241	B	-	654	B	-	260	B	-
Elverta Boulevard to SR 70/99 southbound (on-ramp)	435	B	-	757	B	-	437	B	-	762	C	-
SR 70/99 southbound to I-5 northbound (off-ramp)	350	C	-	212	C	-	362	C	-	219	C	-
I-5 southbound to SR 70/99 northbound (off-ramp)	192	C	-	496	C	-	196	C	-	611	C	-
SR 70/99 southbound to I-5 southbound (on-ramp)	2,597	C	-	3,204	D	-	2,757	C	-	3,410	D	-
I-5 northbound to SR 70/99 northbound (off-ramp)	**3,795**	**F**	-	2,585	C	-	**3,975**	**F**	-	2,801	D	-
Mitigation Measure								D			C	
I-5 northbound to Metro Air Parkway (off-ramp)*	**3,950**	**F**	**[WBR: 1,846, 1,270]**	1,207	C	[WBR: 231, 1,270]	**3,922**	**F**	**[WBR: 1,854, 1,270]**	1,223	C	[WBR: 373, 1,270]
Mitigation Measure								D	[WBR: 1,800, 1,270]		C	[WBR: 313, 1,270]
Metro Air Parkway to I-5 northbound (on-ramp)*	432	B	-	1,983	E	-	470	B	-	2,012	E	-

Table 6.1-39
Cumulative Peak-Hour Freeway Ramp Operating Conditions

Ramp	Level of Service											
	No Project						Plus Project ("with" the Meister-SR 70/99 overpass)					
	A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]	Volume (vph)	LOS	Queue Length (feet) [X: Y, Z][1]
Metro Air Parkway to I-5 northbound (loop on-ramp)*	385	B	-	195	B	-	387	B	-	195	B	-
I-5 southbound to Metro Air Parkway (off-ramp)*	1,975	E	[SEL: 767, 1,250]	821	C	[SER: 56, 1,250]	2,000	E	[SBL: 638, 1,250]	858	C	[SBL: 86, 1,250]
Metro Air Parkway to I-5 southbound (on-ramp)*	300	B	-	363	B	-	311	B	-	381	B	-
Metro Air Parkway to I-5 southbound (loop on-ramp)*	967	B	-	**4,546**	**F**	-	970	B	-	**4,566**	**F**	-
Mitigation Measure								B			C	

Notes: LOS – level of service for ramp freeway junction areas of influence
Bold – Unacceptable Ramp Operation
Reference – Highway Capacity Manual 2000 Edition
vph – Vehicles per hour
* Future ramps
[1] X:Y,Z = Most critical ramp approach: 95th Percentile Queue Length, Available Segment Length/Storage
- Slip ramps. Requires arrival and departure data to estimate queuing on-ramps. However, the ramps are long enough to contain queues. As shown in the table, traffic volumes are low on the slip ramps.

Mitigation Measure 6.1-7a: SR 70/99 Northbound to Elkhorn Boulevard off-ramp (City of Sacramento and Caltrans)

The project applicant shall coordinate with Caltrans to pay its fair share contribution to implement mitigation measure 6.1-5c, which requires re-striping the SR 99 northbound off-ramp approach to provide two left-turn lanes, a shared left turn-right turn lane and a right-turn lane (cumulative base lane geometry assumes two left turn and two right turn lanes). With implementation of this mitigation measure and widening this ramp from one lane to two lanes, this ramp would operate at LOS C and this impact would be reduced to a less-than-significant level. However, these ramps are not under the jurisdiction of the City of Sacramento (i.e., subject to Caltrans jurisdiction). While the project would contribute funds that would implement measures that would fully mitigate impacts to this intersection to a less-than-significant level, it is unknown whether these measures would be implemented because they are not subject to the control of the City. As a result, for purposes of CEQA, cumulative impacts to this ramp would be considered ***significant and unavoidable***.

Mitigation Measure 6.1-7b: I-5 Northbound to SR 70/99 Northbound off-ramp (City of Sacramento and Caltrans)

The project applicant shall coordinate with Caltrans to pay its fair share toward widening the off-ramp to provide an additional lane. This measure would be subject to Caltrans' requirements and Caltrans determining through a feasibility evaluation that this measure could be implemented. It is unknown at this time whether sufficient right-of-way is available to accommodate this improvement. Further, widening of the off ramp is not included in Caltrans' District 3 Draft District System Management Plan (DSMP) and Caltrans does not have any funding mechanisms in place to implement this improvement. Furthermore, widening the off ramp would require additional right-of-way that is not is not subject to the control of the City or the project applicant. It is unknown at this time whether this mitigation would be feasible and, if feasible, whether Caltrans would be able to secure sufficient right-of-way and funding to implement this improvement. Therefore, for purposes of CEQA, this impact would remain ***significant and unavoidable.***

Mitigation Measure 6.1-7c: I-5 Northbound to Metro Air Parkway off-ramp (City of Sacramento and Caltrans)

The project applicant shall coordinate with Caltrans and the Metro Air Park Finance Plan to pay its fair share toward widening the off-ramp to provide two additional lanes. Caltrans' DSMP includes the reconstruction of the I-5/Metro Air Park Interchange, but does not identify specific improvements or a project construction date. Widening of the interchange to provide the two additional lanes could be accommodated within the right-of-way proposed as part of the interchange improvement.

The project applicant shall also implement mitigation measure 6.1-5d, which requires the establishment of a funding mechanism for restriping the I-5 northbound off-ramp approach to provide a left turn lane, a shared left turn-right turn lane and two right turn lanes (cumulative base lane geometry assumes two left turn and two right turn lanes).

Even with implementation of the above mitigation, the ramp is anticipated to continue operating at LOS F. No other feasible mitigation is available. Therefore, this impact would remain ***significant and unavoidable.***

Mitigation Measure 6.1-7d: Metro Air Parkway to I-5 Southbound loop on-ramp (City of Sacramento and Caltrans)

Before project approval, the project applicant shall, in coordination with the City, prepare a City Council-approved Finance Plan to fully fund necessary traffic mitigation. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs (determined in consultation with the City and Caltrans) toward the widening of the on-ramp to provide two additional lanes. The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement. Sufficient right-of-way is currently available to accommodate these improvements without resulting in expansion of this intersection.

Based on "windshield surveys" of the project area, the site proposed for this improvement is substantially similar to the project site. Construction-related impacts would be similar to the project's construction-related impacts and no new significant impacts would occur. Mitigation recommended for the project would also substantially reduce construction-related impacts associated with this measure. The project would contribute approximately 1% of the total p.m. peak-hour trips at this off-ramp and as a result shall contribute 1% to construction of this improvement

Caltrans would be the agency responsible for implementation of this measure and as a result the project applicant would be required to coordinate with Caltrans on the funding of this improvement. Caltrans' District 3 DSMP includes the I-5/Metro Air Parkway Interchange, but does not identify specific improvements or project construction date. Additionally, the construction of Metro Air Parkway to I-5 southbound loop on-ramp is included in the Metro Air Park Finance Plan, so the applicant would be required to pay its fair share contribution in conjunction with Metro Air Park finance plan toward the construction of this improvement.

However, even with implementation of the above mitigation, this ramp is anticipated to continue operating at LOS F. No other feasible mitigation is available. Therefore, this impact would remain ***significant and unavoidable.***

Significance After Mitigation

With implementation of the above mitigation measures, SR 70/99 Northbound to Elkhorn Boulevard off-ramp and the I-5 Northbound to SR 70/99 Northbound off- ramp would operate at acceptable levels under cumulative conditions and the project's cumulative impact would be reduced to a less-than-significant level. However, these ramps are not under the jurisdiction of the City of Sacramento (i.e., subject to Caltrans jurisdiction). While the project would contribute funds that would implement measures that would fully mitigate impacts to these ramps to a less-than-significant level, it is unknown whether these measures would be implemented because they are not subject to the control of the City. As a result, for purposes of CEQA, cumulative impacts to these ramps would be considered ***significant and unavoidable***.

While mitigation may be feasible for the I-5 Northbound to Metro Air Parkway off-ramp and the Metro Air Parkway to I-5 Southbound loop on-ramp, this mitigation would not be able to reduce the impact of the project to a less-than-significant level. These ramps would continue to operate at LOS F and no other feasible mitigation is available. Therefore, cumulative impacts to this ramp would remain ***significant and unavoidable.***

IMPACT 6.1-8

Cumulative Freeway Mainline Segment Impacts. *The proposed project in combination with cumulative projects would increase traffic volumes on the freeway system and would cause three study freeway mainline segments (i.e., I-5 east of Power Line Road, I-5 north of Del Paso Road, I-5 north of I-5/I-80 interchanges between I-80 and Arena Boulevard) to operate unacceptably under Cumulative plus Project Conditions. These freeway mainline segments would operate unacceptably under Cumulative no Project conditions; however, the project would contribute additional trips to these segments, which is unacceptable based on Caltrans standards. This would be a cumulatively* ***significant*** *impact.*

With implementation of the project and cumulative projects, traffic volumes on the local freeway system would increase. Table 6.1-40 compares the peak-hour operating conditions for the freeway mainline segments under Cumulative No Project conditions with that of Cumulative plus Project conditions.

As shown in Table 6.1-40, three mainline segments are expected to operate unacceptably under Cumulative plus Project conditions as described below:

- *Interstate 5 – east of Power Line Road* – Under Cumulative No Project conditions, this mainline segment would operate at LOS F during the a.m. and p.m. peak hours

Table 6.1-40
Cumulative Peak-Hour Freeway Mainline Operating Conditions

Freeway Segment	Direction	Level of Service											
		No Project						Plus Project ("with" the Meister-SR 70/99 overpass)					
		A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour		
		Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS	Volume (vph)	Density (pc/m/l)	LOS
I-5 East of Power Line Road	WB/NB	**6,202**	**> 45**	**F**	3,873	43.4	E	**6,231**	**>45** 29.4	**F** D	3,896	44.1 17.9	E C
	with Mitigation												
	EB/SB	3,755	40.4	D	**7,288**	**> 45**	**F**	3,772	40.8 17.4	E B	**7,340**	**>45** 38.4	**F** E
	with Mitigation												
I-5 North of Del Paso Road	NB	**9,648**	**> 45**	**F**	6,246	29.5	D	**9,845**	**>45** 31.7	**F** E	6,478	31.1 19.9	D C
	with Mitigation												
	SB	6,150	29.0	C	**9,997**	**> 45**	**F**	6,334	30.1 19.4	D C	**10,240**	**>45** 33.6	**F** D
	with Mitigation												
I-5 North of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit	NB	**10,294**	**> 45**	**F**	7,621	41.7	D	**10,527**	**>45** 35.3	**F** E	**7,858**	**>45** 24.1	**F** C
	with Mitigation												
	SB	7,201	37.0	D	**11,146**	**> 45**	**F**	7,412	39.2 22.7	E C	**11,398**	**>45** 41.4	**F** E
	with Mitigation												
SR 70/99 between Elverta Road and Elkhorn Boulevard	NB	2,231	20.5	C	2,606	24.0	C	2,272	20.9	C	2,756	25.5	C
	SB	2,778	25.7	C	2,154	19.8	C	2,828	26.2	D	1,706	15.7	C
SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 Interchange	NB	3,988	24.5	C	3,081	18.9	C	4,171	25.5	C	3,312	20.3	C
	SB	2,947	18.1	C	3,417	21.0	C	3,119	19.1	C	3,629	22.3	C

Notes: vph - vehicles per hour; pc/m/l - passenger cars per mile per lane; LOS = Level of Service;
Bold = Unacceptable Freeway Segment Operation.

(westbound/northbound direction and eastbound/southbound directions respectively). Under Cumulative plus Project conditions, this mainline segment would continue to operate at LOS F during the a.m. and p.m. peak hours; however, the project would contribute additional traffic during the a.m. and p.m. peak hours to a mainline segment that would operate unacceptably.

- *Interstate 5 – north of Del Paso Road* – Under Cumulative No Project conditions, this mainline segment would operate at LOS F during the a.m. and p.m. peak hours (northbound direction and southbound direction respectively). Under Cumulative plus Project conditions, this mainline segment would continue to operate at LOS F during the a.m. and p.m. peak hours; however, the project would contribute additional traffic during the a.m. peak hour to a mainline segment that would operate unacceptably.

- *Interstate 5 – north of I-5/I-80 Interchange* – between I-80 and Arena Boulevard Exit – Under Cumulative No Project conditions, this mainline segment would operate at LOS F during the a.m. and p.m. peak hours (northbound direction and southbound direction respectively). Under Cumulative plus Project conditions, this mainline segment would continue to operate at LOS F during the a.m. and p.m. peak hours; however, the project would contribute additional traffic during the a.m. peak hour to a mainline segment that would operate unacceptably.

Because the project would contribute traffic to three freeway mainline segments that would operate unacceptably under Cumulative No Project conditions, the project's impacts to these mainline segments would be cumulatively ***significant.***

Mitigation Measure 6.1-8a: I-5 east of Power Line Road to the MAP Interchange (City of Sacramento and Caltrans)

Because this mainline segment of I-5 would operate unacceptably under Cumulative No Project conditions, widening this segment to eight lanes (currently four lanes) would improve the operating conditions of this segment during peak conditions to an acceptable LOS. The Caltrans' District 3 DSMP includes adding an HOV lane to I-5 by the year 2020 and according to Metro Air Park Finance Plan, this segment of I-5 would be upgraded to six lanes with buildout of the Metro Air Park project. Therefore, before recordation of the first map, the project applicant shall, in coordination with the City, prepare a City Council-approved Finance Plan. This funding mechanism shall be in conformance with the Draft Greenbriar Finance Plan presented in Appendix C of the DEIR. This funding mechanism shall ensure that the project applicant will pay their fair-share costs, determined in consultation with the City and in coordination with the Metro Air Park Finance Plan, toward the widening of I-5 to six lanes. No other right-of-way is available to widen this segment to eight lanes. The Draft Greenbriar Finance Plan identifies 100% of the funding needed to construct this improvement. Additional right-of-way to accommodate the expansion of this freeway segment beyond six lanes is not available because of the developing nature of properties to the east and west of I-5. While expansion of this freeway segment would reduce the project's cumulative traffic impacts to this freeway segment, it would not reduce the project's cumulative impact to a less-than-significant level because widening to eight lanes is not feasible. No other feasible mitigation is available to reduce this impact. Therefore, while reduced, this impact would remain ***significant and unavoidable***.

Mitigation Measure 6.1-8b: I-5 north of Del Paso Road (City of Sacramento and Caltrans)

Widening this segment of I-5 mainline to twelve lanes (currently six lanes) would improve the operating conditions of this segment during peak conditions to an acceptable LOS. The Caltrans District 3 DSMP includes adding an HOV lane to I-5 by the year 2020 but no funding mechanism for this project is defined. No other freeway expansion projects are planned for this segment of I-5. Further, because of the developing nature of properties to the east and west of I-5, additional right-of-way is not available for the expansion of this freeway

segment. Because no feasible mitigation is available to reduce the project's impacts to this mainline segment, this impact would remain ***significant and unavoidable***.

Mitigation Measure 6.1-8c*:* I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit (City of Sacramento and Caltrans)

Because this mainline segment of I-5 would operate unacceptably under Cumulative No Project conditions, widening this segment of I-5 mainline to twelve lanes (currently six lanes) would improve the operating conditions of this segment during peak conditions to an acceptable LOS. The Caltrans District 3 DSMP includes adding an HOV lane to I-5 by the year 2020 but no funding mechanism for this project is available. No other freeway expansion projects are planned for this segment of I-5. Further, because of the developing nature of properties to the east and west of I-5, additional right-of-way is not available for the expansion of this freeway segment. Because no feasible mitigation is available to reduce the project's impacts to this mainline segment, this impact would remain ***significant and unavoidable***.

Significance After Mitigation

No feasible mitigation is available to reduce the project's cumulative mainline freeway segment impacts to a less-than-significant level. Therefore, the project's cumulative impacts to these mainline freeway segments are considered ***significant and unavoidable***.

IMPACT 6.1-9

Pedestrian and Bicycle Circulation Impacts. *The project would add pedestrian demands within the project site and to and from proposed commercial, retail, and light-rail land uses. Specific information on improvements to on and off-site bicycle and pedestrian facilities is not available at this time. Because the project would add demand for pedestrians and bicycle facilities for which facilities may not be available. This would be a* ***potentially significant*** *bicycle and pedestrian circulation impact.*

According to the City's criteria, the project would result in a significant impact to bicycles and pedestrians if the project conflicts with any existing or planned facility or adds demand to one of these modes that is not adequately accommodated by appropriate facilities. The project would construct sidewalks and pedestrian paths throughout the development. These sidewalks would provide pedestrian connections within the site and to the proposed commercial, retail, and light rail land uses. Further, a pedestrian sidewalk would be provided along the Meister Way overpass and would allow pedestrians to access areas east of SR 70/99.

No bicycle facilities are currently available on or near the project site. On street bike lanes exist at several locations along Del Paso Road and six-foot wide bike lanes exist on both sides of East Commerce Way. The project would increase demand for bicycle and pedestrian facilities. Details of project facilities (e.g., design, siting) are unknown at this time. Therefore, the project could result in inadequate access to on- and off-site pedestrian and bicycle facilities. This would be a ***potentially significant*** impact.

Mitigation Measure 6.1-9: Bicycle and Pedestrian Facilities (City of Sacramento)

a. Before recordation of the first map, the project applicant shall coordinate with the City of Sacramento Development Engineering and Finance Division to identify the necessary on- and off-site pedestrian and bicycle facilities to serve the proposed development. These facilities shall be incorporated into the project and could include: sidewalks, stop signs, in-pavement lighted crosswalks, standard pedestrian and school crossing warning signs, lane striping to provide a bicycle lane, bicycle parking, signs to identify pedestrian and bicycle paths, marked and raised crosswalks, and pedestrian signal heads.

b. Circulation and access to all proposed parks and public spaces shall include sidewalks that meet American with Disability Act Standards.

c. The project applicant shall dedicate a buffer along the edges of the project site (south, east, and west) to the City of Sacramento. This buffer shall be landscaped by the project applicant and shall provide space for future 10-foot off-street bikeways that would connect residents and employees to the NNCP area and other Class I bike facilities. The buffer on the western edge of the project site shall not encroach on the 250-foot linear open space/buffer proposed for giant garter snake habitat.

d. The project applicant shall provide on-street bicycle lanes 5-6-feet wide within the community. Details on the design and siting of these bike lanes shall be done in consultation with the City of Sacramento Development Engineering and Finance Division.

e. Bicycle parking shall conform to City standards and shall be located in high visibility areas to encourage bicycle travel. Class I (i.e., bicycle lockers) and Class II (i.e., racks) bicycle facilities shall be provided throughout the commercial areas of the project, at a ratio of 1 bicycle storage space for every 20 off-street vehicle parking spaces required. Fifty percent of the storage spaces shall be Class I facilities and the remaining 50% shall be Class II facilities.

f. The project applicant shall provide residents, tenants, and employees of the project site with information regarding the Sacramento Area Council of Government's (SACOG) Rideshare bicycle commuting program.

Significance After Mitigation

With implementation of this mitigation measure, adequate bicycle and pedestrian facilities would be provided at the project site in accordance with City standards. This impact would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-10

Demand for Public Transportation. *Public transit is not currently provided to the project site. At the time the project application was submitted to the City, no plans for the provision of public transit services were proposed. The project would increase demands for public transit facilities, none of which are proposed to be provided to the project site. Therefore, the project would result in a* ***significant*** *public transportation impact.*

The project would increase demands for public transportation services. As shown in Table 6.1-20, residents at the project site would generate 233 transit trips per day and patrons of the commercial component of the project would generate 63 transit trips per day. Sacramento Regional Transit District (RT) provides light-rail transit (LRT) service in Sacramento. Regional Transit plans to extend service from downtown Sacramento to the Sacramento International Airport, located west of the project site. Service would be provided through construction of a LRT line along the project's proposed Meister Way. With construction and operation of the proposed LRT station, the project would increase demands for LRT services.

Currently, public transit services (e.g., LRT, shuttle, and bus services) are not provided on the project site or the nearby vicinity and none were proposed at the time the project application was submitted to the City. The project is proposed to be a transit-oriented development that would serve to encourage the use of public transit facilities. Construction of a new LRT station at the project site would facilitate the transit-oriented design elements and would allow for enhanced public transit opportunities. While the RT intends to construct a new LRT line along Meister Way, the timing of construction of this service is currently unknown and this project would be subject to separate environmental review and project approval processes. No interim public transit facilities/services are proposed at the project site and demand for public transit services would not be met. Therefore, the project would result in a ***significant*** public transportation impact.

Mitigation Measure 6.1-10: (City of Sacramento)

a. Before the construction and operation of RT's proposed LRT station along Meister Way, the project applicant shall fund and operate an interim shuttle/bus transportation service for residents and patrons of the project site. The project applicant shall develop this interim transit service in consultation with the City of Sacramento and the RT. The interim transit service shall provide transit services for peak commute periods. To promote the use of public transit services, the project applicant at the sale of proposed residences shall promote the availability of transit services. Once demand for public transit services reaches 50 service requests, the project applicant shall begin to provide transit services and shall increase those services in proportion to the development levels and increased rider ship levels occurring on the project site.

b. The transit service shall take residents to the Central Business District (CBD) (i.e., downtown Sacramento) where they can transfer to light rail, bus, or train and connect to anywhere in greater Sacramento region and to the Bay Area. The transit service shall connect residents to the following transit services: Sacramento Regional Transit, El Dorado Transit, Yuba-Sutter Transit, Yolobus, Placer County Transit, San Joaquin Transit, Fairfield/Suisun Transit, Amador Transit, Roseville Transit, ETRAN (Elk Grove), and the Capitol Corridor/Amtrak. Midday service shall also be considered as development and rider ship demands increase.

c. Final design and operation of the transit service will be subject to the approval of the City and other proposed operating agencies (e.g., RT).

Significance After Mitigation

With implementation of interim public transportation services, the project would ensure that public transportation demands would be adequately met until public transportation services are provided to the project site by RT. This impact would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-11

Construction-Related Impacts. *Construction activities for the project would result in the generation of 50 one-way truck trips per day associated with construction activities and 500 one-way vehicle trips (250 construction workers on-site on a worst-case basis) associated with construction personnel. All construction personnel and vehicles would access the project site from Elkhorn Boulevard and would park in designated areas on the project site. No on-street parking would occur. Although the construction trips would be temporary, because of the size of this project and the large number of personnel required on a daily basis, the project's construction trips could substantially increase local roadway volumes and interfere with the safe and efficient operation of these roadways. This would be a* ***potentially significant*** *impact.*

Construction of the project would result in short-term increases in traffic on local roadways. Construction activities would require the hauling of equipment and materials to the project site and transportation of employees to and from off-site locations. Construction activities would require a maximum of 250 construction workers to commute to the site on a daily basis over a period of 5 to 10 years. These construction workers would generate 500 one-way daily trips to and from the project site. In addition, the project would generate 50 one-way truck trips per day associated with the delivery of construction equipment and materials. Construction vehicles, personnel, and deliveries would access the project site from Elkhorn Boulevard and would park all vehicles in designated areas on the project site. No construction-related vehicles (i.e., equipment, personal vehicles) would be allowed to park along streets in the surrounding neighborhood (e.g., along Elkhorn Boulevard or Lone Tree Road). Existing roadway volumes along Elkhorn Boulevard along the project site frontage are 458 vehicles per day. As a result, the project's proposed construction and vehicle and truck trips (i.e., 650) would increase local roadway volumes by 1.2 times (total of an estimated 1,008 trips).

Because of the extended construction period, these construction trips would combine over time with traffic trips associated with the project, which could result in substantial increases in local roadway volumes. Further, construction activities could result in the temporary disruption of the transportation system in and around the project area, including temporary street closures, which could result in increased roadway congestion, which could interfere with the safe and efficient operation of the local roadway system. Because the construction-related activities could result in substantial increases in local roadway volumes and potential disruptions in the operation of the local roadway network, this would be a ***potentially significant*** impact.

Mitigation Measure 6.1-11: (City of Sacramento)

a. Before issuance of grading permits for the project site, the project applicant shall prepare a detailed Traffic Management Plan that will be subject to review and approval by the City Department of Transportation, Caltrans, Sacramento County, and local emergency services providers including the City of Sacramento fire and police departments. The plan shall ensure that acceptable operating conditions on local roadways and freeway facilities are maintained. At a minimum, the plan shall include:

   - the number of truck trips, time an day of street closures,
   - time of day of arrival and departure of trucks,
   - limitations on the size and type of trucks, provision of a truck staging area with a limitation on the number of trucks that can be waiting,
   - provision of a truck circulation pattern,
   - provision of driveway access plan along Elkhorn Boulevard so that safe vehicular, pedestrian, and bicycle movements are maintained (e.g., steel plates, minimum distances of open trenches, and private vehicle pick up and drop off areas),
   - maintain safe and efficient access routes for emergency vehicles,
   - manual traffic control when necessary,
   - proper advance warning and posted signage concerning street closures, and
   - provisions for pedestrian safety.

b. A copy of the construction traffic management plan shall be submitted to local emergency response agencies and these agencies shall be notified at least 14 days before the commencement of construction that would partially or fully obstruct local roadways.

Significance After Mitigation

Implementation of the construction traffic management plan would ensure the safe and efficient operation of the local roadway system and would reduce the project's construction-related transportation impacts to a ***less-than-significant*** level.

IMPACT 6.1-12

Conformity with City Parking Requirements. *A detailed parking plan has not been submitted by the project applicant. As a result, it is unknown whether adequate parking would be provided on the project site for residential, commercial, and retail land uses. Therefore, this would be a potentially* ***significant*** *impact.*

The proposed project intends to provide parking facilities for on-site residences, the proposed school, public park facilities, the proposed light rail station, and proposed commercial and retail land uses. The City has developed minimum parking standards for each land use and these standards are presented in Table 6.1-41.

Table 6.1-41
City Parking Requirements

Land use	Size	Parking Required (Spaces)
Low Density Residential	671 D.U.	671
Medium Density Residential	2,215 D.U.	2,215
High Density Residential (HDR)	587 D.U.	940
Community/Village Commercial	325.2 KSF	1,301
Retail with HDR	47.5 KSF	191
Open space		None required
Source: Planning Division, City of Sacramento, email dated Sep, 19, 2005		

Proposed single-family residences would consist of 2- and 3-car garages in addition to on-street parking spaces. The light rail station, school, commercial, and retail land uses would also provide parking areas for employees and patrons to these land uses. However, the project applicant has not submitted a detailed parking plan to the City for review. Therefore, it is unknown whether adequate parking in conformance with the City's parking standards would be provided on-site. Therefore, the project would result in a ***potentially significant*** parking impact.

Mitigation Measure 6.1-12: (City of Sacramento)

The project applicant shall submit a detailed parking plan for each proposed land use at the time development entitlements (e.g., building permits or special permits) are sought. The parking plan shall ensure that parking provided on the project site would meet the City's most current parking standards for the proposed land use and it shall identify the number and location of proposed parking spaces including proposed handicap parking spaces. If a light rail station is constructed within project site, then a park and ride lot or park and ride spaces shall be allocated in the retail zoned area in the vicinity of the proposed LRT station. The parking plan shall be subject to the review and approval by the City Development Engineering and Finance Division.

Significance After Mitigation

With implementation of this mitigation measure, adequate parking would be provided on-site in accordance with the City's standards. This impact would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-13

Project Site Access Impacts. *The project would construct 5 new access points to the project site along Elkhorn Boulevard and Lone Tree Road and 3 access points along Meister Way. With implementation of the project and recommended traffic improvements, access from Elkhorn Boulevard and Lone Tree Road would be adequate. However, access points along Meister Way would be uncontrolled and with project build out could result in unsafe site access conditions (e.g., long queues of vehicles, left-turns across free flow traffic). Therefore, this would be a* ***potentially significant*** *site access impact.*

Access to the project site would be provided primarily from Elkhorn Boulevard via three roadways. Other access points would include Meister Way and a new roadway along Lone Tree Road north of Meister Way. Meister Way is a proposed new east-west arterial that would extend to the east over SR 70/99 where it would connect with East Commerce Way. To the west this roadway would connect to Metro Air Parkway.

In general, Meister Way serves as the central dividing line within the project site and divides the site into a northern and southern half. Primary access to the northern half of the project site would be provided at three intersections along Elkhorn Boulevard and one intersection on Lone Tree Road between Elkhorn Boulevard and Meister Way. As described above in Impacts 6.1-1, 6.1-2, 6.1-5, and 6.1-6, with implementation of recommended mitigation under baseline and cumulative plus project conditions, the project driveways along Elkhorn Boulevard and Lone Tree Road would operate acceptably. Primary access to the southern half of the project site would be provided at three intersections along Meister Way. These intersections also provide access to the northern portion of the project. As currently proposed, these intersections would be uncontrolled. Traffic associated with the project could result in hazardous and unsafe driving conditions and could result in the queuing of long lines of vehicles behind a vehicle making a left turn off Meister Way and vehicles turning left would cross free flowing traffic. This would be a ***potentially significant*** impact.

Mitigation Measure 6.1-13: (City of Sacramento)

a. Before 40% buildout of the project site based on total project trips, an exclusive left turn lane and a shared through-right turn lane for the project side streets with stop control shall be provided at the three four legged project intersections along Meister Way.

b. An exclusive left turn lane for vehicles turning left from the eastbound and westbound Meister Way approaches shall be provided at these intersections. Exhibit 6.1-18 shows the proposed traffic controls throughout the project site.

c. Final design and siting of these improvements shall be subject to the approval of the City Development Engineering and Finance Division, Development Services Department.

Significance After Mitigation

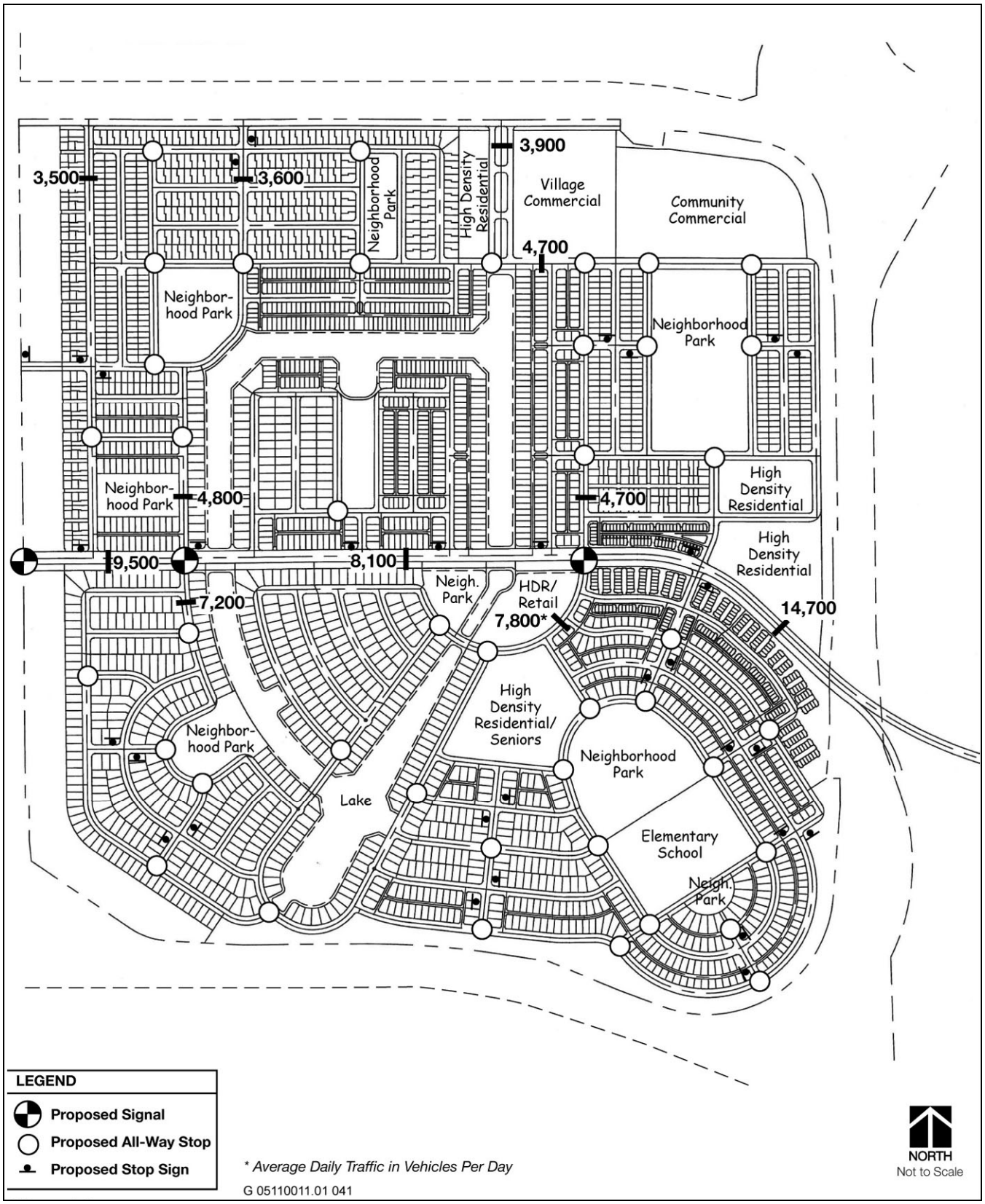
With implementation of this measure, site access impacts along Meister Way would be improved to provide adequate turning opportunities along Meister Way. This impact would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-14

Impacts to Internal Circulation. *Some elements of the internal roadway network (e.g., long, straight streets) could encourage vehicle speeding, which could lead to vehicle safety impact. This would be a potentially significant internal circulation impact.*

The proposed internal circulation network generally consists of three- and four-legged intersections controlled by stop signs (two-way or all-way). Three traffic signals are proposed along the Meister Way alignment. Exhibit 6.1-18 shows the proposed internal circulation traffic facilities.

While most roadway segments providing internal circulation throughout the neighborhood to Meister Way and proposed commercial and retail areas are controlled by stop signs and some traffic signals. Some roadway segments within the project site result in areas where there would be long, straight streets. Without traffic control features in place, these facilities could encourage vehicle speeding, which could lead to vehicle safety impacts within the community. This would be a ***potentially significant*** impact.



Source: TJKM 2005

Proposed Traffic Controls **Exhibit 6.1-18**

Mitigation Measure 6.1-14: Traffic Calming Measures (City of Sacramento)

During review of the project's tentative map and project entitlements, the project applicant shall coordinate with the City to identify roadways where traffic calming measures including but not limited to narrow travel lanes, speed bumps, roundabouts, raised intersections, and stop controls are needed to ensure the orderly, efficient, and safe flow of traffic. Design and siting of these facilities would be subject to approval by the City Development Engineering and Finance Division, and the Development Services Department.

Significance After Mitigation

With implementation of this mitigation measure, safe driving conditions within the project site would be ensured and would be consistent with the City's standards for internal circulation. This impact would be reduced to a ***less-than-significant*** level.

IMPACT 6.1-15

Impacts to Emergency Vehicle Access. *The project would provide adequate emergency access to the project site. However, construction vehicles could temporarily obstruct local roadways, which could impair the ability of local agencies to respond to an emergency in the project area. This would be a* ***potentially significant*** *impact.*

With implementation of the project, emergency access would be provided via three roadways along Elkhorn Boulevard, two roadways along Lone Tree Road, and the Meister Way overpass over SR 70/99. Design and siting of all roadways would be done in consultation with the City Development Engineering and Finance Division, Development Services Department, Fire Department, and Police Department staff to ensure that the roadways provide adequate access for emergency vehicles (i.e., turning radii, lane width).

Although the majority of project construction would occur within the footprint of the project site, construction of proposed intersection improvements, water and wastewater infrastructure, and the Meister Way overpass could partially obstruct roadways in the project vicinity. Obstruction of these roadways could block or slow emergency response vehicles traveling to the site and could adversely affect the response times of emergency response agencies depending on the time of day (i.e., peak hours). This would be a ***potentially significant*** impact.

Mitigation Measure 6.1-15: Emergency Access (City of Sacramento)

a. During review of the project's tentative map and project entitlements, the project applicant shall coordinate with the City Development Engineering and Finance Division, Development Services Department, Fire Department, and Police Department staff to ensure that the roadways provide adequate access for emergency vehicles (i.e., turning radii, lane width).

b. The project applicant shall implement mitigation measure 6.1-12 (Construction Traffic Management Plan).

Significance After Mitigation

With implementation of this measure, adequate emergency access would be provided to the project site during construction and operation of the project. This impact (Impact 6.1-15) would reduce the project's emergency access impacts to a ***less-than-significant*** level.

7 OTHER CEQA-REQUIRED ANALYSES

7.1 GROWTH-INDUCING IMPACTS

7.1.1 INTRODUCTION

As described in Chapter 1, "Introduction," this second recirculated draft environmental impact report (Second RDEIR) includes only those sections that contain significant new information from that published in the DEIR (July 2006). The transportation and circulation section of the DEIR has been recirculated in this document. To the extent that information and analysis for the project have changed, changes to the cumulative analysis are described below. Changes to the text of the DEIR are identified by highlight.

Cumulative impacts are defined in California Environmental Quality Act Guidelines (State CEQA Guidelines) Section 15355 as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355[b]).

According to Section 15126.2(d) of the State CEQA Guidelines, an environmental impact report (EIR) must discuss the growth-inducing impacts of the project. Specifically, CEQA states that the EIR shall:

> Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also, discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Growth-inducing impacts can result from development that directly or indirectly induces additional growth. Examples of growth inducement include:

- redesignation of property from agricultural to urban uses within an agricultural area, thus increasing the potential for adjacent farmland to also be redesignated to urban uses;
- the development of new housing or job-generating uses that would be sufficient in quantity to create a substantial demand for new jobs and housing, respectively;
- the development of new schools as part of a proposed project with excess capacity to serve adjacent currently undeveloped areas;
- the extension of roads and utilities to an area not currently served by such infrastructure; and
- the oversizing of new utility lines to a project site that may have additional capacity to serve currently undeveloped areas nearby.

Growth inducement itself is not an environmental effect but may foreseeably lead to environmental effects. These environmental effects may include increased demand on other community and public services and infrastructure,

increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, or conversion of agricultural and open space land to urban uses.

7.1.2 CITY/COUNTY NORTH NATOMAS JOINT VISION PLAN

The project site is currently located outside the City of Sacramento (City) and outside the City's sphere of influence (SOI). The land use maps in the *City of Sacramento General Plan* (City General Plan) and the *County of Sacramento General Plan* (County General Plan) designate the project site for agricultural land uses. As such, based on current land use designations the project site is not identified for future urban development. Development of the project as proposed would be inconsistent with land uses envisioned in the City and County General Plans.

In 2001, the City and the County of Sacramento (County) embarked upon a long-term agreement to collaboratively manage growth and preservation of open space and habitat in unincorporated areas of the Natomas Basin within Sacramento County. The agreement resulted in the preparation of the City/County North Natomas Joint Vision Plan (Joint Vision). This vision indicated that a substantial portion of the Natomas Basin would become urbanized, including the project site. Both jurisdictions determined that it would be mutually beneficial to cooperatively plan for the urbanization of the area because the City and County would share revenues that result from development of the area and any future development would be in accordance with smart-growth principles. The City Council and County Board of Supervisors approved a Memorandum of Understanding (MOU) that outlined a joint vision for land use and revenue sharing principles for Natomas and recognized the City as the agent of development and the County as the agent of permanent open space protection, including farmlands and habitat. The project as proposed would be consistent with urban development patterns and densities envisioned for the Joint Vision area, and is the first property in the area being considered for development since adoption of the MOU.

7.1.3 GROWTH-INDUCING IMPACTS OF THE PROJECT

The project site is located outside the City of Sacramento's city limit boundaries and outside its SOI boundaries. Project approval would require annexation of the project site into the City of Sacramento and amendment of the City's SOI boundary. Additionally, the proposed project would be served by the Sacramento Regional County Sanitation District (SRCSD) and County Sanitation District-1 (CSD-1). SRCSD and CSD-1 would be required to amend their SOI boundary, as the project site currently lies outside SRCSD's and CSD-1's existing SOI boundary. As discussed above, the City and County General Plans identify agricultural land uses for the project site and proposed land uses would be different than what is currently envisioned.

The Joint Vision plan identifies high-density mixed residential uses for the majority of the project site along with single-family small-lot uses in the southeastern-most portion of the site. Although the proposed project would be consistent with the Joint Vision plan, this plan is conceptual and does not enable or entitle any land uses. The overall development proposed for the project site is similar to urban development envisioned by the City and County, as discussed below. Through development of the project site as envisioned by the Joint Vision (see Section 7.2, "Cumulative Impacts"), the project would be growth inducing because the increased population associated with development would increase demand for goods and services, thereby fostering population and economic growth in the City of Sacramento and nearby communities. More importantly, it would set a precedent for allowing development north of the current City boundaries; this is discussed further below.

Regarding growth inducement, the 1986 North Natomas Community Plan (NNCP) EIR and the 1993 NNCP EIR Supplement found that the development of the NNCP area would have growth-inducing effects. Development of the North Natomas area will continue to have growth-inducing effects on the adjacent areas surrounding the plan area (City of Sacramento 1993). The project is a reflection of that anticipated growth-inducing effect of the NNCP. The 1986 NNCP EIR and the 1993 NNCP EIR Supplement stated that the magnitude of the growth-inducing effect identified for the NNCP area would be moderated by planning for a realistic jobs-to-housing

balance. Although this balance has not yet been realized in the North Natomas community, the land use designations provided by the NNCP are intended to achieve a balance as residential neighborhoods mature and the establishment of commercial services becomes increasingly viable. Whether this balance mutes pressure for growth outside the NNCP, however, remains to be seen.

Development of the project would not substantially contribute to an overall growth-inducing effect because of its specific location and the nature of the proposed development. The project would be located between residential development occurring in the NNCP area and commercial and industrial development approved for the future Metro Air Park. Because of its adjacency to the NNCP area, the project would extend the North Natomas community to the west. Further, proposed land uses (e.g., residential, commercial, open spaces, school) would complement existing and proposed adjacent land uses.

Roadways providing access to and within the project site would consist of existing roads, improved roads along existing roadway alignments, and new roads. The project would develop and/or improve the road network in the Greenbriar area including Elkhorn Boulevard, Lone Tree Road, and the State Route (SR) 70/99-Elkhorn Boulevard interchange. The proposed project would also construct a new east-west roadway, Meister Way, through the center of the project site to provide access to and from the NNCP area to the east and Metro Air Park to the west. Because of the project site's location (i.e., adjacent to Interstate 5 [I-5] and SR 70/99), the proposed roadway would not provide new or substantially enhanced access to currently undeveloped areas to the south and east. Further, no roadways are proposed to be extended to the north. The proposed Meister Way would only provide connectivity between the approved Metro Air Park development and the existing North Natomas Community. Therefore, the Greenbriar roadway network would not be considered growth-inducing.

Currently, there are no public storm drain facilities that serve the project site or any properties to the north and west. Properties located to the east and south are currently served by a storm drain system operated by the Reclamation District (RD) 1000. A formal stormwater management system is proposed for the project site that would include a series of pipes and detention facilities that would be operated by the City. Proposed stormwater conveyance facilities would not serve (i.e., they would not be sized to handle additional flows from) other development projects outside the plan area, and therefore would not be growth inducing.

The City currently does not provide water service to the project site. The proposed project includes plans for extension of the City's infrastructure from the existing water mains located to the east and south of the site. The extension of water infrastructure to the project site would allow for extending water service to the Metro Air Park development located to the west. However, the Metro Air Park development is an approved development project, and provision of water to Metro Air Park would not be dependent upon water infrastructure constructed to serve the project. Extension of water services to the Greenbriar and Metro Air Park project sites is designed to serve these projects alone and would not induce further growth beyond these projects.

Municipal wastewater treatment service is not currently available to the project site. However, a trunk sewer line, part of SRCSD's wastewater conveyance pipeline system, currently extends across the project site in an east-west direction connecting with Sacramento International Airport and the NNCP area. This trunk line currently conveys wastewater from Sacramento International Airport and would also convey future wastewater generated by the Metro Air Park development to the east. The proposed project would connect to this wastewater trunk line at a point on the easternmost portion of the site. The proposed project would construct the necessary facilities on-site to serve development and connect to SRCSD's conveyance system.

The proposed project would involve a substantial construction effort over an extended period that would bring construction workers to the project site on a daily basis during peak periods. Because construction workers typically do not change where they live each time they are assigned to a new construction site, it is not anticipated that there would be any substantial relocation of construction workers to the City or County of Sacramento associated with the proposed project. The existing number of residents in the City and County of Sacramento who are employed in the construction industry would likely be sufficient to meet the demand for construction workers

that would be generated by the proposed project. Between June and July 2005, the construction industry in Sacramento metropolitan area added 800 new jobs, which accounted for the sixth consecutive month of expansion in the construction industry and brought the construction industry's job total to a new record high (EDD 2005). As of July 2005, there were 73,400 jobs in the construction industry for the Sacramento metropolitan area (EDD 2005). Therefore, no substantial increase in demand for housing or goods and services would be created by project construction workers, and thus no growth inducement associated with these workers would be expected.

In addition, employees would be hired for the proposed elementary school. No employment assumptions for elementary schools in the City of Sacramento were available; based on average school enrollments and average school sizes, Economic & Planning Systems estimated the number of employees per acre for elementary schools at 5.0 employees per acre (Ross, pers. comm., 2005). Based on this estimate, construction of an elementary school on 10 net acres on the project site would result in the creation of 50 full-time equivalent positions employed by the school district. Approximately 850 additional full-time positions would be created by commercial land uses on the project site. It is expected that the proposed project's employment needs would be largely filled by existing Sacramento County or regional residents. Therefore, the proposed project would not be expected to directly induce population growth by bringing substantial numbers of new employees to the project vicinity.

The proposed project would include the development of up to 3,473 residential units with an estimated population of 8,926. Although the proposed project includes the provision of commercial services, on-site services would meet only some of the needs of the project population. The additional population associated with the proposed project would spur an increase in demand for goods and services in the surrounding area and region, which could potentially result in additional development to satisfy this demand. In this respect, the proposed project would be growth inducing. It would be speculative, however, to try to predict exactly where any such new services would locate. The most logical assumption is that they would locate where the existing City and County General Plans currently anticipate them. The general plans have already undergone environmental review and any new individual projects requiring discretionary approvals would undergo their own environmental review if of a scale that warrants environmental review.

Fire, protection, law enforcement, and other City services would be expanded only as necessary to meet project demand. As discussed in Section 6.6, "Public Services," existing law enforcement services have sufficient capacity to serve the proposed project. The City of Sacramento Fire Department (SFD) is planning for the construction of an additional fire station that would serve the project site and surrounding Natomas area. The project would coordinate with SFD and pay required fees to ensure adequate facilities are in place to meet project demands. The project would also provide space for the construction of an elementary school and would pay fees toward funding necessary school facilities. Because adequate public services are available to serve the project or the proposed project would provide or ensure that additional public services would be available to meet project demands (i.e., schools, police, fire), it would not facilitate additional development requiring public services.

The land directly north of the project site is outside the City's SOI boundary and is located in the jurisdiction of the County. This land is designated in the County General Plan for agricultural land uses. Because of this designation and its location outside the City's SOI, the intended long-term use of this property is for agriculture. As the proposed project develops, particularly along its northern edge, it would place urban development adjacent to agricultural land. Historically, this type of land use pattern has resulted in conflicts between the ongoing agricultural operations and the urban development uses. Further, economic returns from urban development are typically substantially higher than continued agricultural use of land, and encroaching urban uses typically make attractive the conversion of adjacent agricultural land to urban uses. Thus, it can be expected that the project would place pressure on agricultural land to the north of the site to convert to urban uses.

Conversion of adjacent agricultural lands to urban uses is not consistent with existing and adopted long-term plans for the area. This potential conversion of agricultural land to an urban use and the related loss of agricultural land, loss of biological habitat, additional traffic generation, and air and noise impacts are potential growth-inducing impacts of the project. Development in this area would also require the extension of unplanned

infrastructure (i.e., water, storm drainage, wastewater). Because development of these agricultural lands would require the County to amend its general plan and/or the City to expand its corporate limits and SOI boundary, such a land use conversion is not assured. Although development of the project, despite not providing any direct infrastructure linkages to the area, may contribute to possible long-term economic pressure for the eventual filing of applications for general plan amendments and/or other discretionary approvals in the area north of the project site, the responses of future elected bodies to such applications cannot be predicted. It is therefore impossible to conclude that the long-term urbanization of this northern area would be a reasonably foreseeable indirect effect of the project. (See State CEQA Guidelines Section 15358, which defines "effects" for purposes of CEQA as including "[i]ndirect or secondary effects which are caused by the project and are later in time or farther removed in distance, but are still *reasonably foreseeable"* [emphasis added].) This said, however, the project's potential for setting a precedent for growth and extension of the NNCP boundaries is an important consideration. As the NNCP is built out, substantial pressure has been placed to consider development of the area to the north, including the project site. Recent proposals have included consideration of developing the area and using revenues from development to help fund a new sports arena. This proposal did not result in formal application to the City or County, but it suggests that interest in the area is high. Further, under the Joint Vision and the Sacramento Area Council of Governments (SACOG) Blueprint, much of the area is identified as future urban development.

Approval of the project would require the City to expand its sphere of influence to cover the site, which also requires approval of the Sacramento Local Agency Formation Commission (LAFCo). This approval could set precedent for future considerations of growth in the area, but it would also potentially mute such considerations in that LAFCo would not be apt to consider multiple sphere-of-influence changes in rapid succession. Further, ultimate development of the site would require agreement with the U.S. Fish and Wildlife Service (USFWS) because the site, and the rest of the Joint Vision area, is not permitted for development in the Natomas Basin Habitat Conservation Plan (NBHCP). Thus, additional requests for development would be closely scrutinized by USFWS. In short, the precedent-setting nature of the project itself may make other development requests more difficult to process.

Overall, the proposed project would be growth inducing because the increased population associated with the proposed project would increase demand for goods and services, thereby fostering population and economic growth in the City of Sacramento and nearby communities. It can be expected that a successful project would place pressure on adjacent areas to the north to seek development entitlements. As explained above, however, it would be speculative to assume that these areas would in fact develop with urban uses, and numerous discretionary actions subject to environmental review and political considerations would have to be granted before any such urban uses could materialize. In summary, much of the growth that the proposed project would induce has been evaluated and provided for in the City General Plan, County General Plan, and other relevant planning documents.

7.2 CUMULATIVE IMPACTS

This draft environmental impact report (DEIR) provides an analysis of overall cumulative impacts of the project taken together with other past, present, and probable future projects producing related impacts, as required by Section 15130 of the State CEQA Guidelines. The goal of such an exercise is twofold: first, to determine whether the overall long-term impacts of all such projects would be cumulatively significant; and second, to determine whether Greenbriar itself would cause a "cumulatively considerable" (and thus significant) incremental contribution to any such cumulatively significant impacts. (See State CEQA Guidelines Sections 15130[a]–[b], Section 15355[b], Section 15064[h], and Section 15065[c]; and *Communities for a Better Environment v. California Resources Agency* [2002] 103 Cal.App.4th 98, 120.) In other words, the required analysis intends to first create a broad context in which to assess the project's incremental contribution to anticipated cumulative impacts, viewed on a geographic scale well beyond the project site itself, and then to determine whether the project's incremental contribution to any significant cumulative impacts from all projects is itself significant (i.e., "cumulatively considerable" in CEQA parlance).

Cumulative impacts are defined in State CEQA Guidelines Section 15355 as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355[b]).

Consistent with State CEQA Guidelines Section 15130(a), the discussion of cumulative impacts in this DEIR focuses on significant and potentially significant cumulative impacts. State CEQA Guidelines Section 15130(b), in part, provides the following:

> The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

7.2.1 PROJECTS CONTRIBUTING TO POTENTIAL CUMULATIVE IMPACTS

The State CEQA Guidelines identify two basic methods for establishing the cumulative environment in which the project is to be considered: the use of a list of past, present, and probable future projects or the use of adopted projections from a general plan, other regional planning document, or a certified EIR for such a planning document. For this DEIR, both the list and the plan approach have been combined to generate the most reliable future projections possible. A list approach is used to define specific projects that are currently proposed, but are not necessarily considered within an approved planning document. The plan approach is used to consider development consistent with an adopted plan. The plan approach is also used to consider the potential cumulative impacts of long-term development of the Joint Vision area, because specific development proposals for this overall area are not yet formed, and the best source for consideration of this area is the SACOG Blueprint, as will be discussed below.

CUMULATIVE CONTEXT

The City of Sacramento has developed over the past 150-plus years beginning in the late 1840s immediately following the discovery of gold. Over this time the City, and the Sacramento region, has shifted largely, though not entirely, from natural habitat to agriculture and urban development. Overall, population in Sacramento County has increased dramatically over the past 65 years, based on U.S. Census data, from approximately 170,000 in 1940 to 500,000 in 1960, 780,000 in 1980, and 1,230,000 in 2000 (California Department of Finance 2005). Over this same period, the City of Sacramento grew from approximately 105,000 people in 1940 to 192,000 in 1960, 276,000 in 1980, and 407,000 in 2000 (California Department of Finance 2005). According to the California Department of Conservation, Sacramento County comprises 636,083 acres, and the amount of urbanized land increased from 131,321 acres in 1988 to 159,903 acres in 2002, a change of 28,582 acres (4.5% of total County acreage) over the reporting period (California Department of Conservation Farmland Mapping and Monitoring Program, 1988–2002 Land Use Summary). The population growth and the related development has changed the environment of the Sacramento region, and this change has resulted in the environmental baseline for many of the issues discussed in Chapter 6, such as adverse air quality, diminishing biological habitat, increased traffic, etc.

The North Natomas area of the City of Sacramento is another important indicator of past development. Greenbriar, if approved, would amend the boundary of the NNCP and would be a Special Planning Area (SPA) within the NNCP subject to its own Planned Unit Development (PUD) guidelines and finance plan. As described further below, the NNCP is an approximately 9,000-acre area of the City that began developing in 1999 and is

expected to reach buildout in 2016. The cumulative effects of this buildout are described in the cumulative impact analysis.

RELATED PROJECTS CONTRIBUTING TO CUMULATIVE IMPACTS

CURRENTLY PLANNED AND PROPOSED PROJECTS

Comments received on the DEIR requested that several regional projects be added to the cumulative traffic scenario. A description of these additional cumulative regional projects is provided below.

North Natomas Community Plan

Development projects in the North Natomas community that have been approved but are yet to be fully built out have been identified and evaluated by the NNCP and the associated environmental review documents. For this reason, the cumulative analysis contained in this EIR focuses on the overall development anticipated in the North Natomas community as projected by the NNCP. Using this approach, this cumulative assessment provides the most conservative and inclusive analysis of past, present, and potential future projects.

The North Natomas community is bounded by Elkhorn Boulevard to the north, I-80 to the south, the Natomas East Main Drainage Canal to the east, and the West Drainage Canal to the west, covering more than 9,000 acres in the northwest portion of the city (see Exhibit 3-2 in Chapter 3) that was predominantly in agricultural use before development. The NNCP provides a long-term vision for the development of the North Natomas community. The environmental consequences from implementation of the NNCP were addressed in the 1986 NNCP EIR (certified by the Sacramento City Council in May 1986) as well as the 1993 Supplement to the 1986 NNCP EIR. Development within the NNCP started in 1999.

There are several development projects that have been approved in the North Natomas community. Some of these projects are fully built out and occupied at this juncture, while others are still in development phases. These projects are generally located to the south and east of the project site and include the Westborough project, Cambay West, Natomas Crossing, Natomas Town Center, Panhandle, and Natomas Creek.

In addition, three major shopping centers are being proposed in the NNCP area including Natomas Landing, Commerce Station, and Natomas Century. The Natomas Landing shopping center encompasses approximately 70 acres located adjacent and east of the West Lakeside project and would develop regional commercial, retail, office, and high-density residential land uses. The Commerce Station shopping center encompasses approximately 181 acres located on a strip of land located between Interstate 5 and East Commerce Way and north of Del Paso Road. Commerce Station proposes to develop office, commercial, retail, and multi-family housing land uses. The Natomas Century shopping center encompasses 45 acres located at the intersection of El Centro Road and Del Paso Road and would develop commercial, retail, and office land uses.

The development projects in the North Natomas community that have been approved but are yet to be fully built out have been identified and anticipated by the NNCP and the associated environmental review documents. For this reason, the cumulative analysis contained in this EIR focuses on the overall development anticipated in the North Natomas community as projected by the NNCP. Using this approach, this cumulative assessment provides the most conservative and inclusive analysis of past, present, and potential future projects.

In 2000, the estimated population for the North Natomas area was 2,002 people, occupying 740 housing units (SACOG 2001). At buildout (year 2016), the NNCP estimates a population of 66,495 in the North Natomas community occupying 33,257 housing units on approximately 9,038 acres, and 72,016 employees; the NNCP area is projected to account for approximately 35% of new housing and 30% of the new jobs in the City of Sacramento at buildout (City of Sacramento 1994). According to the City of Sacramento, development within the NNCP area as of September 14, 2005, includes approval of 12,162 lots for development of residential, commercial, and

industrial land uses; approval of 10,801 building permits; approval of 11,599 single-family residential special permits; and approval of 6,003 multifamily residential special permits (City of Sacramento 2005).

According to SACOG projections, there were 14,865 persons living in the NNCP area and 5,368 housing units in the year 2005. SACOG projects 45,040 persons occupying 17,230 housing units in the year 2025 (SACOG 2005). Using these numbers, SACOG projects a growth of 30,175 persons, or 203% increase, and an increase of 11,862 housing units, or 221% increase, by the year 2025.

Metro Air Park

In addition to development anticipated within the North Natomas community, the Metro Air Park development is a newly developing project located adjacent to the Sacramento International Airport and along the westerly edge of the Greenbriar site. The Metro Air Park totals 1,983 acres and has been approved for development of approximately 20 million square feet of office space, light industrial projects, retail and hotel developments, and a golf course on land east of the airport and north of I-5. The project is located in an area that has historically been dominated by agricultural uses. Construction of the Metro Air Park began in September 2003.

West Lakeside

As detailed in the MOU for the City/County Joint Vision for Natomas, the City has been identified as the appropriate agent for planning new growth in Natomas (City of Sacramento and County of Sacramento 2002). An application for development within the Joint Vision area is on file for the West Lakeside project. No other applications for the Joint Vision area have been filed and its future development potential is in the early consideration stage by the City and County. As such, development of the Joint Vision is considered separately in this analysis. The West Lakeside project is a proposal located approximately 0.25 mile south of the project site adjacent to the eastern border of the West Drainage Canal. This project includes the development of 524 residential units, a 10-acre elementary school, and approximately 33 acres of open space land uses (e.g., parks and detention basins).

Natomas Panhandle Annexation

The City of Sacramento is the process of processing a proposal to annex a strip of land (approximately 595 acres) located adjacent to the eastern edge of NNCP area. Specifically, the area is located north of Del Paso Road, south of West Elkhorn Boulevard, west of East Levee Road and Sorento Road, and east of the NNCP area. This area is proposed to be developed as a Planned Unit Development (PUD) with a variety of low-, medium-, and high-density residential uses (total of 3,075 residential units), commercial uses, an elementary school, a middle/high school, and recreation and park spaces. Streets, water and sewer lines, and drainage facilities would be installed as part of the proposed development.

Placer Vineyards Specific Plan

Placer Vineyards Specific Plan area encompasses approximately 5,230 acres located in the southwest corner of Placer County, bounded on the north by Baseline Road, on the south by the Sacramento-Placer County line, on the west by the Sutter-Placer County line, and on the east by Dry Creek and Walerga Road. Placer Vineyards Specific Plan is a mixed-use master planned community that includes residential, employment, commercial, open space, recreational, and public/quasi-public land uses. Placer Vineyards Specific Plan envisions construction of 14,132 homes in a range of housing types, styles, and densities. At build out, projected to occur over a twenty year time frame, Placer Vineyards would have a population of approximately 33,000 people, 434 acres of employment centers, 166 acres of retail commercial centers, and 920 acres of new parks and open space.

Placer Ranch Specific Plan

The Placer Ranch Specific Plan area encompasses approximately 2,213 acres located north and adjacent to the City of Roseville and West Roseville Specific Plan area, approximately one mile west of the SR 65/Sunset Boulevard interchange, and bisected by Fiddyment Road. The Placer Ranch Specific Plan includes a mixture of industrial, commercial, office and professional, educational, and residential land uses. The Placer Ranch Specific Plan is envisioned to develop 4,618 residential units and includes land that would be developed with a California State University campus sized to accommodate between 15,000 and 25,000 full time students at build out.

Regional University and Community Specific Plan

The Regional University and Community Specific Plan area encompasses approximately 1,136 acres located north of Baseline Road, east of Brewer Road, and west of the future extension of Watt Avenue. The Regional University and Community Specific Plan includes two primary components: a University campus (600 acres) and an adjoining community (536 acres). The Regional University is planned to accommodate approximately 6,000 students, along with 800 professors and staff, and to offer both undergraduate and graduate degrees. In addition to the institutional facilities on campus, the campus would include approximately 1,155 residential units for students and faculty, as well as retirement housing. The preliminary University program includes a full range of academic, administrative, athletic, and performing arts facilities; faculty and staff housing; student housing; and a retirement village. In addition, a portion of the campus is planned for a potential private high school that could accommodate 1,200 students and accompanying staff and faculty. The proposed Community would involve mixed-use development with a variety of residential, commercial, employment, open space, parks, and public uses. The Community would include 3,232 residential units of varying densities, commercial, open space, and recreation areas.

West Roseville Specific Plan

The West Roseville Specific Plan area is located in the northwestern-most portion of the City of Roseville and encompasses 3,162 acres is adjacent to and east of the Placer Vineyards Specific Plan located in Placer County. The West Roseville Specific Plan land use plan identifies a blend of residential, service, employment, open space, and public uses and envisions housing approximately 20,810 residents and providing jobs for 3,726 employees.

Elverta Specific Plan

The Elverta Specific Plan area encompasses 1,744 acres of land located in the north-central portion of Sacramento County and approximately 10 miles northeast of downtown Sacramento. The Elverta Specific Plan includes the development of primarily residential land uses including approximately 881 acres of urban residential land uses and 552 acres of agricultural-residential land uses with an anticipated total number of 4,950 housing units. In addition, the Elverta Specific Plan includes the development of approximately 15 acres of commercial land uses, 4.4 acres of office/professional land uses, 20 acres as schools, 73 of parks, 18 acres as open space (former landfill site), and 192 acres as drainage-ways, detention facilities, trails, power line corridors, and major roads.

Plumas Lake Specific Plan

The Plumas Lake Specific Plan is an approximate 5,200-acre area located in the County of Yuba south of the community of Olivehurst. A variety of land uses are proposed for development with residential land uses occupying the majority of the area with commercial, business park, medical park, public uses, parks and recreation, schools, and buffer land uses occupying remaining areas. Buildout of the Plumas Lake Specific Plan is envisioned to result in approximately 11,740 housing units and a residential population of approximately 33,000. Residenital land uses would encompass 3,219 acres, commercial and industrial land uses would encompass approximately 610 acres, open space land uses would encompass 611 acres, and public land uses would encompass approximately 859 acres.

Habitat Conservation Plan–Related Development Considerations

Several regional habitat conservation planning efforts are also under way that allow for development, while setting aside, enhancing, and protecting habitat for sensitive species found in the region. The NBHCP would include the protection, management, and monitoring of conservation lands to reconcile the needs of 22 special-status species with planned development in the Natomas Basin, including lands within the City of Sacramento and Sutter County. Implementation of the NBHCP would provide a comprehensive program for the preservation and protection of habitat for threatened and endangered species potentially found on approximately 53,537 acres of undeveloped and agricultural land in northwestern Sacramento County and southern Sutter County. In addition, a habitat conservation plan (HCP) was developed and adopted for the Metro Air Park (described above).

The land that would be authorized for development under the take permits associated with the NBHCP would be 15,517 acres, of which approximately 4,000 acres are currently undeveloped lands within the City of Sacramento, within the NNCP. In combination with the Metro Air Park, this total would reach 17,500 acres allocated among the City, Metro Air Park, and Sutter County. (Although the Metro Air Park is not part of the NBHCP, it was evaluated in the environmental impact report/environmental impact statement [EIR/EIS] for the NBHCP.) Authorized development would include projects sponsored by either private developers or public entities that occur within the permitted area.

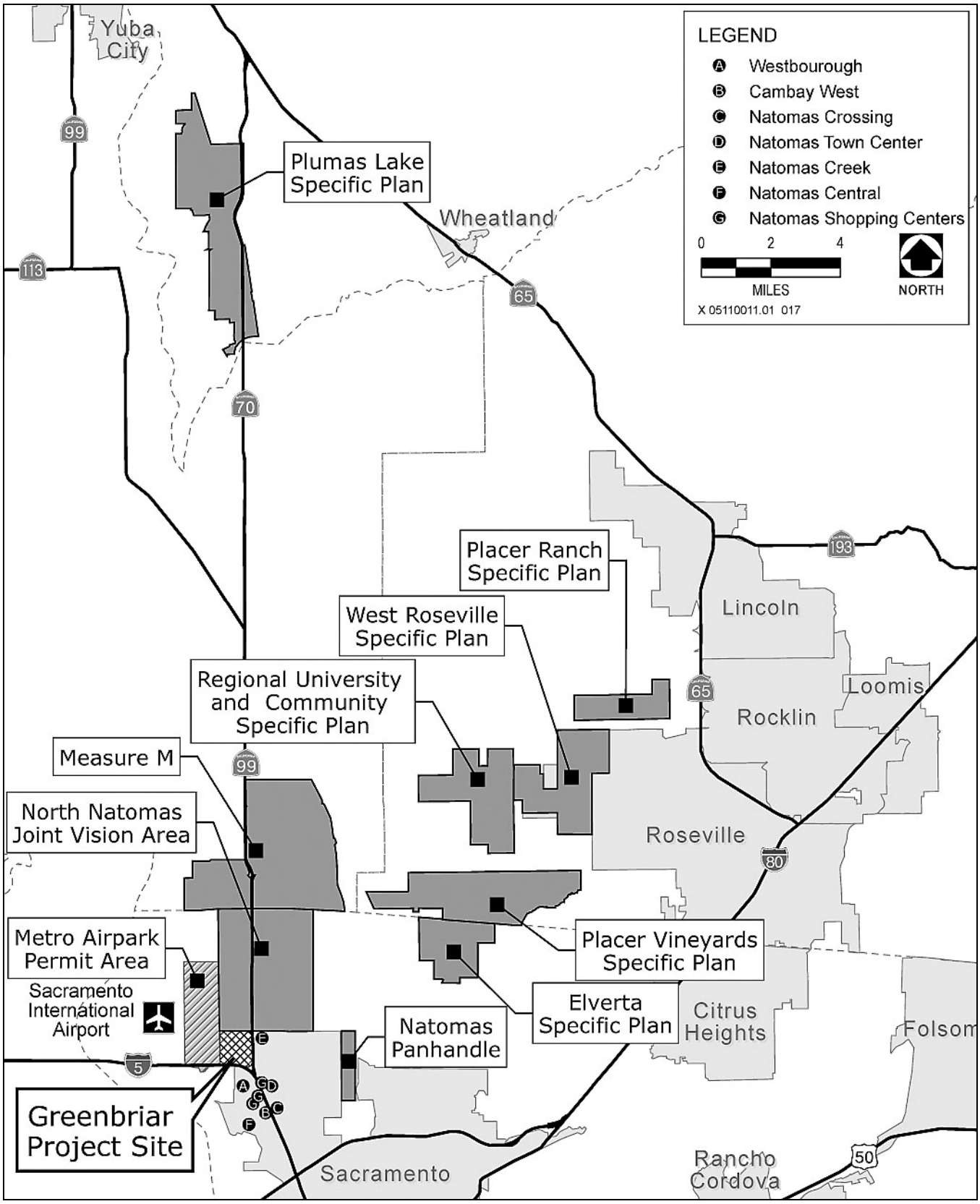
SUMMARY OF CURRENTLY PLANNED AND PROPOSED PROJECTS

Table 7-1 provides a summary of the projects considered in the cumulative analysis. Exhibit 7-1 presents the general location of cumulative projects.

Table 7-1
Cumulative Projects

Cumulative Project	Total Acres	Residential Land Uses (acres/units)	Commercial/Industrial Land Uses (acres)	Population (persons)
North Natomas Community Plan	9,038	3,160/33,257	2,195	66,495
Metro Air Park Development	1,983	0/0	1,983	0
West Lakeside Development	133.4	70/524	0	1,215
Natomas Panhandle Annexation	590	Unknown/3,075	unknown	unknown
North Natomas Shopping Centers	295	unknown	unknown	unknown
Placer Vineyards Specific Plan	5,230	3,710/14,132	600	33,000
Placer Ranch Specific Plan	2,213	784/6,758*	740	18,280
Regional University and Community Specific Plan	1,136	unknown/3,232	45	unknown
West Roseville Specific Plan	3,162	1,731/8,390	177.2	20,810
Elverta Specific Plan	1,744	1,432/4,950	19.4	unknown
Plumas Lake Specific Plan	5,200	3,219/11,740	610	33,000
Greenbriar Development Project	577	390/3,473	27.5	8,926
Total		14,496/89,531	6,397.1	181,726

* includes university student housing



Source: SACOG 2006, EDAW 2007, CaSIL 1998

Project's Contribution to Potential Cumulative Impacts **Exhibit 7-1**

FUTURE POTENTIAL CUMULATIVE PROJECT: CITY/COUNTY JOINT VISION AND SUTTER COUNTY MEASURE M

Joint Vision

As discussed in Section 3.7.2, "North Natomas Joint Vision Area," the Joint Vision Plan is a collaborative effort between the City and County of Sacramento to develop a vision for the 10,000-acre area of the County between the northern city limits and Sutter County. Concepts for development have been considered and include a mixture of residential densities, an industrial park (in addition to Metro Air Park), and open spaces throughout, including most extensively in the northern extent separating development from the Sutter County boundary. In fact, a large amount of open space is anticipated to be dedicated (for habitat preservation and farmland retention) in this area. To date, no land use plans have been adopted, and all considerations to date have been conceptual.

The City and County's conceptual vision for growth within this area is generally compatible with the principles outlined in SACOG's Blueprint (discussed in Section 3.8.3, "Sacramento Region Blueprint"). The preferred vision for growth and development within this area could result in the development of a range of development densities, depending on the development scenario ultimately selected. Under the preferred scenario, two development options are under consideration: (1) No Development in Floodplain Areas; (2) Reclamation of up to 50% of Floodplain Areas if sufficiently protected. The difference between the options would depend upon whether areas within the existing floodplain are brought under 100-year flood protection through the construction of measures (e.g., improved levees, setback levees, elevated building pads) to remove flood hazards. Table 7-2 presents the range of development densities for the options under consideration.

Table 7-2
Joint Vision Development Densities

Land Use Category	No Development in Floodplain				Up to 50% of Floodplain is Reclaimed			
	Net Acres	Units	Commercial Square Feet	Jobs	Net Acres	Units	Commercial Square Feet	Jobs
Residential Mixed Use	2,154	38,759	--	--	2,656	47,801	--	--
Commercial/ Employment	186	--	3,255,709	11,772	233	--	4,656,698	16,837
Open Space/ Public	1,453	--	--	--	1,794	--	--	--

Source: City of Sacramento 2005

The Greenbriar site is in the area being considered under the Joint Vision. For comparison purposes and to demonstrate the magnitude of the proposal, development of the Joint Vision would occur over an area approximately 6.5–8.0 times larger than the project site, would develop 10–13 times more houses, and would develop 11–16 times the commercial space proposed by the project.

The ultimate development scenario that would be proposed for the Joint Vision area is not known and likely will not be known within the time this EIR and development are being considered. However, because the development potential of the area is large and it is being actively studied, this EIR includes disclosure of the plan to the extent that it can be known. It is considered as future potential cumulative development, and because this is a speculative development proposal at this time, it is considered separately and less extensively than the cumulative development that is currently planned and proposed (i.e., specific development proposals have been submitted). The Joint Vision plan would be the subject of extensive CEQA review and consideration by the City and County,

neighboring jurisdictions, regulatory agencies including the California Department of Fish and Game (DFG) and USFWS, local service providers and LAFCo, and its likely implementation is best described as unknown.

Measure M

In 2004, Sutter County voters passed Measure M, an advisory measure intended to provide the Board of Supervisors with an indication of how the citizens of Sutter County feel about the types and level of development in the 7,500-acre area of the South Sutter County Industrial/Commercial Reserve. The southern boundary of the Measure M area forms the Sutter/Sacramento County line, approximately 4 miles north of Greenbriar. The vote did not approve any specific development proposals, but did provide guidance on how development may be viewed in the future. Measure M parameters for the South Sutter area are:

- at least 3,600 acres for commercial/industrial development;
- at least 1,000 acres for schools, parks, other public uses, and retail; and
- no more than 2,900 acres for residential development, with a population cap of 39,000.

An application for the Measure M area has not been submitted to Sutter County, as of December 2005 (well after the date of the Notice of Preparation [NOP] for this EIR), so the specifics of any development proposal are not known beyond the parameters outlined above.

7.2.2 Cumulative Impact Analysis

Traffic and Circulation

Planned and Proposed Development Impacts

Year 2025 Cumulative Conditions

The analysis of cumulative traffic impacts is presented in Section 6.1, "Transportation and Circulation," of this EIR. Please refer to that section. As shown, cumulative development would cause a number of roadways, including freeway segments, to operate above capacity levels, which is a significant cumulative impact. In the year 2025 (without project), the following eight intersections are expected to operate unacceptably:

- SR 70/99 Southbound Ramps and Elverta Road (Level of Service [LOS] F during the a.m. peak hour)
- SR 70/99 Northbound Ramps and Elverta Road (LOS F during the a.m. peak hour)
- Elkhorn Boulevard and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- SR 70/99 Northbound Ramps and Elkhorn Boulevard (LOS F during the a.m. peak hour)
- Metro Air Parkway and I-5 Northbound Ramps (LOS F during the a.m. and p.m. peak hours)
- Elverta Road and Lone Tree Road (LOS E and LOS F during the a.m. and p.m. peak hours, respectively)
- Meister Way and Metro Air Parkway (LOS F during the p.m. peak hour)
- Metro Air Parkway and Bayou Road (LOS F during the a.m. and p.m. peak hours)

The following two roadway segments are expected to operate unacceptably under Cumulative (2025) Conditions:

- Elkhorn Boulevard west of SR 70/99 Interchange—LOS F
- Metro Air Parkway north of I-5 Interchange—LOS F

The following three freeway ramps are expected to operate unacceptably under Cumulative (2025) Conditions:

- SR 70/99 northbound to Elkhorn Boulevard off-ramp—LOS F during the a.m. peak hour
- I-5 northbound to Metro Air Parkway off-ramp—LOS F during the a.m. peak hour

- Metro Air Parkway to I-5 southbound loop on-ramp—LOS F during the p.m. peak hour

The following three freeway segments are expected to operate unacceptably under Cumulative (2025) Conditions:

- I-5 east of Powerline Road—LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour
- I-5 north of Del Paso Road—LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour
- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit—LOS F for the northbound approach during the a.m. peak hour and the southbound approach during the p.m. peak hour

Cumulative Plus Project

Under Cumulative plus Project conditions, the following 14 intersections would operate unacceptably:

- SR 70/99 Southbound Ramps and Elverta Road (LOS F during the a.m. peak hour)
- SR 70/99 Northbound Ramps and Elverta Road (LOS F during the a.m. peak hour)
- Elkhorn Boulevard and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- SR 70/99 Southbound Ramps and Elkhorn Boulevard (LOS E during the a.m. peak hour)
- SR 70/99 Northbound Ramps and Elkhorn Boulevard (LOS F during the a.m. peak hour)
- Metro Air Parkway and I-5 Northbound Ramps (LOS F during the a.m. and p.m. peak hours)
- Elverta Road and Lone Tree Road (LOS E and LOS F during the a.m. and p.m. peak hours, respectively)
- Meister Way and Metro Air Parkway (LOS F during the p.m. peak hour)
- Meister Way and Lone Tree Road (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- Meister Way and E. Commerce Way (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- Metro Air Parkway and Bayou Road (LOS F during the a.m. and p.m. peaks)
- Elkhorn Boulevard and Project Street 1 (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- Elkhorn Boulevard and Project Street 2 (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)
- Elkhorn Boulevard and Project Street 3 (LOS D and LOS F during the a.m. and p.m. peak hours, respectively)

The following three roadway segments are expected to operate unacceptably under Cumulative plus Project conditions:

- Elkhorn Boulevard west of SR 70/99 Interchange—LOS F
- Metro Air Parkway north of I-5 Interchange—LOS F
- Meister Way west of SR 70/99—LOS F

The following four freeway ramps are expected to operate unacceptably under Cumulative plus Project conditions:

- SR 70/99 northbound to Elkhorn Boulevard off-ramp—LOS F during the a.m. peak hour
- I-5 northbound to SR 70/99 northbound off-ramp—LOS F during the a.m. peak hour
- I-5 northbound to Metro Air Parkway off-ramp—LOS F during the a.m. peak hour
- Metro Air Parkway to I-5 southbound loop on-ramp—LOS F during the p.m. peak hour

The following three freeway segments are expected to operate unacceptably under Cumulative plus Project conditions:

- I-5 east of Power Line Road—LOS F for the northbound direction during the a.m. peak hour and the southbound direction during the p.m. peak hour

- I-5 north of Del Paso Road—LOS F for the northbound direction during both a.m. and p.m. peak hours and the southbound direction during the p.m. peak hour

- I-5 north of I-5/I-80 Interchange between I-80 and Arena Boulevard Exit—LOS F for the northbound direction during the p.m. peak hour and the southbound direction during the p.m. peak hour

As shown, the project would contribute considerably to cumulative traffic impacts, increasing the number of intersections, roadway segments, and freeway ramps that operate unacceptably, and exacerbating adverse operating conditions on three freeway segments that would already operate poorly.

The ability to mitigate these impacts is tied to fair-share contributions to regional transportation funds, but these programs are not currently available and, therefore, implementation of the improvements cannot be guaranteed. Further, in some instances, freeway widening would be required, and this is likely not financially feasible or would require right-of-way acquisition that is not available. Please see Section 6.1, "Transportation and Circulation." Therefore, these impacts are considered cumulatively ***significant and unavoidable***.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

As described above, cumulative development would result in significant impacts on a number of roadways, intersections, and freeway segments, which would operate above capacity. Because the land uses are imprecisely defined for the Joint Vision area, traffic impacts can only be roughly estimated. Using trip generation rates that reflect a relative midpoint generation level, it is assumed that residential uses would generate seven daily and 0.7 p.m. peak-hour trips; commercial would generate 50 daily and five peak-hour trips per 1,000 square feet; and employment would generate four daily and 0.5 p.m. peak-hour trips per job. At these rates, the Joint Vision would generate 480,000–635,000 daily and 50,000–65,000 p.m. peak-hour trips. By comparison, the project would generate 41,119 daily and 4,467 p.m. peak-hour trips. This would be a substantial addition of traffic to the regional roadway system, and would further exacerbate cumulative traffic impacts. Because, as described above, the addition of Greenbriar traffic would be considerable, it would also contribute considerably to cumulative impacts associated with development of the Joint Vision, if approved.

The land uses for the Measure M area of South Sutter County have only been discussed within basic parameters. The ultimate land uses and how they are configured will largely influence trip generation and distribution patterns for Measure M, and until plans are proposed, it would be speculative to forecast traffic impacts. Given the magnitude of potential development, which is similar to the Joint Vision, it is likely that substantial additional traffic would be placed on I-5 and SR 70/99, and that traffic impacts would be further exacerbated.

The ability of the project to reduce its contribution to this impact is tied to fair-share contributions to regional transportation funds, but these programs are not currently available. Further, in some instances, freeway widening would be required, and this is likely not financially feasible or would require right-of-way acquisition that is not

available. It is expected to contribute considerably to a cumulatively significant unavoidable impact. However, an analysis of traffic from the Joint Vision project would need to be conducted, along with the development of mitigation programs, to determine what the actual cumulative impact would be after mitigation. It is suggested that the City of Sacramento and the County consider a regional transportation fee program to fund regional improvements to the degree feasible.

AIR QUALITY

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

Past development in the Sacramento Valley Air Basin (SVAB) combined with meteorological conditions has resulted in significant cumulative impacts on air quality. As described in Section 6.2, "Air Quality," the SVAB is in nonattainment status for ozone and small particulate matter (less than 10 microns in diameter, or PM_{10}).

The Sacramento Metropolitan Air Quality Management District (SMAQMD) has established a significance threshold of 85 pounds per day (lb/day) for oxides of nitrogen (NO_X), an ozone precursor, during construction. For respirable particulate matter (PM_{10}), SMAQMD defines a substantial contribution as any project that would add a concentration of 2.5 micrograms (µg) per cubic meter. Modeling by the district has shown that projects that generally disturb more than 15 acres in any one day, even when fully mitigated by the use of dust control, could add 2.5 µg per cubic meter of $PM_{10.}$ to sensitive receptors near a project site.

The proposed project would result in significant and unavoidable construction-related air quality impacts associated with generation of NO_X and PM_{10}, even with implementation of mitigation measures identified in Section 6.2, "Air Quality." Assuming that all related projects also implement all feasible construction emission control measures consistent with SMAQMD guidelines, construction emissions on some of the related projects may be less than significant, although it is likely that larger projects, such as the Metro Air Park development, would result in significant and unavoidable air quality impacts on their own. This impact cannot be more precisely determined because related projects would develop on their own schedules, some of which are not known. It would, thus, be speculative to try to add together the various projects with their differing and changing schedules. However, given the large scale of development that would occur with the related projects (over 20 times the size of Greenbriar), taken in total and combined with the nonattainment status of the SVAB for ozone and PM_{10} and other development that would occur in the SVAB, these cumulative projects would result in a significant and unavoidable cumulative construction-related air quality impact. Because the project would result in a significant impact from the generation of NO_X and PM_{10}, it would also be expected to contribute considerably to the ***significant and unavoidable*** cumulative air quality impact.

Long-term emissions from related projects, considered in light of the nonattainment status of the air basin, would also be cumulatively significant. As described in Section 6.2, "Air Quality," SMAQMD has established thresholds of significance for project operations: 65 lb/day of reactive organic gases (ROG) and NO_X, and a substantial contribution to PM_{10} (see discussion above). The proposed project would result in significant and unavoidable long-term regional (operational)-related air quality impacts and would exceed the SMAQMD thresholds. It would, therefore, contribute considerably to the cumulative air quality impact. Related projects would similarly contribute, although to a much greater degree. Emissions attributable to the proposed project, cumulative development listed on Table 7-1, and emissions from other reasonably foreseeable future projects in SVAB as a whole, would continue to contribute to long-term increases in emissions that would exacerbate existing and projected nonattainment conditions. Thus, the proposed project would contribute to a ***significant and unavoidable*** cumulative air quality impact and the project's contribution would be considerable.

Given that compliance with applicable rules and regulations would be required for the control of stationary-source toxic air contaminant (TAC) emissions, both on-site and off-site, the project's contribution to long-term cumulative increases in stationary source TAC concentrations would be minor and ***less than significant***. All other TAC issues are site specific; the project would not result in a considerable contribution to any regional TAC impacts.

As described in Section 6.2, "Air Quality," implementation of the proposed project would result in less-than-significant local mobile source carbon monoxide (CO)–related air quality impacts. Carbon monoxide emissions from mobile sources would be anticipated to further decrease under cumulative conditions because of implementation of emissions control technology; thus, 1- and 8-hour CO concentrations for the 2025 cumulative conditions would not be anticipated to exceed the significance thresholds of 20 parts per million (ppm) and 9 ppm. Consequently, the cumulative impact of the project's contribution to traffic volumes on the local roadway network relative to CO concentrations would be ***less than significant***.

With respect to mitigation, the EIR includes all available feasible mitigation to reduce the project's contribution to cumulative construction-related and long-term emission air quality impacts; see Section 6.2, "Air Quality," Mitigation Measures 6.2-1 and 6.2-2. However, while this mitigation would substantially reduce emissions from the project, it is not sufficient to reduce the project's cumulative contribution to below a level that is not considerable. Therefore, the project would contribute considerably to cumulatively ***significant and unavoidable*** air quality impacts associated with ozone precursors and PM_{10} during construction and operations.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Given that the Joint Vision could result in development at a magnitude of more than 10 times the project and the Measure M development could be similar in magnitude as the Joint Vision, they would be expected to further contribute to cumulative significant adverse air quality conditions, especially associated with ozone precursors and PM_{10} during construction and operations. The Joint Vision and Measure M would, therefore, exacerbate future cumulative conditions, and the project would contribute considerably to these conditions, because it would exceed significance thresholds as described above.

7.2.3 NOISE

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

Construction activities occurring during the daytime hours are exempt from the provisions of the noise ordinance, provided, however, that all construction equipment is required to be fitted with factory-installed muffling devices and maintained in good working order. For the proposed project, it was determined that adherence to these noise regulations would be sufficient to avoid significant construction-noise impacts. Because daytime construction is required under the noise ordinance, it can be reasonably assumed that related projects would include such restrictions. Hence, cumulative noise impacts associated with construction noise sources would be expected to be ***less than significant***. Further, construction noise is localized. Thus, if construction activities occur simultaneously, they would likely not result in cumulative impacts unless sites are being developed in close proximity to one another and expose sensitive receptors to significant noise levels at the same time. Because the proposed project would comply with the noise ordinance and because it is not anticipated that the proposed project would combine with any others to produce construction noise at sensitive receptors, it would not contribute to any such significant cumulative noise impacts. This would be a ***less-than-significant*** cumulative impact.

Likewise, stationary noise (i.e., noise generated by stationary on-site uses) would be localized to those areas of the site where the noise would be detectable, and would not combine with other projects in the region to produce cumulative noise, and this would be a ***less-than-significant*** cumulative stationary-noise impact.

The one source of noise that would be expected to result in potential cumulative noise impacts is traffic noise. As described in Section 6.3, "Noise," implementation of the proposed project would result in significant long-term traffic-generated noise impacts under Existing plus Project conditions, with several homes being exposed to substantial increases in noise. These impacts would occur at selected off-site sensitive receptors within the County, generally at homes located on Lone Tree Road (south of Elkhorn), Elverta Road (east of Power Line), Power Line Road (between Elkhorn and Del Paso), and Elkhorn Boulevard (between Power Line and Lone Tree),

where noise from the project was modeled to increase by more than 4 A-weighted decibels (dBA) community noise equivalent level (CNEL), which exceeds the County's threshold of significance. Given the relative size of related projects and the fact that they would use the same roadways, it is likely that cumulative development would likewise result in similar significant impacts at these sensitive receptors. The project's contribution to the noise levels at these areas would be considerable and, as described in Section 6.3, "Noise," mitigation is not feasible. Therefore, the project would contribute considerably to this ***significant and unavoidable*** cumulative impact.

Further, buildout of the area would result in a noticeable increase in traffic noise on major roadways. For instance, under current conditions, the 65-dBA CNEL contour extends 798 feet from I-5 (west of the SR 70/99 split) (see Table 6.3-1). Under cumulative (with-project) conditions, the noise contour would extend an additional 326 feet from I-5 (Table 6.3-13). The 65-dBA CNEL contour from Elkhorn Boulevard, between Lone Tree and SR 70/99, does not extend outside of the roadway under current conditions; under Cumulative plus Project conditions the 65-dBA CNEL contour would extend 404 feet (modeled) from the roadway. Thus, the combined cumulative increase in traffic from future growth would extend the 65-dBA CNEL contour (and all other traffic noise contours) considerably, and this would affect sensitive land uses in the area. This is considered a significant cumulative traffic noise impact, and the project would contribute considerably to it. Mitigation for this impact would be developed primarily as new development proceeds, resulting in construction of noise walls, berms, etc. Areas that are already developed and do not have these noise attenuation features would be the most vulnerable to increased noise.

Because cumulative noise would be generated by several projects, it may require a regional program to sufficiently fund soundwalls, berms, etc. It is not known if such a program would be feasible to implement. Because mitigation to sufficiently reduce noise at every existing and proposed sensitive receptor may be infeasible, this cumulative traffic noise impact is considered ***significant and unavoidable*** and the project contribution would be considerable.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Given that the Joint Vision could result in development at a magnitude of more than 10 times the project and it would contribute substantial new traffic to regional roadways, it would be expected to further contribute to cumulative significant adverse noise generation at sensitive land uses. The Joint Vision would, therefore, exacerbate future cumulative conditions, and the project would contribute considerably to these conditions, because it would exceed significance thresholds as described above. Because potential Measure M development in south Sutter County would be similar in magnitude as the Joint Vision (although traffic patterns would be different), it is likely to contribute even further to cumulative noise impacts. Mitigation would need to be considered once the magnitude of noise impacts is better understood, but it may or may not be feasible. The project's contribution to cumulative noise would be considerable, and the impact is assumed to be significant and unavoidable.

7.2.4 UTILITIES

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

Cumulative development throughout the City of Sacramento is expected to increase demand for water from 135,576 acre-feet/year (AFY) in 2005 to 242,877 AFY in 2030. Entitled surface water supply would increase from 205,000 AFY in 2005 to 310,800 AFY in 2030 (see Table 6.4-2 in Section 6.4, "Utilities"). Ample surplus water is available over the foreseeable future. Further, no additional water treatment or conveyance facilities would be needed to serve the project. The project would result in a less-than-significant cumulative water supply impact.

Regarding wastewater conveyance, Section 6.4, "Utilities," identified that sufficient capacity is available to convey wastewater to the Sacramento Regional Wastewater Treatment Plant (SRWTP). Further, SRCSD has indicated that capacity would be available to treat project-related wastewater flows (Hedges, pers. comm., 2006).

Cumulative development in the SRWTP service area (most of Sacramento County and part of Yolo County) would result in the need to expand the treatment plant, and this expansion is planned and has undergone CEQA review and approval (the legal adequacy of the EIR is being challenged). The expansion would be timed to proceed before its capacity constraining development. The proposed project would contribute considerably to the need to expand the plant, and the expansion would result in significant air quality impacts from ozone precursors during construction. No other unmitigated significant impacts from plant expansion were identified in the EIR prepared for the plant expansion. However, the project would contribute considerably to a ***significant and unavoidable*** cumulative impact.

With implementation of the project, no increase in the discharge rate of stormwater runoff from the site from the project would be expected, so the project would not contribute cumulatively to any stormwater runoff impacts from related development. This would be a ***less-than-significant*** cumulative impact.

On a cumulative basis, adequate electrical and natural gas facilities and services are available to meet project demands because staffs of the Sacramento Municipal Utility District (SMUD) and Pacific Gas and Electric Company (PG&E) have indicated that they would expand their operations on an as-needed basis to meet new demands (Hager, pers. comm., 2005; Schlaht, pers. comm., 2005). No expansion of existing facilities would be required for the project. As a result, the project would not contribute to a significant cumulative electricity and natural gas impact. This would be a ***less-than-significant*** cumulative impact.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Development in the Joint Vision area would increase demands for water. Given the availability of water in the City, it is not expected that Joint Vision development would result in significant cumulative water supply impacts. Sutter County has its own water supply system and would not cumulatively affect the availability of entitled water for the City of Sacramento.

Joint Vision development would add to the need for additional wastewater treatment services, which would require expansion as a result of cumulative development (see discussion above). It is unknown if Measure M development would seek connection to the SRWTP, or if it would provide for a different means of treatment, so its contribution to the need to provide expanded local wastewater treatment facilities is not known.

7.2.5 PUBLIC SERVICES

As described in Section 6.5, “Public Services,” of the EIR, the project applicant would prepare a separate financing plan that would establish the necessary funding mechanisms to provide services to the project. A summary of the elements and performance standards of the finance plan is included in Appendix C. The proposed project would fully provide for its increment of necessary public services and would not result in a contribution to any cumulative impacts. As stated in Section 6.5, “Public Services,” of this EIR, no new police, fire, or solid-waste facilities would be required that are not already planned for; sufficient capacity has been determined to exist at proposed on-site and off-site schools, and no long-term shortfall of school services and facilities would result; and the project proponent would pay development impact fees sufficient to mitigate school impacts. For these reasons, the proposed project would result in less-than-significant public services impacts and would not contribute to a cumulative public services impact. This would be a ***less-than-significant*** cumulative impact.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Proposed cumulative development, and additionally the Joint Vision and Sutter County Measure M projects, may result in cumulative impacts on various public services, but because the project would not result in an incremental contribution to these impacts, no further analysis is needed under CEQA.

7.2.6 PARKS AND OPEN SPACE

The proposed project would not result in significant impacts on parks and open space. Similarly, development of the cumulative projects would not be expected to result in impacts related to parks and open space because each development would be required to comply with the City's standards for provision of park facilities. The City does, however, have a citywide deficit of neighborhood/community parkland acreage of less than 20 acres (City of Sacramento 2004a). This deficit is a baseline effect and is considered a significant cumulative impact because it has resulted from past development in the City. However, the proposed project would meet the City's Quimby Act parkland dedication requirements (see Section 6.6, "Parks and Open Space") and it would satisfy the proposed project's overall park needs. Because of this, it would not contribute to the cumulative parkland deficit and would, therefore, not contribute considerably to any park impacts. However, conversion of the project site from predominantly agricultural and open space uses to urban development would result in a significant open space impact. The applicant would provide land for in a permanent conservation easement for open space to offset the project's impact to open space resources. While the permanent conservation easement would lessen significant effects, it would only partially offset proposed conversion and no new open space would be made available. As a result, the project would result in a considerable contribution to a ***significant and unavoidable*** cumulative open space impact.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Proposed cumulative development, and additionally the Joint Vision and Sutter County Measure M projects, may result in cumulative impacts on parks, but because the project would not contribute to these impacts, no further analysis is needed under CEQA. Further, it is likely that these new projects would meet parkland dedication requirements that would cover their contribution to parkland demand, given that they would be subject to Quimby Act requirements. Development of the Joint Vision and Sutter County M projects would result in the permanent conversion of open space resources. Although, open space resources would be permanently conserved as part of those projects, no new open space areas would be created and conserved lands would only partially offset open space impacts. The project in combination with the Joint Vision and Sutter County M projects would result in a considerable contribution to a ***significant and unavoidable*** cumulative open space impact and the project's contribution would be considerable.

7.2.7 AESTHETICS

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

Implementation of the proposed project would substantially alter the visual character of the project site through conversion of agricultural land to developed urban uses, resulting in a significant aesthetic impact related to degradation of visual character. Because of the scale and location of the proposed project, there is no feasible mitigation available to address aesthetic resource impacts associated with the conversion of agricultural land to urban development. However, the area to the south and east of the site has been undergoing a visual transformation over the last 10 years, as the NCCP area has converted from predominantly agriculture to a suburbanized setting. The project would result in the extension of this suburban setting. Although design, architectural, development, and landscaping standards are included to ensure that urban development on the project site conforms to certain aesthetic guidelines, there is no mechanism to allow implementation of the project while avoiding the conversion of the local viewshed from agricultural to urban development. Because development in the NNCP area and Metro Air Park has occurred on formerly agricultural land, as would be the case under the proposed project, and West Lakeside development, development of the NNCP would be expected to result in a similar aesthetic impact regardless of implementation of project design guidelines. Therefore, the proposed project would considerably contribute to a significant cumulative impact on aesthetics, and this impact would be ***significant and unavoidable***.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Development in the Joint Vision area would result in the conversion of around half of the 10,000-acre open space between the current NNCP boundaries and the Sutter County line. This conversion would extend even further the change in the viewshed from open space to suburban. This sort of change would be perceived as a regional alteration of open space, and would lend to the overall aesthetic sense that a large part of the formerly rural area north of downtown Sacramento is irretrievably changing to suburban development. This is a cumulatively significant impact. The impact could be reduced by requiring that large areas of open space are retained along I-5 and SR 70/99, and by requiring design features that provide for visually diverse and high quality development. Further, a concept included in the Joint Vision MOU calls for a buffer between development in the Joint Vision area and the boundary with Sutter County. This would help maintain visual buffer so it does not appear that development in Sacramento County is merging with development in Sutter County and community separation would be somewhat maintained.

Development of the Measure M area of Sutter County would convert an additional 7,500 acres and add to the cumulative impact associated with this aesthetic impact. The buffer between Sacramento County and Sutter County would help reduce the sense of cumulative change in aesthetic character, but would not eliminate the overall visual sense of the conversion of the project area from agriculture to suburban development. This is a cumulatively ***significant*** impact.

The project would contribute considerably to this cumulatively significant aesthetic impact, even though its impact would be substantially reduced through mitigation proposed for the project.

7.2.8 PUBLIC HEALTH AND HAZARDS

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

The proposed project would result in a potentially significant public health and hazards impact related to the potential for health hazards from soils contaminated by previously unknown underground storage tanks (USTs) or by other sources at the former Two Jakes Park site (see Section 6.8, “Public Health and Hazards”). However, any USTs found would be removed and any contaminated soils would be excavated and treated according to County Environmental Management Department (EMD) procedures before the resumption of construction, thus reducing this impact to a less-than-significant level. Similarly, development of cumulative projects would not be expected to result in significant impacts related to public health and hazards that could not be addressed by standard mitigation and remediation measures (City of Sacramento 1993). This would be a ***less-than-significant*** cumulative impact.

Implementation of the project would place residents within the Sacramento International Airport’s overflight safety zone and would be inconsistent with the safety standards in the Comprehensive Land Use Plan (CLUP) related to the proposed parks and light rail station that fall within the overflight safety zone. Location of these facilities in the airport’s overflight safety zone would increase safety risks associated with aircraft operations. It is important to note that locating a project within an Airport Safety Zone does not suggest that safety impacts would occur; rather, the Airport Safety Zone is an area of elevated safety risk. That is, in the highly unlikely circumstance of a forced landing not on airport property, the Airport Safety Zone is the area where such a forced landing has a greater probability of occurring. Therefore, development located within this area has an elevated risk of a safety hazard, although such a risk remains remote.

Other cumulative development proposed in and near the Airport Safety Zone could add to this cumulative impact. The Metro Air Park project is located within the Airport Safety Zone. The project is the only other project currently being considered that is located within the overflight zone of the airport. These two projects, together, cumulatively increase safety risks from airport overflights. The West Lakeside project, located southeast of the airport, is outside of the Airport Safety Zone even though it is subject to overflights from airport. Given that the

overflight zone defines the maximum extent of defined significant safety risk, the fact that no other projects are within the overflight zone suggests that there are no other projects that contribute to this cumulative impact. As described in Section 6.8, "Public Health and Hazards," the project's airport safety hazard impacts would be reduced to a less-than-significant level through implementation of mitigation that requires a wildlife management plan for the on-site lake/detention basin. Therefore, this is a ***less-than-significant*** cumulative impact and the project's contribution would be less than considerable.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Much of the land that is located within the Joint Vision area is also located within the Sacramento International Airport safety zone. However, no specific development locations have been established within the Joint Vision area. Therefore, it is not known if development within the Joint Vision area would add to cumulative impacts associated with the airport overflights and the attendant safety risks. Similarly, the very southern edge of the Measure M area falls within the northern extent of the Airport Safety Zone. However, there is not a specific land use plan for the Measure M area, as yet, so it cannot be determined if any land uses would be located within the overflight safety area. To the extent that land uses may be located within the Airport Safety Zone, such land uses would, in combination with Greenbriar and the Metro Air Park projects, add to cumulative impacts associated with airport safety. Because land uses for both the Joint Vision and Measure M areas have not yet been defined, it would be speculative to state that inconsistent land uses would be located within the Airport Safety Zone. Therefore, there is no conclusion that can be drawn regarding whether there would be increased cumulative impacts associated with development in these areas.

7.2.9 GEOLOGY AND SOILS

The proposed project would result in potentially significant impacts related to exposure of people and structures to seismic hazards, including ground shaking and liquefaction; subsidence or compression of unstable soils; and damage associated with expansive soils. However, these impacts would be reduced to a less-than-significant level with implementation of recommendations included in the preliminary geotechnical report and a comprehensive site-specific geotechnical report for the proposed project. Any residual less-than-significant impacts would be confined to the project site; they would not combine with any geotechnical effects associated with development in other areas. Similarly, development of cumulative projects would not be expected to result in geology and soils impacts that could not be addressed by standard engineering practices (City of Sacramento 1993). In combination, additional cumulative geology and soils impacts would not be anticipated because these effects are typically site-specific. Thus, the proposed project would result in a ***less-than-significant*** cumulative geology and soils impact.

7.2.10 HYDROLOGY, DRAINAGE, AND WATER QUALITY

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

The proposed project would not result in significant impacts related to hydrology, drainage, and water quality. At the time of publication of the 1993 NNCP EIR Supplement and the subsequent NNCP Update (City of Sacramento 1993, 1996), the NNCP area was located within the 100-year floodplain; thus, development of the NNCP area under the conditions described in the 1993 EIR Supplement and NNCP Update would be expected to result in a significant and unavoidable impact with regard to flooding hazards. However, the North Natomas area was granted 100-year flood protection in 1998 as a result of local flood protection projects, and the significant and unavoidable impact conclusion was no longer valid. Recently, the levees protecting the Natomas Basin have been found to require additional improvements and the U.S. Army Corps of Engineers (USACE) has indicated that it cannot support a determination that the levees meet 100-year flood certification criteria. As a result, the project would place housing in an area subject to potential flooding from 100-year flood events. Mitigation has been recommended that would require the project applicants to contribute fair-share funding toward the installation of improvements identified by the Sacramento Area Flood Control Agency (SAFCA) to provide a 100-year level of flood protection for the Sacramento levee system. However, these improvements would not be in place before the

issuance of the project's first occupancy permit. While the improvements, once in place, would reduce the project's flooding impacts to a less-than-significant level, the improvements are under the jurisdiction of SAFCA and not subject to the City's or LAFCo's control. Therefore, it is unlikely that all necessary levee improvements would be in place at the time the project's first occupancy permit would be issued. During the time between issuance of the first occupancy permit and construction of all necessary levee improvements to provide a 100-year level of flood protection, the project could result in a significant and unavoidable interim flooding impact and would contribute considerably to a ***significant and unavoidable*** cumulative impacts related to exposure to flooding. Because the project would also contribute to the need for levee improvements, it would also contribute to the potential environmental impacts that would occur with implementation of the improvements, some of which would remain significant and unavoidable even with implementation of all feasible mitigation (e.g., construction-related air quality, traffic, noise). As a result, the project would contribute considerably to ***significant and unavoidable*** cumulative levee improvement impacts.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

As described above, the project site is located in an area identified at risk to levee failure and would result in a significant and unavoidable interim flooding impact. Similarly, any cumulative development within the Joint Vision area and the Measure M area that occurs before completion of all necessary levee improvements that would provide a 100-year level of flood protection could also be subject to flooding risks. Therefore, the project in combination with Joint Vision and Sutter County M cumulative projects would result in a significant and unavoidable interim cumulative flooding impact.

7.2.11 AGRICULTURE

PLANNED AND PROPOSED DEVELOPMENT IMPACTS

Approval of the NNCP required that the City of Sacramento adopt a Statement of Overriding Considerations for the significant impact of conversion of agricultural land. The City determined that conversion of farmlands that were once within the boundaries of the NNCP was an acceptable impact and that there were overriding reasons for approval of development of the NNCP. The NNCP, in combination with the proposed West Lakeside project and the Metro Air Park project, would convert a total of 11,100 acres of land, much of it in agriculture. A large amount of this land has already been converted within the NNCP. The proposed project would convert 518 additional acres of Important Farmland at the site (389 acres of Prime Farmland). While the EIR includes mitigation aimed at reducing the potential to cause adjacent land to convert from agriculture to urban uses, and would preserve through permanent conservation easements open space and habitat lands, some of which may be used for agricultural operations, the impact of the conversion of 518 acres of on-site agricultural land is a significant and unavoidable impact. In combination, the proposed project would add to the cumulative loss of farmlands associated with other development in the NNCP, plus West Lakeside. This is considered a significant cumulative impact to which the project would contribute. Because additional feasible mitigation is not available to mitigate the loss of agricultural land, this impact would be ***significant and unavoidable***.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Development of the Joint Vision area would result in an estimated conversion of up to 4,683 acres of open space land to developed uses. Some of the developed uses would include parks, but also would result in a conversion of current land uses. The majority of this land is in agricultural use. Conversion of this amount of agricultural land would be a significant impact. Similarly, the Measure M area would result in the conversion of up to 7,500 acres of land, most of it in agricultural use. The combination of this conversion, in addition to the agricultural conversions described above, would result in substantial loss of agricultural land within the Natomas Basin. This is a significant cumulative impact to agricultural land, and the proposed project would contribute considerably to this impact. There are no mitigation measures available to substantially lessen this cumulatively significant and unavoidable impact.

7.2.12 BIOLOGICAL RESOURCES

Similar to the proposed project, additional development as proposed within the North Natomas community would result in impacts on Swainson's hawk, giant garter snake, riparian/wetland habitat, and agricultural lands/rice fields. The development of the NNCP area and the Metro Air Park in combination with the proposed project would continue to diminish the lands available for biotic resources. The undeveloped lands in this area, as well as South Sutter County, and West Yolo County, serve as prime habitat for a variety of wildlife and vegetation. The continued development of these lands would result in the incremental decline in the number and diversity of plant and animal species, including sensitive species. The project would contribute to this decline. This is a considerable contribution to this ***significant*** cumulative impact.

In consideration of these impacts, the NBHCP provides a comprehensive program for the preservation and protection of habitat for threatened and endangered species potentially found on approximately 53,537 acres of undeveloped and agricultural land in northwestern Sacramento County and southern Sutter County. The primary component of the conservation strategy for funding habitat reserve acquisition would be the use of mitigation fees to set aside 0.5 acre of habitat land for each acre of development that occurs in the Natomas Basin. Approximately 8,750 acres of land would be acquired or preserved through implementation of the NBHCP. Included within this area is development within the NNCP, which includes all the cumulative projects except for West Lakeside. West Lakeside would require its own habitat conservation strategy, possibly through preparation of an HCP, or through some other similar means. In addition, a HCP was approved for the Metro Air Park. These conservation plans in combination with the mitigation recommended for the proposed project provide a comprehensive preservation, conservation, and minimization strategy, would reduce the severity of these cumulative biological impacts.

In addition to the projects considered for all resource areas in this EIR, other projects are considered in the cumulative impacts for biological resources. These projects are considered for biological resources only because they do not combine with other resource areas (e.g., traffic, agriculture) to produce cumulative effects, or they are already considered in other sections of this EIR (e.g., noise from the expanded airport operations is considered in Section 6.3, "Noise"). Other projects are described below.

SACRAMENTO INTERNATIONAL AIRPORT DEVELOPMENT PLAN

The Airport Development Plan would include the major improvements that are needed at the Sacramento International Airport over a 20-year planning horizon. These improvements are safety, security, and capacity enhancement projects that would enable the Sacramento County Airport System to meet customer service goals at increased levels of activity in passengers, air cargo, and aircraft operations.

The plan is still under development, but the Sacramento International Airport Master Plan Study (PB Aviation 2004) contains a recommended Airport Development Plan that illustrates the type, location, and scale of projects under consideration. Most projects would be within the existing Airport Operations Area (AOA). Outside of the AOA, potential projects include approximately 400 acres of development (parking and commercial development) on adjacent land along I-5, and approximately 500 acres of development (aviation-related and commercial development) on adjacent land to the north of the AOA.

The recommended Airport Development Plan also would eliminate several waterways, including:

- 4.4 miles of the drainage ditch north of Elverta Road,
- 2.0 miles of the drainage ditch west of Powerline Road,
- 1.0 mile of the canal adjacent to the access road west of Powerline Road, and
- 0.5 mile of the drainage ditch along Bayou Road.

SACRAMENTO AREA FLOOD CONTROL AGENCY LEVEE UPGRADE PROJECT

To assess the risk of levee failure and to identify potential remedies, SAFCA commissioned the Natomas Levee Evaluation Study in 2005, discussed in more detail in Section 6.9, "Hydrology, Drainage, and Water Quality." A variety of remedies were proposed for identified problems. Most of these remedies involve levee improvement and bank protection techniques, including construction of cutoff walls within existing levees, placement of toe rock, and revegetation of banks at locations along existing levees that pose erosion problems. The implementation of these remedies could temporarily disturb approximately 30 acres of habitat for covered species.

As a potential remedy, the study also assessed a setback levee along the upper 5 miles of the east levee of the Sacramento River. This levee would be set back about 1,000 feet from the existing levee. Under this alternative the existing levee would continue to confine the river; the new levee would ensure safe containment of a 200-year flood if the existing levee were to fail. The construction of this levee could affect up to 150 acres of habitat for species covered by the NBHCP (EDAW 2005).

NATOMAS MUTUAL WATER COMPANY AMERICAN BASIN FISH SCREEN AND HABITAT IMPROVEMENT PROJECT (ABFSHIP)

The Natomas Mutual Water Company (Natomas Mutual) annually diverts nearly 100,000 acre-feet (AF) of water from the Sacramento River and the Natomas Cross Canal and distributes that water throughout the Natomas Basin. Natomas Mutual is currently planning and designing two new diversions to replace its existing five diversions. These pumps would be located along the Sacramento River near Sankey Road and between Elverta Road and Elkhorn Road, respectively. These new diversions would retain the same pumping capacity of the existing diversions (630 cubic feet per second [cfs]), plus an additional 14 cfs to accomodate the Bolen Ranch, which would then eliminate its existing, independent diversion. The new pumps, however, would be variable-frequency drive pumps that would facilitate the management of water levels throughout the canal system. Other changes to the current infrastructure would include:

- construction of a new highline canal between the proposed Sankey Diversion along the landside of the Natomas Cross Canal south levee to the existing Northern Pumping Plant;
- relocation and extension of the existing Vestal Drain adjacent to the new highline canal between RD 1000's Pumping Plant No. 4 and the new Sankey Diversion site;
- decommissioning and removal of the existing Verona Diversion Dam and Lift Pumps;
- additional capacity for the internal re-lift pumps at RD 1000 Pumping Plant No. 3 in place of the removed Riverside Pumping Plant;
- regrading the Riverside Main Highline Canal from RD 1000 Pumping Plant No. 3 to the existing Riverside Pumping Plant;
- upgrading of two control structures, the County Line Check and Lift Pump and the Elkhorn Check and Lift Pumps;
- removing the five pumping plants (two along the Natomas Cross Canal and three along the Sacramento River);
- regrading the North Drainage Canal from the V Drain to SR 70/99 in order to improve conveyance; and
- regrading the Elkhorn Main Highline Canal between the existing Prichard Pumping Plant and the existing Elkhorn Pumping Plant.

SACRAMENTO RIVER WATER RELIABILITY STUDY

The Sacramento River Water Reliability Study (SRWRS) was initiated in 2002 by the U.S. Bureau of Reclamation (Reclamation), Placer County Water Agency (PCWA), Sacramento Suburban Water District (SSWD), City of Roseville (Roseville), and the City of Sacramento. Its goal is to develop a water supply plan that is consistent with the Water Forum Agreement (The Water Forum 2000). It would fulfill this goal by providing additional water supply to PCWA for planned urban growth, to SSWD for groundwater stabilization, to Roseville for planned urban growth and a local conjunctive use program, and to the City of Sacramento for water supply reliability and wheeling services with neighboring water purveyors to meet their water supply demands and to reduce their reliance on groundwater. It also would increase the interconnectivity and source redundancy to the water supply system to maximize long-term water supply reliability.

An initial alternatives report has been prepared for this study (Reclamation 2005) that developed four alternatives. These alternatives are:

SRWS Elverta Diversion Alternative. This alternative would consist of a diversion on the Sacramento River with an associated pump station and water treatment plant, and treated water pipelines to water distribution systems of the SRWRS partners. Water pipelines would extend from the Sacramento River across the Natomas Basin along or adjacent to Elverta Road, and from Elverta Road south to the City of Sacramento. Total pipeline length would be approximately 9 miles.

Joint SRWS-ABFSHIP Elverta Diversion Alternative. This alternative would consist of a consolidated diversion on the Sacramento River and associated facilities to accommodate the needs of the SRWRS partners and the NMWC from the Elkhorn Diversion planned under the ABFSHIP. Water pipelines would extend from the Sacramento River across the Natomas Basin along or adjacent to Elverta Road, and from Elverta Road south to the City of Sacramento. Total pipeline length would be approximately 9 miles.

ARPS-Elverta Diversion Alternative. This alternative would consist of facility expansions by PCWA in Placer County, increased use of groundwater by Roseville, and construction of a diversion on the Sacramento River and of associated treatment and transmission facilities by Sacramento. (Under this alternative, Natomas Mutual would construct and operate its planned Elkhorn Diversion independent of the SRWRS, or continue to divert from its existing diversion.) Water pipelines would extend from the Sacramento River along or adjacent to Elverta Road for approximately 5 miles, and from Elverta Road south to the City of Sacramento. Total pipeline length would be approximately 6.5 miles.

ARPS-Joint Sacramento-ABFSHIP Elverta Diversion Alternative. This alternative would include the same facilities as the ARPS-Elverta Alternative plus additional diversion capacity and facilities at the diversion if the ABFSHIP lead agencies select the Sankey/Elkhorn Diversions alternative for the ABFSHIP. Water pipelines would extend from the Sacramento River along or adjacent to Elverta Road for approximately 5 miles, and from Elverta Road south to the City of Sacramento. Total pipeline length would be approximately 6.5 miles.

Each of these projects could combine to result in disturbances to biological resources, particularly aquatic resources. Mitigation would be developed for each of these projects, and to the degree that endangered species are affected, mitigation would be required, by law, to fully mitigate impacts.

Similarly, the Greenbriar project would be required to comply with the federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA). Both of these acts require that impacts on endangered species are minimized and fully mitigated. As described in Section 6.12, “Biological Resources,” extensive mitigation is proposed, including the purchase and enhancement of two mitigation sites (Natomas 130 and Spangler), purchase of additional easements for Swainson’s hawk habitat, along with establishment of a 250-foot linear open space/buffer along the western edge of the Greenbriar site. Additionally, the project applicant would consult with USFWS and DFG on this mitigation plan, and would incorporate additional mitigation that arises through the

consultation process. Taken together, it is expected that this mitigation would lessen the impact of the proposed project on biological resources to the extent that it is not considerable. The project, therefore, would not contribute considerably to a cumulatively significant impact on these biological resources and this would be a ***less-than-significant*** cumulative impact.

JOINT VISION AND SUTTER COUNTY MEASURE M CUMULATIVE IMPACTS

Development within the Joint Vision area would result in the conversion of up to 4,683 additional acres of open space land that provides various levels of habitat for Swainson's hawk, giant garter snake, and other species that are currently protected by the NBHCP. This is nearly half the acreage within that Joint Vision area. Some of the land within this area has already been set aside as a habitat in compliance with the NBHCP. Additional development within the Joint Vision area would be expected to have adverse impacts on the various species covered by the NBHCP. It is very likely, and expected, that any development within this area would require a new habitat conservation plan, consistent with FESA and the CESA. As described above, compliance with these laws requires that impacts on endangered species are minimized and fully mitigated. However, it must be recognized that this level of additional development would be expected to have residual environmental impacts on the various species in the area. While the extent of potential mitigation for development within this area is not currently known, there is the real potential that cumulatively significant impacts to various of the species could occur. Because the project would result in adverse effects (which would be mitigated), it has the potential to combine with adverse effects from development in the Joint Vision area, and generate cumulatively significant impacts. However, a conclusion on this issue cannot be reached until development is actually proposed in the Joint Vision area.

The Measure M area is located on property that is covered by the incidental take permit issued under the NBHCP. While development of this 7,500-acre area could adversely affect the various species covered by the NBHCP, the impacts would be minimized and fully mitigated through necessary compliance with the terms of the NBHCP.

Overall, development of the project site, the NNCP area, West Lakeside, the Joint Vision area, and be Measure M area would result in development of several thousand acres of habitat and potential habitat. While this development would be subject to the terms and conditions of HCPs, which either are or would be in existence to guide development while minimizing impacts of biological resources, it is cumulative impacts could occur to sensitive biological resources. That stated, it would be speculative to conclude, without the details of any HCP's, whether the residual impacts would be cumulatively significant.

7.2.13 CULTURAL RESOURCES

Development of the cumulative projects has the potential to result in the discovery of undocumented subsurface cultural resources or unmarked historic-era and prehistoric Native American burials. However, these potential impacts would not increase in severity in consideration of cumulative projects. In addition, the incorporation of standard measures addressing the response when undocumented resources are discovered would address this potential impact. For these reasons, the proposed project would result in a ***less-than-significant*** cumulative impact on cultural resources.

7.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES THAT WOULD BE CAUSED BY THE PROPOSED PROJECT

CEQA (Public Resources Code Section 21100[b][2]) provides that an EIR shall include a detailed statement setting forth "[i]n a separate section…[a]ny significant effects on the environment that would be irreversible if the project is implemented." State CEQA Guidelines Section 15126.2(c) provides the following guidelines for analyzing the significant irreversible environmental changes of a project:

> Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also irretrievable damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

Although the proposed project would use minor amounts of both renewable and nonrenewable natural resources for project construction, this use would not increase the overall rate of use of any natural resource, or result in the substantial depletion of any nonrenewable resource.

The project includes the development of or creation of access to a previously inaccessible area. However, development of the project site would commit future generations to the significant irreversible change of converting the project site from agricultural, which supports both crops and habitat, and open-space use to an urbanized land use. Mitigation for habitat conversion is included in the project and considered in this EIR.

Lastly, the proposed project is not anticipated to result in irreversible damage from environmental accidents, such as an accidental spill or explosion of a hazardous material. During construction, equipment would be using various types of fuel and material classified as hazardous. In the State of California, the storage and use of hazardous substances are strictly regulated and enforced by various local, regional, and state agencies. The enforcement of these existing regulations would preclude credible significant project impacts related to environmental accidents.

7.4 SUMMARY OF SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

This section is prepared in accordance with Section 15126.2(b) of the State CEQA Guidelines, which requires the discussion of any significant environmental effects that cannot be avoided if a project is implemented. These include impacts that can be mitigated but cannot be reduced to a less-than-significant level.

An analysis of environmental impacts caused by the proposed project is provided in Chapter 6 of this EIR. The following is a summary of the impacts that have been determined to be significant and unavoidable:

- *Transportation*

  - *Impacts on the Freeway Ramps*. The proposed project would increase traffic volumes on the freeway system and would cause three study freeway ramps (i.e., SR 70/99 northbound/Elkhorn Boulevard off-ramp, SR 70/99 southbound/I-5 southbound off-ramp, and I-5 northbound/SR 70/99 northbound off-ramp) to operate unacceptably under Baseline plus Project Conditions. With implementation of Mitigation Measure 6.1-3b, the SR 70/99 Northbound to Elkhorn Boulevard off-ramp would operate at acceptable levels and this impact would be reduced to a less-than-significant level. However, this ramp is not under the jurisdiction of the City of Sacramento (i.e., subject to California Department of Transportation [Caltrans] jurisdiction). While the project would contribute funds that would implement measures that would fully mitigate impacts on this ramp to a less-than-significant level, it is unknown whether these measures would be implemented because they are not subject to the control of the City. As a result, for purposes of CEQA impacts on the SR 70/99 Northbound to Elkhorn Boulevard off-ramp (Impact 6.1-3b) would remain ***significant and unavoidable***. Further, no feasible mitigation is available to reduce the project's impacts on the SR 70/99 Southbound to I-5 Southbound on-ramp and the I-5 Northbound to SR 70/99 Northbound off-ramp because recommended mitigation is beyond the control of the project applicant, outside the jurisdiction of the City, and there is no established funding mechanism available for contribution to recommended improvements. Therefore, impacts on these ramps would be ***significant and unavoidable.***

- *Freeway Mainline Segment Impacts.* The proposed project would increase traffic volumes on the freeway system and would cause four study freeway mainline segments (i.e., I-5 north of Del Paso Road, I-5 north of I-5/I-80 interchanges between I-80 and Arena Boulevard, SR 70/99 between Elverta Road and Elkhorn Boulevard, and SR 70/99 between Elkhorn Boulevard and I-5/SR 70/99 interchange) to operate unacceptably under Baseline plus Project Conditions. Because no feasible mitigation is available to reduce the project's impacts on study area freeway segments, impacts on these freeway segments would remain ***significant and unavoidable.***

- *Cumulative Traffic Impacts on Study Area Intersections.* No feasible mitigation is available or implementation of feasible mitigation can not be guaranteed because it is not subject to the control of the City for the intersections of Elkhorn Boulevard and Lone Tree Road, Meister Way and Metro Air Parkway, Meister Way and Lone Tree Road, Elkhorn Boulevard and Project Street 1, Elkhorn Boulevard and Project Street 2, and Elkhorn Boulevard and Project Street 3. Therefore, the project's cumulative impacts to these intersections are considered ***significant and unavoidable***.

- *Cumulative Impacts on Study Area Roadway Segments.* The proposed project in combination with cumulative projects would increase the volume-to-capacity ratio by more than 0.05along the Elkhorn Boulevard west of SR 70/99 interchange segment and would cause this segment to continue operating at LOS F under Cumulative plus Project conditions. No feasible mitigation is available to reduce the project's cumulative impacts on this segment. Therefore, the project's cumulative impact on this roadway segment would be ***significant and unavoidable***.

- *Cumulative Impacts on Study Area Freeway Ramps.* The proposed project in combination with cumulative projects would increase traffic volumes on the freeway system and would cause six study freeway ramps to operate unacceptably under Cumulative plus Project conditions and exceed Caltrans thresholds of significance for freeway ramp operations. With implementation of recommended mitigation measures the SR 70/99 Northbound to Elkhorn Boulevard off-ramp and I-5 Northbound to SR 70/99 Northbound off- ramp would operate at acceptable levels under cumulative conditions and the project's cumulative impact would be reduced to a less-than-significant level. However, these ramps are not under the jurisdiction of the City of Sacramento (i.e., subject to Caltrans jurisdiction). While the project would contribute funds that would implement measures that would fully mitigate impacts on these ramps to a less-than-significant level, it is unknown whether these measures would be implemented because they are not subject to the control of the City. As a result, for purposes of CEQA, cumulative impacts on these ramps would be ***significant and unavoidable***.

  Further, mitigation may be feasible for the I-5 Northbound to Metro Air Parkway off-ramp and the Metro Air Parkway to I-5 Southbound loop on-ramp; however, this mitigation would not be able to reduce the impact of the project to a less-than-significant level. These ramps would continue to operate at LOS F and no other feasible mitigation is available. Therefore, cumulative impacts to this ramp would remain ***significant and unavoidable.***

- *Cumulative Freeway Mainline Segment Impacts.* The proposed project in combination with cumulative projects would increase traffic volumes on the freeway system and would cause three study freeway mainline segments (i.e., I-5 east of Powerline Road, I-5 north of Del Paso Road, I-5 north of I-5/I-80 interchanges between I-80 and Arena Boulevard) to operate unacceptably under Cumulative plus Project conditions. These intersections would operate unacceptably under Cumulative No Project conditions; however, the project would contribute additional trips to these intersections, which is unacceptable based on Caltrans standards. No feasible mitigation is available to reduce the project's cumulative mainline freeway segment impacts (Impacts 6.1-8a, b, and c) to a less-than-significant level. Therefore, the project's cumulative impacts on these mainline freeway segments would be ***significant and unavoidable***.

- *Short-term Construction-Generated Emissions*

  The proposed project would result in construction-generated emissions that would exceed SMAQMD's significance threshold for NO_X and would contribute concentrations that would exceed ambient air quality standards. Mitigation recommended for the project would include measures to limit temporary construction emissions including use of late-model engines, low-emission diesel products, alternative fuels, payment of fees to SMAQMD's construction mitigation fund, and reduction of fugitive dust emissions. Implementation of the recommended mitigation would substantially reduce NO_X and fugitive dust emissions; however, emissions would still exceed SMAQMD's significance thresholds. Therefore, the project would result in a ***significant unavoidable*** impact and would result in a substantial contribution to a ***significant and unavoidable*** cumulative impact.

- *Generation of Long-Term (Regional) Emissions of ROG, NO_X, and PM_{10}*

  Long-term operation of the project would result in operations of ozone-precursor pollutants that would exceed SMAQMD's threshold. Furthermore, the project's operational emissions would conflict with or obstruct implementation of applicable air quality plans. Mitigation recommended for the project would include the redesign and incorporation of features into the project that would encourage bicycle, pedestrian, and transit use, would eliminate physical barriers between residential and nonresidential uses, and build to Title 24 energy standards. Implementation of the recommended mitigation would substantially reduce operational emissions; however, emissions would still exceed SMAQMD's significance thresholds. Therefore, the project would result in a ***significant unavoidable*** regional emission impact and would result in a substantial contribution to a ***significant and unavoidable*** regional emission cumulative impact.

- *Exposure of Sensitive Receptors to Toxic Air Contaminant Emissions*

  Exposure to mobile-source TAC emissions from on-site mobile sources are, therefore, considered ***significant and unavoidable***. This conclusion is because of the uncertainty associated with on-site commercial land use activities and the proximity of sensitive receptors to such uses. This conclusion may, therefore, change as more detailed information regarding proposed on-site commercial uses becomes available.

- *Long-Term Operational Traffic Noise*

  Implementation of the project would result in increases in traffic noise levels greater than 4 dBA and would cause noise levels to exceed the County's 60 dBA day-night average noise level (L_{dn})/CNEL exterior noise standards at sensitive receptors in unincorporated Sacramento County. No feasible mitigation is available to reduce exterior project-related traffic noise levels to a less-than-significant level. Therefore, the project would result in a ***significant and unavoidable*** long-term operational traffic noise impact and would result in a substantial contribution to a ***significant and unavoidable*** long-term operational traffic noise cumulative impact in the County.

- *Land Use Compatibility with On-site Noise Levels*

  Implementation of the project would expose on-site sensitive receptors to future noise levels generated by area traffic and light rail operations that exceed applicable noise standards. Mitigation recommended for the project would require the construction of sound barriers, reorientation of on-site land uses to protect outside areas from transportation noise, and preparation of site-specific acoustical analyses. Even with implementation of recommended mitigation, outdoor areas at proposed residential uses and the proposed school would exceed the City's noise standards. Therefore, the project would result in a ***significant and unavoidable*** land use compatibility impact and would result in a substantial contribution to a ***significant and unavoidable*** land use compatibility cumulative impact.

- *Environmental Impacts Associated with SRWTP Expansion*

  The project would result in increased demand for wastewater treatment from the SRWTP. Although wastewater treatment capacity is currently available to serve the project, the project in combination with other cumulative development would result in the need to expand the capacity of the SRWTP. SRCSD prepared and approved the SRWTP 2020 Master Plan Expansion Project in 2004, which would allow the incremental expansion of the SRTWP to meet projected wastewater demands over the next 15–20 years. An EIR was prepared and certified for that project and identified one significant and unavoidable impact related to construction-related air quality. Although wastewater treatment capacity is currently available to serve the project, the project in combination with other development would contribute to the need for and expanded SRWTP and would contribute to the ***significant and unavoidable*** construction-related air quality impact. Therefore, the project would contribute to a ***significant and unavoidable*** cumulative wastewater impact.

- *Increased Demand for Fire and Emergency Medical Services*

  Implementation of the project would increase demand for fire protection services. Although the Sacramento Fire Department is planning to construct a new fire station near the project site and with this facility SFD would provide fire and emergency services to the project site within acceptable standards, the timing of construction of this facility is currently unknown and could result in a potentially significant fire and emergency medical service impact. Mitigation recommended for the project would require that adequate fire and emergency medical services be in place before issuance of the project's first occupancy permit, which may require the construction of a new fire station facility. Construction of this facility could result in construction-related environmental effects some of which may be significant and unavoidable even with implementation of all feasible mitigation. Therefore, because the project would contribute the need for a new fire station facility the construction of which could result in significant and unavoidable environmental effects, this would be a ***significant and unavoidable*** impact.

- *Degradation of Visual Character*

  Implementation of the proposed project would substantially alter the visual character of the project site through conversion of agricultural land to developed urban uses, resulting in a significant aesthetic impact related to degradation of visual character. Because of the scale and location of the proposed project, there is no feasible mitigation available to address aesthetic resource impacts associated with the conversion of agricultural land to urban development. Although design, architectural, development, and landscaping standards are included to ensure that urban development on the project site remains within certain aesthetic guidelines, there is no mechanism to allow implementation of the project while avoiding the conversion of the local viewshed from agricultural to urban development. Therefore, this impact would remain ***significant and unavoidable*** and would contribute to a ***significant and unavoidable*** cumulative impact.

- *Conversion of Open Space*

  The proposed project would result in the conversion open space areas to urban land use. Because feasible mitigation is not available to completely mitigate the loss of open space, this impact would be ***significant and unavoidable*** and the project would contribute to a ***significant and unavoidable*** cumulative open space impact.

- *Potential for Safety Hazards from Proximity of Airport to Proposed Land Uses*

  The project would result in the construction of seven neighborhood parks and a light rail station either partially or wholly within the safety zone as identified in the Sacramento International Airport CLUP. These land uses are prohibited from being located within the safety zone in order to minimize potential risks associated with aircraft hazards. Therefore, the project would resulted in a significant impact related to incompatibility with the Sacramento International Airport CLUP. Mitigation recommended for the project

would require the City to issue an override to the Airport Land Use Commission's (ALUC's) consistency determination. However, this mitigation would not eliminate the project's inconsistency with the CLUP; therefore, this would be a ***significant and unavoidable*** impact.

- *Conversion of Prime Farmland and Unique Farmland*

  The proposed project would result in the conversion Prime and Unique Farmland to urban land use. Because feasible mitigation is not available to completely mitigate the loss of Prime Farmland and Unique Farmland, this impact would be significant and unavoidable and the project would contribute to a ***significant and unavoidable*** cumulative farmland impact.

- *On-Site Flooding Risk from Potential for Levee Failure*

  The project site would be threatened by potential levee failure associated with a 100-year flood event for an interim time period, until levee improvements are implemented. Once the levee improvements are made, it would be expected that the levees would provide at least 100-year flood protection. Because the unknown timeframe for levee improvements could expose on-site residents to flooding from the 100-year event, and because the project would contribute to potential environmental impacts associated with construction of levee improvements, impacts related to on-site flooding risks from potential levee failure are considered a short-term ***significant and unavoidable*** impact. Once improvements to the levee are made, impacts associated with exposure to the 100-year flood event would be ***less than significant***.

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10 REPORT PREPARATION

10.1 CO-LEAD AGENCIES

CITY OF SACRAMENTO

DEVELOPMENT SERVICES DEPARTMENT

Lezley Buford ..... Environmental Planning Services Manager
Tom Buford ..... Associate Planner
David Kwong ..... Senior Planner
Carol Shearly ..... New Growth Manager
Arwen Wacht ..... Associate Planner
Samar Hajeer ..... Associate Civil Engineer
Scott Tobey ..... Development Engineering & Finance
Sabina Gilbert ..... Legal Counsel
Joe Cerullo ..... Legal Counsel

SACRAMENTO COUNTY LOCAL AGENCY FORMATION COMMISSION

Peter Brundage ..... Executive Officer
Don Lockhart ..... Assistant Executive Officer
Nancy Miller ..... Legal Counsel
Bob Klousner ..... Planning Consultant

10.2 EIR CONSULTANT

EDAW, INC.

Gary Jakobs, AICP ..... Principal-in-Charge
Amanda Olekszulin ..... Project Manager
John Hope ..... Project Coordinator/Environmental Analyst
Julie Nichols ..... Environmental Analyst
Honey Walters ..... Senior Air Quality/Noise Specialist
Austin Kerr ..... Air Quality/Noise Specialist
Leo Edson ..... Senior Wildlife Biologist
Bob Solecki ..... Wildlife Biologist
Kristin Heckman ..... Wildlife Biologist
John Hunter ..... Senior Restoration Ecologist
Brian Ludwig ..... Senior Archaeologist
Brian Perry ..... Graphics
Lorrie Jo Williams ..... Graphics
Lisa Clement ..... GIS Specialist
Chris Donohue ..... GIS Specialist
Debbie Jew ..... Word Processing
Gayiety Lane ..... Word Processing
Amber Martin ..... Word Processing

APPENDIX A

NOISE MODELING

RUN NAME: SR 99/70 BETWEEN ELKHORN BLVD AND I-5 SPLIT-REVISED TRAFFIC NUMBERS
RUN DATE: 3/13/07
TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	67.76	11.06	8.38
M-TRUCKS	8.24	1.34	1.02
H-TRUCKS	1.71	0.28	0.21

ADT: 71151 SPEED: 65 ACTIVE HALF WIDTH (FT): 40
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5
*Please note that calibration offset is not accounted form here, but is reflected in updated table.

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE = 79.82
* * DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL * *

70 CNEL	65 CNEL	60 CNEL	55 CNEL
366.4	785.5	1690.2	3639.9

RUN NAME: I-5 WEST OF SR 99/70 SPLIT RUN DATE: 3/13/07
TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	67.76	11.06	8.38
M-TRUCKS	8.24	1.34	1.02
H-TRUCKS	1.71	0.28	0.21

ADT: 106194 SPEED: 65 ACTIVE HALF WIDTH (FT): 88
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE = 79.74
* * DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL * *

70 CNEL	65 CNEL	60 CNEL	55 CNEL
482.1	1024.9	2201.1	4738.3

*Please note that calibration offset is not accounted form here, but is reflected in updated table.

RUN NAME: ELKHORN BLVD BETWN LONE TREE AND SR 99/70 SPLIT
RUN DATE:
3/13/07

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	67.76	11.06	8.38
M-TRUCKS	8.24	1.34	1.02
H-TRUCKS	1.71	0.28	0.21

ADT: 66091 SPEED: 45 ACTIVE HALF WIDTH (FT): 36
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE = 76.04
* * DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL * *

70 CNEL	65 CNEL	60 CNEL	55 CNEL
200.5	426.3	915.7	1971.2

RUN NAME: LONE TREE RD SOUTH OF ELKHORN BLVD RUN DATE:
3/13/07

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	67.76	11.06	8.38
M-TRUCKS	8.24	1.34	1.02
H-TRUCKS	1.71	0.28	0.21

ADT: 22320 SPEED: 45 ACTIVE HALF WIDTH (FT): 21
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE = 72.25
* * DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL * *

70 CNEL	65 CNEL	60 CNEL	55 CNEL

98.0 207.4 444.8 957.3

RUN NAME: MEISTER WAY BETWN LONE TREE AND SR 99/70 RUN DATE: 3/13/07

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	67.76	11.06	8.38
M-TRUCKS	8.24	1.34	1.02
H-TRUCKS	1.71	0.28	0.21

ADT: 18460 SPEED: 35 ACTIVE HALF WIDTH (FT): 12
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE = 69.72
* * DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL * *

70 CNEL	65 CNEL	60 CNEL	55 CNEL
59.4	126.0	270.4	582.0

APPENDIX B

TJKM TRAFFIC DATA

TRIP GENERATION FORMULAS

ITE Trip Generation Parameters

Land Use (Units)	Time Period	Equation / Rate	Percent Entering	Percent Exiting
210 Single-Family Detached Housing (dwelling units)	Daily	Ln(T)=0.92 Ln(X) + 2.71	50	50
	AM Peak Hour	T=0.7X +9.43	26	74
	PM Commuter Hour	Ln(T)=0.9 Ln(X) + 0.53	64	36
220 Apartment (dwelling units)	Daily	T=6.01X + 150.35	50	50
	AM Peak Hour	T=0.49X + 3.73	20	80
	PM Commuter Hour	T=0.55X +17.65	65	35
230 Residential Condominiums / Townhomes (dwelling units)	Daily	Ln(T)=0.85 Ln(X) + 2.55	50	50
	AM Peak Hour	Ln(T)=0.8 Ln(X) + 0.26	18	82
	PM Commuter Hour	Ln(T)=0.82 Ln(X) + 0.32	64	36
520 Elementary School (students)	Daily	T=1.29X	50	50
	AM Peak Hour	Ln(T)=1.11 Ln(X) – 1.73	55	45
	PM School Hour	Ln(T)=1.08 Ln(X) – 1.90	45	55
	PM Commuter Hour	Not available	-	-
820 Shopping Center (1,000 square feet)	Daily	Ln(T)=0.65 Ln(X) + 5.83	50	50
	AM Peak Hour	Ln(T)=0.6 Ln(X) + 2.29	61	39
	PM Commuter Hour	Ln(T)=0.66 Ln(X) + 3.4	48	52
850 Supermarket (1,000 square feet)	Daily	T=66.95X + 1391.56	50	50
	AM Peak Hour	Ln(T)=1.7 Ln(X) – 1.42	61	39
	PM Commuter Hour	Ln(T)=0.79 Ln(X) + 3.20	51	49
932 High-Turnover Restaurant (1,000 square feet)	Daily	T=127.15X	50	50
	AM Peak Hour	T=11.52X	52	48
	PM Commuter Hour	T=10.92X	61	39

Source: *ITE Trip Generation, Seventh Edition.*

Notes: 1. Used average rates when equations were not available.

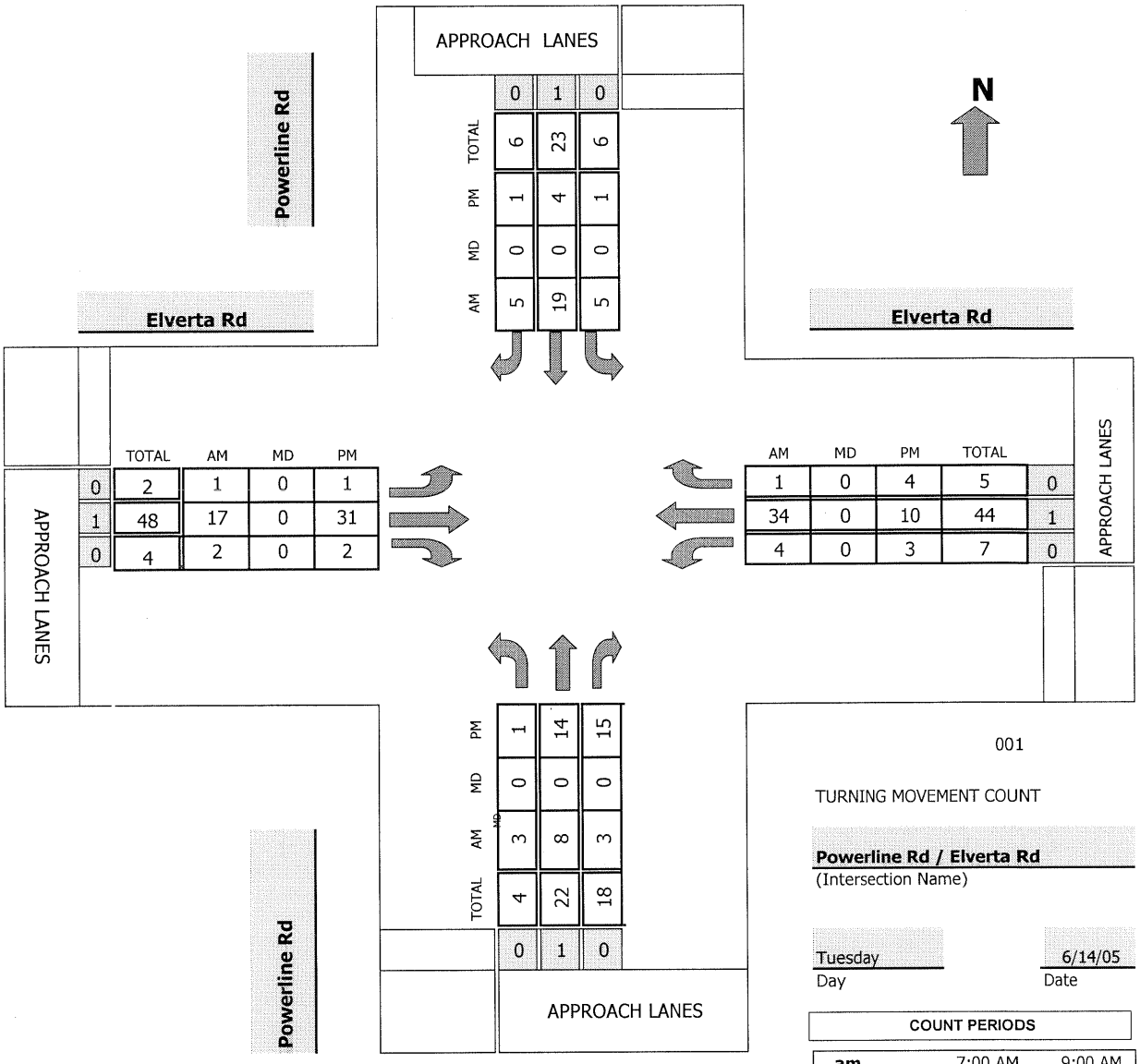
2. T = Trips; X = dwelling units, students, or thousand square feet

APPENDIX A - EXISTING TRAFFIC COUNTS

- Intersection Turning Movement Counts
- Ramp Counts
- Freeway Mainline Counts

TMC Summary of Powerline Rd/Elverta Rd

Project #: 05-7065-005



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TURNING MOVEMENT COUNT

Powerline Rd / Elverta Rd
(Intersection Name)

Tuesday
Day

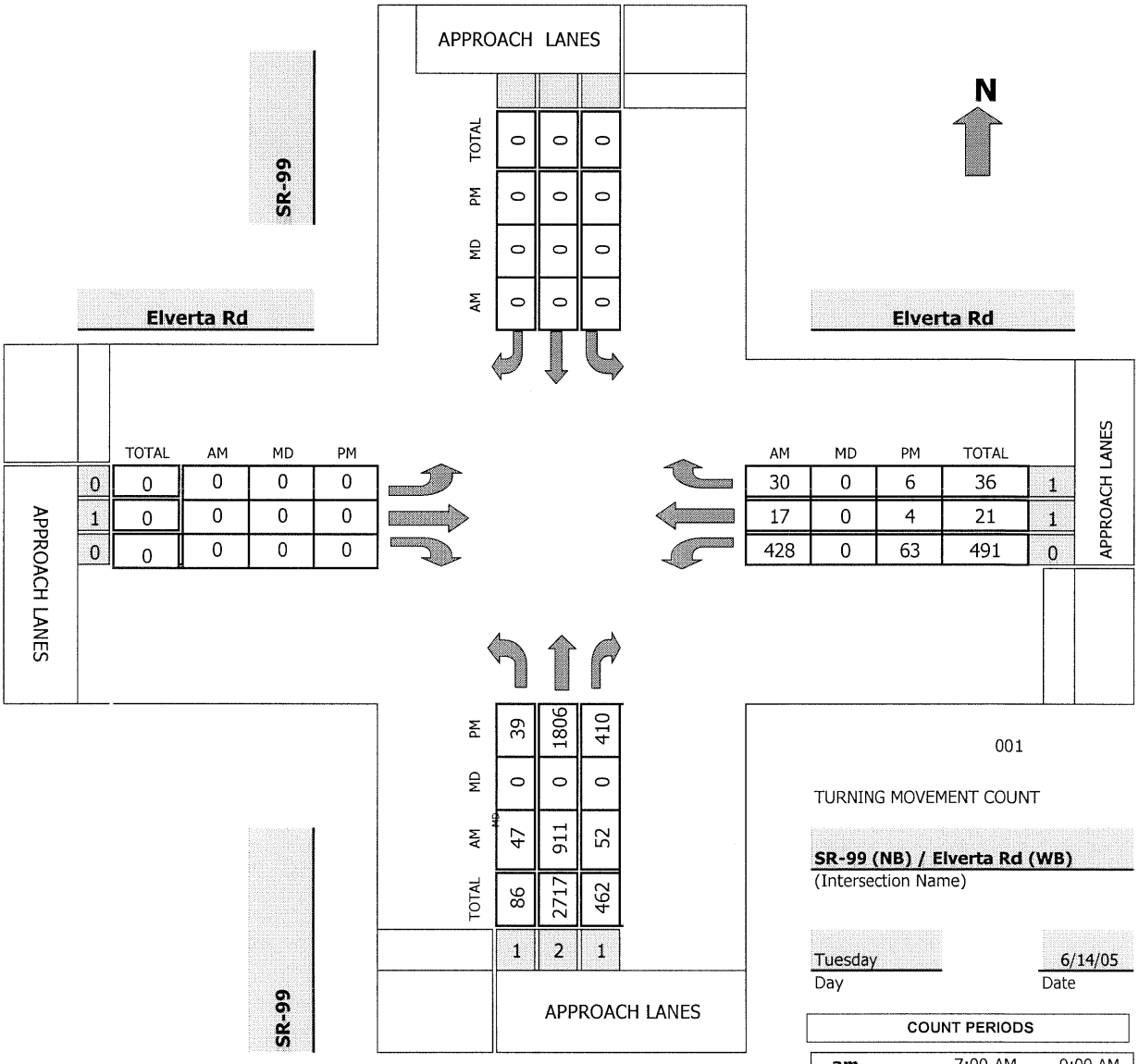
6/14/05
Date

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

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

TMC SUMMARY OF SR-99 (NB)/Elverta Rd (WB)

Project #: 05-7065-010



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TURNING MOVEMENT COUNT

SR-99 (NB) / Elverta Rd (WB)
(Intersection Name)

Tuesday
Day

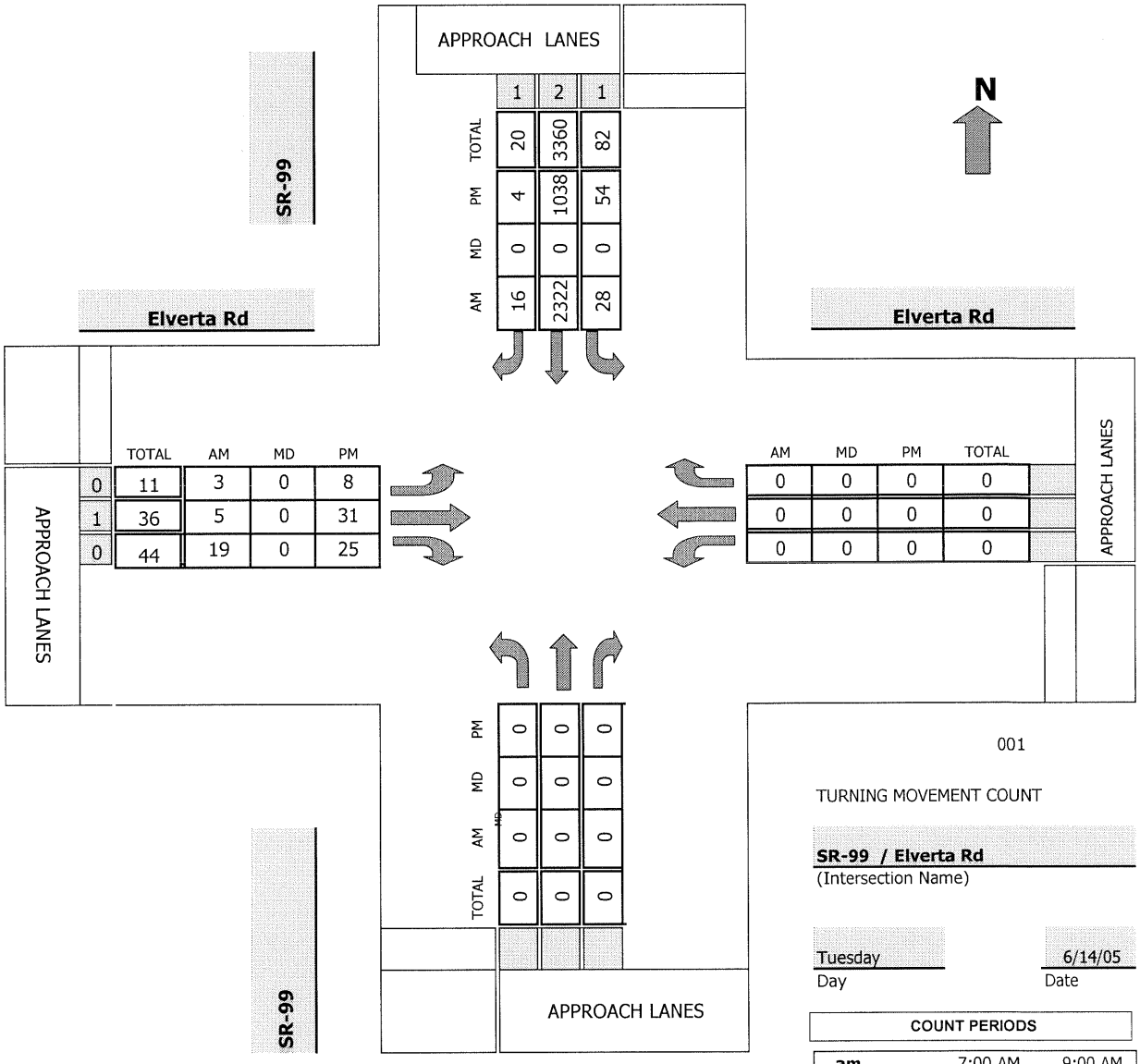
6/14/05
Date

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

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

TMC Summary of SR-99 (SB)/Elverta Rd (EB)

Project #: 05-7065-011



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TURNING MOVEMENT COUNT

SR-99 / Elverta Rd
(Intersection Name)

Tuesday
Day

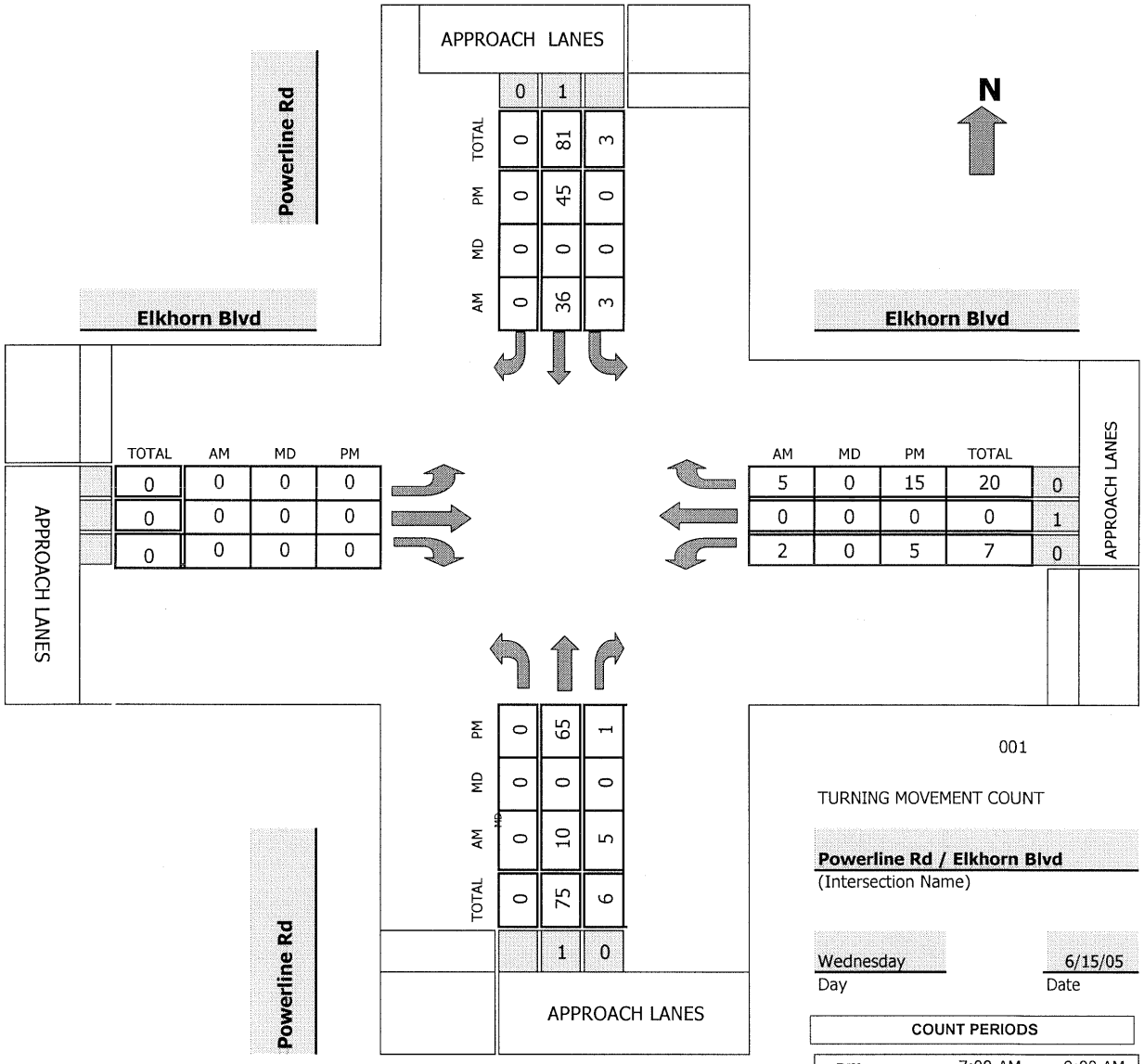
6/14/05
Date

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

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

TMC Summary of Powerline Rd/Elkhorn Blvd

Project #: 05-7065-003



001

TURNING MOVEMENT COUNT

Powerline Rd / Elkhorn Blvd
(Intersection Name)

Wednesday
Day

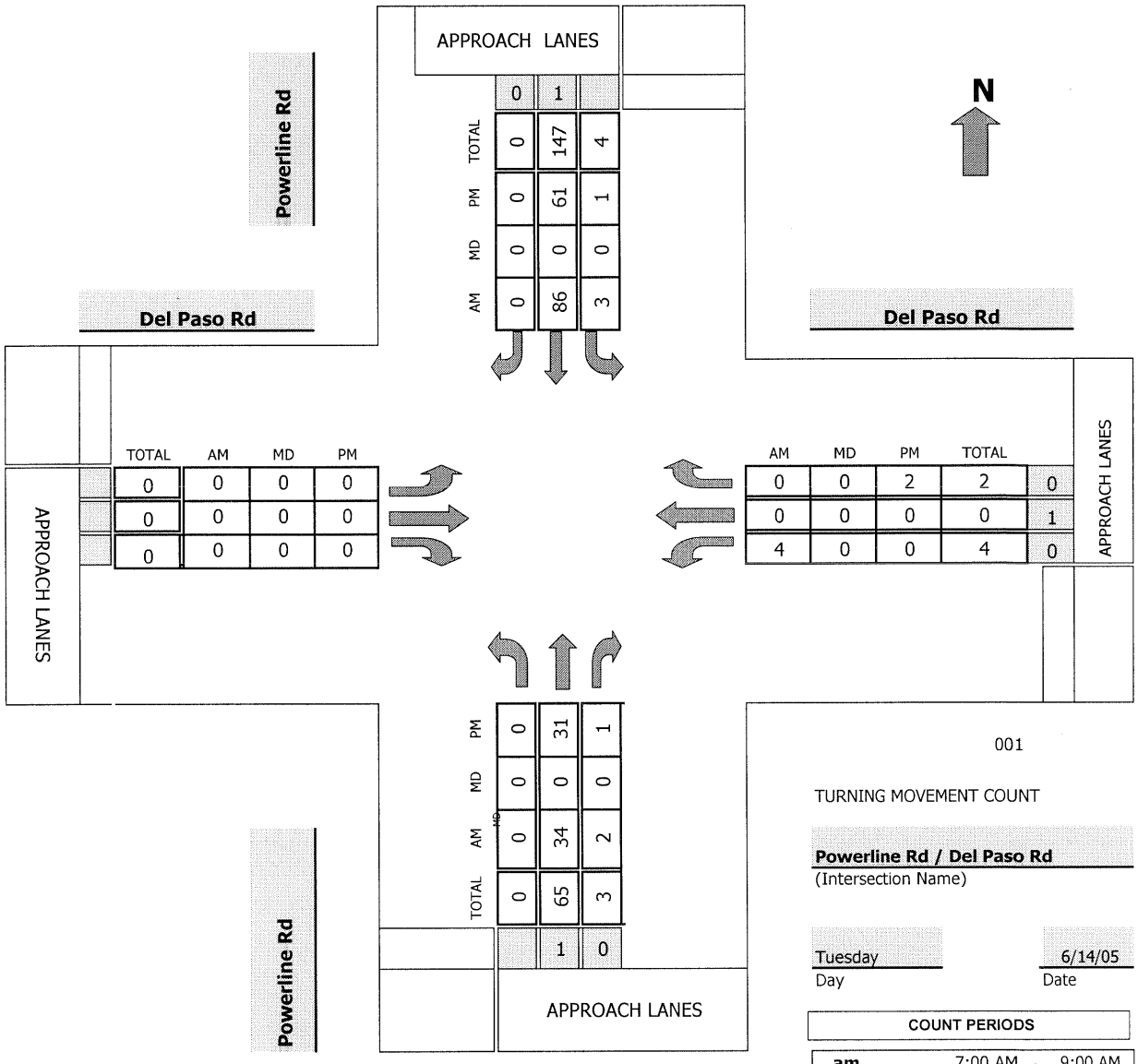
6/15/05
Date

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

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

TMC Summary of Powerline Rd/Del Paso Rd

Project #: 05-7065-006



TOTAL	0	147	4
PM	0	61	1
MD	0	0	0
AM	0	86	3

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

AM	MD	PM	TOTAL	
0	0	2	2	0
0	0	0	0	1
4	0	0	4	0

PM	0	31	1
MD	0	0	0
AM	0	34	2
TOTAL	0	65	3
		1	0

001

TURNING MOVEMENT COUNT

Powerline Rd / Del Paso Rd
(Intersection Name)

Tuesday — Day

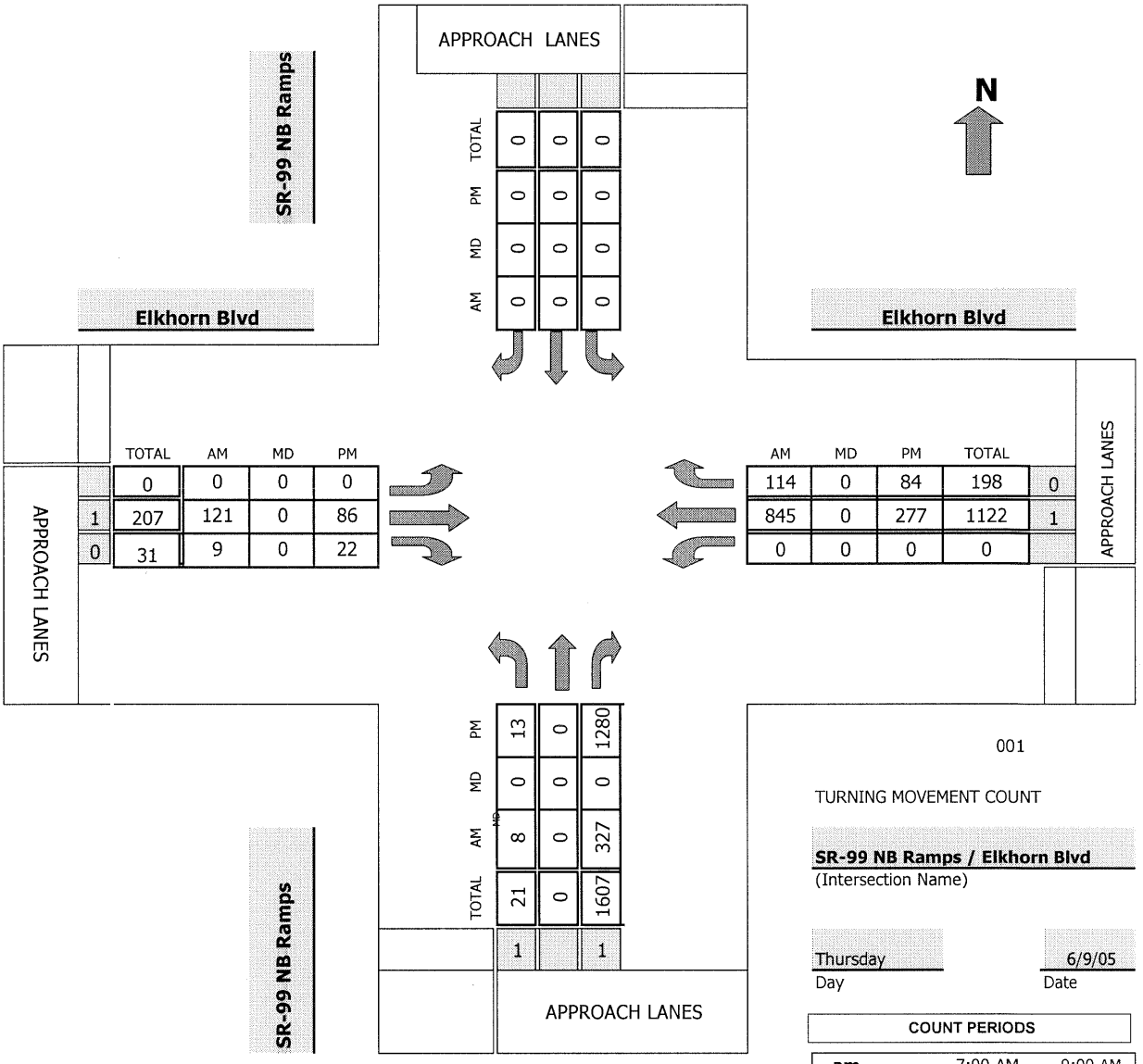
6/14/05 — Date

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

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

TMC Summary of SR-99 NB Ramps/Elkhorn Blvd

Project #: 05-7065-001



001

TURNING MOVEMENT COUNT

SR-99 NB Ramps / Elkhorn Blvd
(Intersection Name)

Thursday
Day

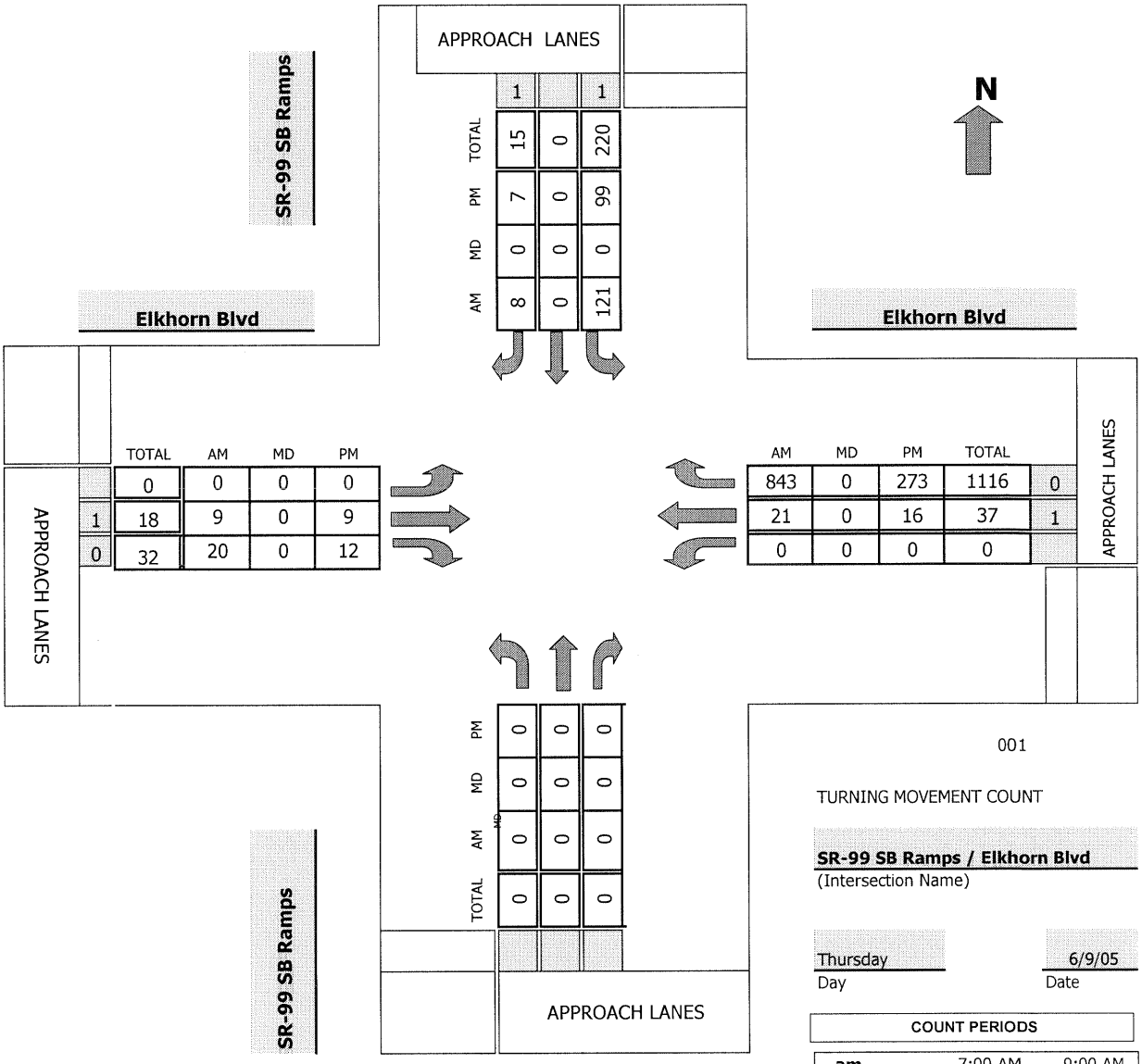
6/9/05
Date

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

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

TMC Summary of SR-99 SB Ramps/Elkhorn Blvd

Project #: 05-7065-002



001

TURNING MOVEMENT COUNT

SR-99 SB Ramps / Elkhorn Blvd
(Intersection Name)

Thursday
Day

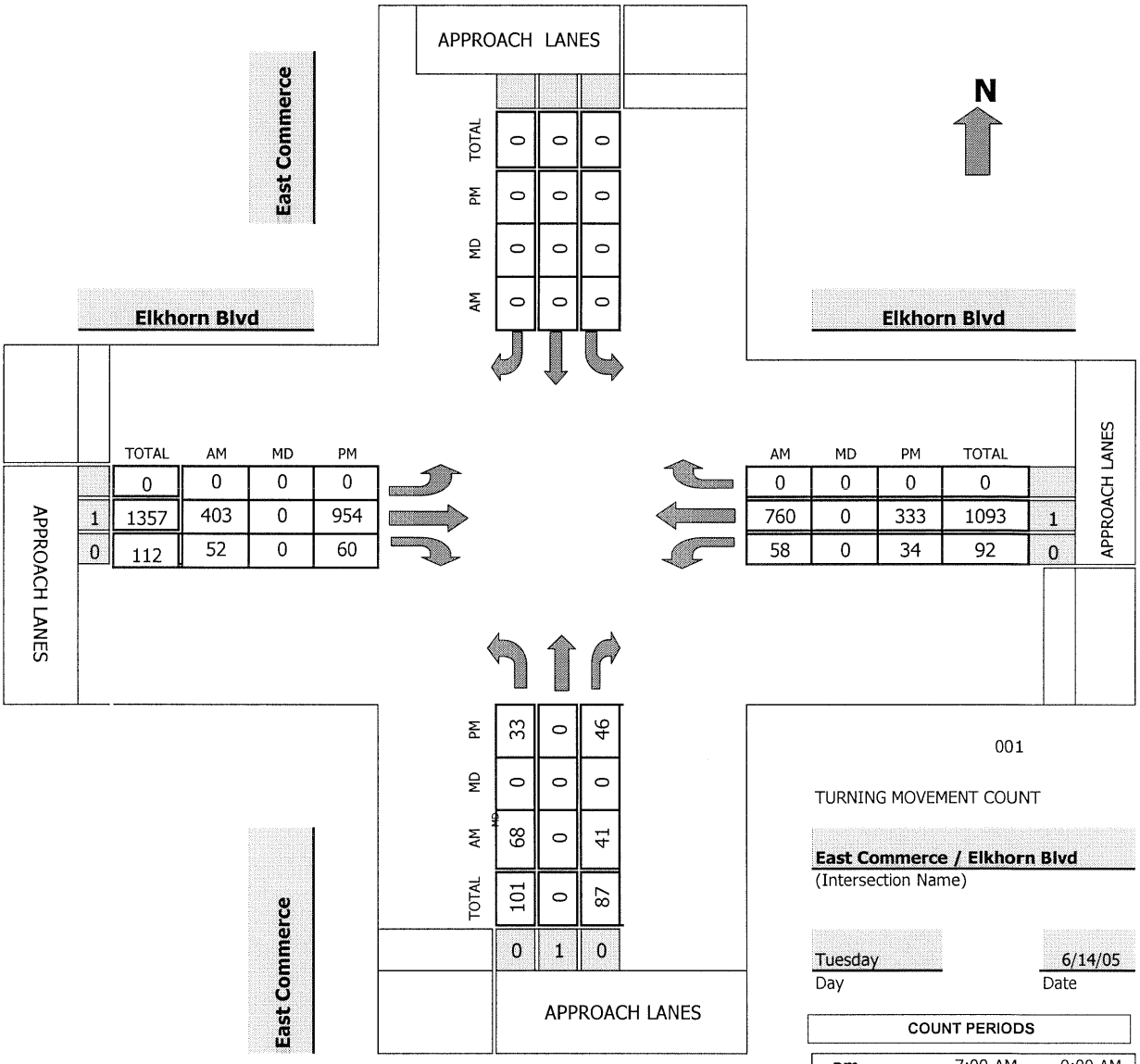
6/9/05
Date

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

AM PEAK HOUR	700 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	445 PM

TMC Summary of East Commerce/Elkhorn Blvd

Project #: 05-7065-004



001

TURNING MOVEMENT COUNT

East Commerce / Elkhorn Blvd
(Intersection Name)

Tuesday
Day

6/14/05
Date

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

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

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-001

Location: SR-99 NB off-ramp to Elkhorn Blvd

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00	20					12:00	94				
00:15	24					12:15	100				
00:30	28					12:30	78				
00:45	8	80			80	12:45	92	364			364
01:00	11					13:00	84				
01:15	11					13:15	96				
01:30	9					13:30	90				
01:45	11	42			42	13:45	107	377			377
02:00	8					14:00	78				
02:15	9					14:15	109				
02:30	4					14:30	111				
02:45	12	33			33	14:45	101	399			399
03:00	9					15:00	115				
03:15	5					15:15	145				
03:30	3					15:30	129				
03:45	7	24			24	15:45	179	568			568
04:00	6					16:00	175				
04:15	9					16:15	215				
04:30	13					16:30	246				
04:45	24	52			52	16:45	327	963			963
05:00	29					17:00	270				
05:15	27					17:15	325				
05:30	36					17:30	275				
05:45	44	136			136	17:45	216	1086			1086
06:00	60					18:00	172				
06:15	89					18:15	128				
06:30	105					18:30	106				
06:45	140	394			394	18:45	86	492			492
07:00	81					19:00	85				
07:15	100					19:15	65				
07:30	76					19:30	73				
07:45	75	332			332	19:45	71	294			294
08:00	71					20:00	53				
08:15	65					20:15	75				
08:30	85					20:30	66				
08:45	71	292			292	20:45	54	248			248
09:00	66					21:00	58				
09:15	84					21:15	63				
09:30	58					21:30	80				
09:45	85	293			293	21:45	64	265			265
10:00	54					22:00	56				
10:15	74					22:15	38				
10:30	60					22:30	45				
10:45	62	250			250	22:45	40	179			179
11:00	80					23:00	27				
11:15	92					23:15	36				
11:30	83					23:30	26				
11:45	83	338			338	23:45	26	115			115
Total Vol.		2266			**2266**			5350			**5350**

Daily Totals

NB	SB	EB	WB	**Combined**
7616				**7616**

	AM		**PM**	
Split %	100.0%	**29.8%**	100.0%	**70.2%**
Peak Hour	06:30	**06:30**	16:45	**16:45**
Volume	426	**426**	1197	**1197**
P.H.F.	0.76	**0.76**	0.95	**0.92**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-002

Location: SR-99 NB loop onramp from Elkhorn Blvd

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00	1					12:00	1				
00:15	0					12:15	0				
00:30	0					12:30	2				
00:45	0	1			1	12:45	0	3			3
01:00	0					13:00	1				
01:15	1					13:15	1				
01:30	0					13:30	0				
01:45	0	1			1	13:45	0	2			2
02:00	0					14:00	2				
02:15	0					14:15	2				
02:30	0					14:30	1				
02:45	0	0				14:45	0	5			5
03:00	0					15:00	1				
03:15	0					15:15	3				
03:30	0					15:30	1				
03:45	0	0				15:45	0	5			5
04:00	0					16:00	0				
04:15	0					16:15	0				
04:30	0					16:30	0				
04:45	1	1			1	16:45	0	0			
05:00	0					17:00	0				
05:15	3					17:15	2				
05:30	1					17:30	0				
05:45	0	4			4	17:45	1	3			3
06:00	2					18:00	2				
06:15	1					18:15	0				
06:30	1					18:30	2				
06:45	1	5			5	18:45	0	4			4
07:00	1					19:00	0				
07:15	0					19:15	1				
07:30	1					19:30	1				
07:45	1	3			3	19:45	0	2			2
08:00	1					20:00	1				
08:15	0					20:15	0				
08:30	2					20:30	0				
08:45	0	3			3	20:45	1	2			2
09:00	0					21:00	0				
09:15	0					21:15	0				
09:30	0					21:30	0				
09:45	1	1			1	21:45	1	1			1
10:00	1					22:00	0				
10:15	1					22:15	0				
10:30	1					22:30	1				
10:45	0	3			3	22:45	0	1			1
11:00	4					23:00	0				
11:15	2					23:15	0				
11:30	2					23:30	0				
11:45	2	10			10	23:45	0	0			
Total Vol.		32			**32**			28			**28**

Daily Totals

NB	SB	EB	WB	**Combined**
60				**60**

	AM		**PM**	
Split %	100.0%	**53.3%**	100.0%	**46.7%**
Peak Hour	11:00	**11:00**	13:45	**13:45**
Volume	10	**10**	5	**5**
P.H.F.	0.63	**0.63**	0.75	**0.63**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-003

Location: SR-99 NB slip on ramp from Elkhorn Blvd

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00	1					12:00	12				
00:15	0					12:15	25				
00:30	0					12:30	28				
00:45	0	1			1	12:45	22	87			87
01:00	0					13:00	27				
01:15	0					13:15	19				
01:30	1					13:30	15				
01:45	0	1			1	13:45	13	74			74
02:00	1					14:00	23				
02:15	2					14:15	26				
02:30	2					14:30	17				
02:45	0	5			5	14:45	37	103			103
03:00	2					15:00	43				
03:15	1					15:15	24				
03:30	0					15:30	32				
03:45	2	5			5	15:45	30	129			129
04:00	2					16:00	26				
04:15	2					16:15	24				
04:30	10					16:30	35				
04:45	4	18			18	16:45	25	110			110
05:00	7					17:00	23				
05:15	21					17:15	24				
05:30	21					17:30	24				
05:45	18	67			67	17:45	19	90			90
06:00	22					18:00	15				
06:15	39					18:15	19				
06:30	26					18:30	16				
06:45	27	114			114	18:45	6	56			56
07:00	33					19:00	10				
07:15	21					19:15	9				
07:30	24					19:30	16				
07:45	19	97			97	19:45	11	46			46
08:00	27					20:00	8				
08:15	18					20:15	10				
08:30	29					20:30	10				
08:45	27	101			101	20:45	12	40			40
09:00	27					21:00	5				
09:15	22					21:15	8				
09:30	14					21:30	4				
09:45	21	84			84	21:45	8	25			25
10:00	19					22:00	10				
10:15	30					22:15	4				
10:30	24					22:30	8				
10:45	17	90			90	22:45	3	25			25
11:00	30					23:00	2				
11:15	15					23:15	2				
11:30	15					23:30	6				
11:45	30	90			90	23:45	2	12			12
Total Vol.		673			**673**			797			**797**

Daily Totals

NB	SB	EB	WB	**Combined**
1470				**1470**

	AM		**PM**	
Split %	100.0%	**45.8%**	100.0%	**54.2%**
Peak Hour	06:15	**06:15**	14:45	**14:45**
Volume	125	**125**	136	**136**
P.H.F.	0.80	**0.80**	0.74	**0.79**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-004

Location: SR-99 SB off ramp to Elkhorn Blvd

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00		4				12:00		27			
00:15		2				12:15		16			
00:30		2				12:30		25			
00:45		0	8		8	12:45		17	85		85
01:00		1				13:00		22			
01:15		3				13:15		23			
01:30		0				13:30		19			
01:45		2	6		6	13:45		28	92		92
02:00		1				14:00		34			
02:15		0				14:15		28			
02:30		0				14:30		15			
02:45		0	1		1	14:45		32	109		109
03:00		2				15:00		23			
03:15		0				15:15		20			
03:30		1				15:30		25			
03:45		0	3		3	15:45		24	92		92
04:00		3				16:00		26			
04:15		4				16:15		26			
04:30		9				16:30		31			
04:45		9	25		25	16:45		22	105		105
05:00		2				17:00		25			
05:15		10				17:15		24			
05:30		23				17:30		19			
05:45		21	56		56	17:45		34	102		102
06:00		29				18:00		20			
06:15		26				18:15		14			
06:30		33				18:30		17			
06:45		46	134		134	18:45		18	69		69
07:00		29				19:00		24			
07:15		34				19:15		14			
07:30		34				19:30		6			
07:45		47	144		144	19:45		10	54		54
08:00		25				20:00		17			
08:15		34				20:15		11			
08:30		28				20:30		9			
08:45		14	101		101	20:45		11	48		48
09:00		15				21:00		13			
09:15		24				21:15		5			
09:30		17				21:30		7			
09:45		17	73		73	21:45		5	30		30
10:00		15				22:00		5			
10:15		24				22:15		5			
10:30		23				22:30		5			
10:45		13	75		75	22:45		1	16		16
11:00		24				23:00		2			
11:15		18				23:15		3			
11:30		30				23:30		3			
11:45		17	89		89	23:45		0	8		8
Total Vol.			715		**715**				810		**810**

Daily Totals

NB	SB	EB	WB	**Combined**
	1525			**1525**

	AM		**PM**	
Split %	100.0%	**46.9%**	100.0%	**53.1%**
Peak Hour	07:00	**07:00**	13:30	**13:30**
Volume	144	**144**	109	**109**
P.H.F.	0.77	**0.77**	0.80	**0.80**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-005

Location: SR-99 SB loop on ramp from Elkhorn Blvd

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00		11				12:00		99			
00:15		6				12:15		116			
00:30		8				12:30		98			
00:45		5	30		30	12:45		93	406		406
01:00		4				13:00		109			
01:15		4				13:15		84			
01:30		4				13:30		76			
01:45		6	18		18	13:45		106	375		375
02:00		2				14:00		104			
02:15		6				14:15		94			
02:30		4				14:30		105			
02:45		4	16		16	14:45		88	391		391
03:00		9				15:00		112			
03:15		8				15:15		94			
03:30		21				15:30		95			
03:45		12	50		50	15:45		90	391		391
04:00		17				16:00		65			
04:15		33				16:15		78			
04:30		52				16:30		74			
04:45		30	132		132	16:45		65	282		282
05:00		36				17:00		68			
05:15		60				17:15		64			
05:30		97				17:30		57			
05:45		85	278		278	17:45		77	266		266
06:00		114				18:00		55			
06:15		131				18:15		59			
06:30		163				18:30		62			
06:45		169	577		577	18:45		46	222		222
07:00		158				19:00		41			
07:15		207				19:15		61			
07:30		195				19:30		43			
07:45		197	757		757	19:45		32	177		177
08:00		184				20:00		36			
08:15		169				20:15		23			
08:30		121				20:30		40			
08:45		132	606		606	20:45		38	137		137
09:00		100				21:00		33			
09:15		113				21:15		28			
09:30		80				21:30		35			
09:45		98	391		391	21:45		33	129		129
10:00		68				22:00		31			
10:15		76				22:15		25			
10:30		89				22:30		23			
10:45		90	323		323	22:45		14	93		93
11:00		86				23:00		19			
11:15		84				23:15		7			
11:30		116				23:30		12			
11:45		93	379		379	23:45		13	51		51
Total Vol.			3557		**3557**				2920		**2920**

Daily Totals

NB	SB	EB	WB	**Combined**
	6477			**6477**

	AM		**PM**	
Split %	100.0%	**54.9%**	100.0%	**45.1%**
Peak Hour	07:15	**07:15**	12:15	**12:15**
Volume	783	**783**	416	**416**
P.H.F.	0.95	**0.95**	0.90	**0.90**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-006

Location: SR-99 SB slip on ramp from Elkhorn

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00		0				12:00		4			
00:15		0				12:15		3			
00:30		0				12:30		2			
00:45		0	0			12:45		3	12		12
01:00		0				13:00		5			
01:15		1				13:15		2			
01:30		0				13:30		2			
01:45		0	1		1	13:45		5	14		14
02:00		0				14:00		2			
02:15		0				14:15		2			
02:30		0				14:30		5			
02:45		0	0			14:45		1	10		10
03:00		0				15:00		10			
03:15		0				15:15		3			
03:30		0				15:30		3			
03:45		0	0			15:45		3	19		19
04:00		0				16:00		3			
04:15		0				16:15		3			
04:30		1				16:30		2			
04:45		3	4		4	16:45		6	14		14
05:00		1				17:00		3			
05:15		0				17:15		3			
05:30		1				17:30		2			
05:45		0	2		2	17:45		1	9		9
06:00		1				18:00		5			
06:15		1				18:15		0			
06:30		0				18:30		3			
06:45		0	2		2	18:45		4	12		12
07:00		0				19:00		3			
07:15		1				19:15		3			
07:30		4				19:30		1			
07:45		16	21		21	19:45		4	11		11
08:00		4				20:00		1			
08:15		2				20:15		0			
08:30		8				20:30		3			
08:45		2	16		16	20:45		6	10		10
09:00		2				21:00		0			
09:15		3				21:15		0			
09:30		2				21:30		1			
09:45		6	13		13	21:45		0	1		1
10:00		1				22:00		4			
10:15		1				22:15		1			
10:30		2				22:30		2			
10:45		5	9		9	22:45		1	8		8
11:00		0				23:00		1			
11:15		0				23:15		0			
11:30		3				23:30		1			
11:45		2	5		5	23:45		1	3		3
Total Vol.			73		**73**				123		**123**

Daily Totals

NB	SB	EB	WB	Combined
	196			**196**

	AM		PM	
Split %	100.0%	**37.2%**	100.0%	**62.8%**
Peak Hour	07:45	**07:45**	14:30	**14:30**
Volume	30	**30**	19	**19**
P.H.F.	0.47	**0.47**	0.48	**0.48**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-011

Location: I-5 SB on ramp from SR-99 SB

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00		35				12:00		313			
00:15		33				12:15		338			
00:30		37				12:30		309			
00:45		26	131		131	12:45		270	1230		1230
01:00		29				13:00		280			
01:15		27				13:15		338			
01:30		27				13:30		311			
01:45		19	102		102	13:45		317	1246		1246
02:00		27				14:00		387			
02:15		30				14:15		324			
02:30		25				14:30		351			
02:45		26	108		108	14:45		324	1386		1386
03:00		28				15:00		340			
03:15		44				15:15		368			
03:30		60				15:30		371			
03:45		54	186		186	15:45		355	1434		1434
04:00		82				16:00		445			
04:15		93				16:15		369			
04:30		122				16:30		363			
04:45		137	434		434	16:45		312	1489		1489
05:00		198				17:00		299			
05:15		294				17:15		264			
05:30		396				17:30		260			
05:45		442	1330		1330	17:45		279	1102		1102
06:00		515				18:00		261			
06:15		607				18:15		231			
06:30		726				18:30		250			
06:45		737	2585		2585	18:45		170	912		912
07:00		745				19:00		180			
07:15		794				19:15		154			
07:30		768				19:30		151			
07:45		729	3036		3036	19:45		144	629		629
08:00		638				20:00		136			
08:15		545				20:15		128			
08:30		485				20:30		112			
08:45		535	2203		2203	20:45		141	517		517
09:00		380				21:00		116			
09:15		380				21:15		115			
09:30		352				21:30		100			
09:45		320	1432		1432	21:45		124	455		455
10:00		349				22:00		104			
10:15		289				22:15		86			
10:30		340				22:30		96			
10:45		306	1284		1284	22:45		82	368		368
11:00		313				23:00		58			
11:15		323				23:15		51			
11:30		297				23:30		39			
11:45		308	1241		1241	23:45		50	198		198
Total Vol.			14072		**14072**				10966		**10966**

Daily Totals

NB	SB	EB	WB	**Combined**
	25038			**25038**

	AM		**PM**	
Split %	100.0%	**56.2%**	100.0%	**43.8%**
Peak Hour	06:45	**06:45**	15:30	**15:30**
Volume	3044	**3044**	1540	**1540**
P.H.F.	0.96	**0.96**	0.87	**0.87**

Volumes for: Tuesday, June 14, 2005 City: Sacramento Project #: 05-7066-012

Location: I-5 NB off ramp to SR-99 NB

AM Period	NB	SB	EB	WB		PM Period	NB	SB	EB	WB	
00:00	73					12:00	271				
00:15	61					12:15	276				
00:30	52					12:30	261				
00:45	34	220			220	12:45	293	1101			1101
01:00	29					13:00	313				
01:15	37					13:15	303				
01:30	23					13:30	295				
01:45	26	115			115	13:45	310	1221			1221
02:00	24					14:00	312				
02:15	26					14:15	390				
02:30	21					14:30	413				
02:45	37	108			108	14:45	445	1560			1560
03:00	25					15:00	481				
03:15	32					15:15	481				
03:30	25					15:30	546				
03:45	40	122			122	15:45	603	2111			2111
04:00	53					16:00	667				
04:15	72					16:15	743				
04:30	96					16:30	759				
04:45	103	324			324	16:45	792	2961			2961
05:00	159					17:00	844				
05:15	183					17:15	796				
05:30	215					17:30	799				
05:45	236	793			793	17:45	604	3043			3043
06:00	331					18:00	529				
06:15	415					18:15	436				
06:30	389					18:30	347				
06:45	360	1495			1495	18:45	305	1617			1617
07:00	292					19:00	263				
07:15	304					19:15	228				
07:30	262					19:30	212				
07:45	242	1100			1100	19:45	222	925			925
08:00	239					20:00	181				
08:15	264					20:15	219				
08:30	240					20:30	169				
08:45	256	999			999	20:45	195	764			764
09:00	258					21:00	161				
09:15	302					21:15	182				
09:30	235					21:30	173				
09:45	278	1073			1073	21:45	180	696			696
10:00	252					22:00	150				
10:15	234					22:15	159				
10:30	243					22:30	132				
10:45	273	1002			1002	22:45	102	543			543
11:00	256					23:00	99				
11:15	269					23:15	92				
11:30	269					23:30	64				
11:45	272	1066			1066	23:45	59	314			314
Total Vol.		8417			**8417**			16856			**16856**

Daily Totals

NB	SB	EB	WB	**Combined**
25273				**25273**

	AM		**PM**	
Split %	100.0%	**33.3%**	100.0%	**66.7%**
Peak Hour	06:00	**06:00**	16:45	**16:45**
Volume	1495	**1495**	3231	**3231**
P.H.F.	0.90	**0.90**	0.96	**0.96**

CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

									AM PEAK							PM PEAK						
DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
10	099	SJ		6.654	6	A	02	N	2728	7.79	73.83	5.75	8	WED	MAR	N	2478	8.91	58.64	5.22	16	FRI	JUL
10	099	SJ		18.68	96	A	02	S	4293	7.84	54.22	4.25	9	THU	NOV	N	4179	8.19	50.51	4.14	17	FRI	MAY
10	099	SJ		19.29	282	A	02	S	3812	7.18	55.48	3.99	7	FRI	MAY	N	3983	7.9	52.7	4.16	17	THU	JUN
10	099	SJ		21.67	115	A	02	S	4257	7.76	60.96	4.73	8	WED	FEB	N	4148	7.98	57.73	4.61	18	THU	MAY
10	099	SJ		22.92	265	A	02	S	3378	8.03	63.68	5.11	8	TUE	FEB	S	3727	8.74	64.49	5.64	14	SAT	FEB
10	099	SJ		29.50	18	B	02	S	2820	7.39	60.91	4.5	8	THU	JAN	N	2784	8.37	53.12	4.45	17	THU	SEP
10	099	SJ		31.58	209	A	02	S	2497	6.7	62.04	4.15	8	FRI	MAR	N	2782	8.7	53.17	4.63	17	FRI	MAR
03	099	SAC		.123	500	O	02	S	2231	6.69	57.4	3.84	8	THU	MAR	S	2585	8.7	51.17	4.45	17	FRI	MAY
03	099	SAC		3.525	307	A	02	N	2559	6.52	64.54	4.21	7	THU	NOV	S	2745	8.25	54.77	4.52	18	FRI	NOV
03	099	SAC		6.008	501	A	00	S	2255	6.81	59.89	4.08	7	TUE	NOV	N	2580	8.54	54.64	4.66	17	FRI	MAR
03	099	SAC		17.24	520	B	02	N	5146	6.44	59.78	3.85	8	FRI	JAN	S	5666	6.97	60.82	4.24	18	THU	APR
03	099	SAC		17.24	521	A	00	N	4139	6.68	63.42	4.24	8	THU	FEB	S	4333	7.06	62.83	4.43	18	THU	MAR
03	099	SAC		33.36	545	B	02	S	3314	10.3	77.92	8.03	8	TUE	MAY	N	3509	11.69	72.71	8.5	17	FRI	DEC
03	099	SUT	R	8.07	344	B	02	S	1578	7.26	83.8	6.08	7	WED	OCT	N	1625	9.54	65.66	6.26	18	FRI	AUG
03	099	SUT	R	8.07	547	A	02	S	864	8.3	77.07	6.4	8	TUE	SEP	N	895	9.02	73.42	6.62	18	THU	JUN
03	099	SUT	R	19.69	549	B	02	S	942	8.14	81.42	6.62	7	TUE	MAY	N	944	9.94	66.81	6.64	17	FRI	MAY
03	099	SUT		20.99	550	B	02	S	717	7.58	78.79	5.97	8	TUE	NOV	N	735	9.9	61.87	6.12	17	FRI	OCT
03	099	SUT		20.99	551	A	02	S	839	7.3	77.97	5.69	7	TUE	MAY	N	915	10.06	61.74	6.21	18	FRI	SEP
03	099	SUT		28.67	558	A	02	N	1310	7.13	63.35	4.51	9	WED	SEP	N	1499	9.22	56.02	5.17	18	FRI	SEP
03	099	SUT		28.67	559	B	02	S	901	5.9	65.58	3.87	7	WED	SEP	N	1147	8.35	59	4.93	18	FRI	JUN
03	099	SUT		29.67	553	A	02	N	1236	6.77	56.59	3.83	11	SAT	AUG	N	1585	8.75	56.13	4.91	17	FRI	MAY
03	099	SUT		30.03	560	A	02	N	1159	7.11	52.92	3.76	12	FRI	AUG	N	1501	9.16	53.19	4.87	18	FRI	NOV
03	099	SUT	T	30.63	562	A	02	S	936	6.86	67.24	4.61	8	FRI	MAY	N	1065	8.95	58.68	5.25	18	FRI	NOV
03	099	BUT		11.16	572	B	00	S	467	8.66	52.12	4.51	9	TUE	NOV	S	573	10.43	53.11	5.54	17	WED	NOV
03	099	BUT		11.16	573	A	00	S	468	8.65	51.6	4.46	9	TUE	NOV	S	577	9.84	55.91	5.5	15	WED	NOV
03	099	BUT		13.16	574	B	02	S	433	7.9	50.41	3.98	8	WED	MAY	S	537	9.39	52.6	4.94	16	FRI	MAY
03	099	BUT		21.81	306	A	02	S	1263	8.94	57.02	5.1	8	MON	APR	S	1293	9.86	52.95	5.22	16	FRI	MAR
03	099	BUT	R	30.60	585	B	02	S	1891	9.21	63.54	5.85	8	THU	FEB	N	1795	9.44	58.85	5.55	16	TUE	FEB
03	099	BUT	R	36.31	590	A	02	S	1040	8.61	64.44	5.54	8	THU	NOV	N	1033	9.66	57.01	5.51	18	FRI	FEB
02	099	TEH		0	182	O	02	S	516	7.83	57.65	4.52	8	TUE	FEB	N	643	10.36	54.31	5.63	17	FRI	MAY
02	099	TEH		24.94	141	B	00	N	519	8.08	67.14	5.43	8	TUE	NOV	S	472	8.9	55.46	4.94	18	WED	FEB
07	101	LA	S	.907	131	A	01	N	4128	5.93	57.45	3.41	7	WED	MAY	S	4568	6.54	57.67	3.77	16	THU	MAR
07	101	LA		.46	441	A	01	N	8274	6.12	62.51	3.83	8	FRI	DEC	S	7458	6.15	56.13	3.45	17	THU	OCT

CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

									AM PEAK							PM PEAK						
DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
06	005	KER		13.52	631	A	02	N	3654	8.96	63.28	5.67	8	SAT	MAY	S	4656	13.65	52.95	7.23	16	WED	DEC
06	005	KER		19.61	640	A	02	N	2179	11.52	64.97	7.48	12	SAT	NOV	S	2714	13.31	70.02	9.32	18	SAT	DEC
06	005	KER		33.49	158	A	00	N	1053	7.84	57.04	4.47	12	FRI	JUN	S	1500	11.69	54.49	6.37	17	SUN	JUN
06	005	KER		47.55	201	A	01	S	1176	7.82	52.15	4.08	11	FRI	APR	N	1915	12.02	55.22	6.64	14	SUN	JUL
06	005	KIN		16.57	203	A	02	S	2269	12.48	56.44	7.05	12	THU	DEC	N	2865	17.16	51.87	8.9	15	SUN	JUL
06	005	FRE		48.99	851	A	02	S	2407	9.74	71.47	6.96	7	THU	NOV	N	2895	16.63	50.33	8.37	14	SUN	NOV
10	005	MER		6.28	304	A	01	S	1603	9.04	58.02	5.24	11	MON	MAY	N	2292	13.57	55.24	7.5	17	SUN	JUL
10	005	MER		17.58	284	A	01	S	1358	9.23	53.05	4.89	12	SUN	JUL	N	1962	10.74	65.86	7.07	21	SUN	APR
10	005	MER		21.84	50	A	01	N	1642	10.68	50.35	5.38	12	SAT	SEP	N	2183	10.96	65.2	7.15	20	SUN	JUL
10	005	SJ		3.444	183	A	01	S	1017	8.51	61.12	5.2	12	MON	APR	N	1212	11.74	52.79	6.2	16	FRI	AUG
10	005	SJ		6.467	82	A	02	S	1036	9.32	53.35	4.97	12	SAT	AUG	N	1275	11.04	55.41	6.12	18	FRI	JUN
10	005	SJ	R	12.62	13	A	01	S	5972	6.59	71.56	4.72	7	TUE	SEP	N	6250	7.4	66.7	4.94	16	FRI	OCT
10	005	SJ		28.53	55	A	02	S	5730	7.8	63.15	4.92	7	MON	APR	N	5756	8.41	58.82	4.95	16	THU	MAY
10	005	SJ		32.66	161	A	02	N	2732	6.78	57.54	3.9	12	SAT	APR	N	3448	9.36	52.56	4.92	17	FRI	FEB
10	005	SJ		39.57	180	A	02	N	3231	7.37	81.65	6.02	12	FRI	MAR	N	4139	9.35	82.5	7.71	17	FRI	JUL
10	005	SJ		39.57	230	B	02	S	2363	6.72	61.63	4.14	12	FRI	DEC	S	2988	7.95	65.86	5.23	14	SUN	NOV
10	005	SJ		44.71	24	B	01	N	2048	7.21	59.52	4.29	11	SAT	OCT	N	2448	9.78	52.47	5.13	18	FRI	AUG
03	005	SAC		10.29	8	A	02	N	2847	7.62	63.58	4.85	8	MON	APR	S	3134	9.79	54.48	5.33	17	FRI	JUL
03	005	SAC		12.04	10	A	02	N	4920	8.29	69.49	5.76	8	TUE	MAR	S	4996	9.51	61.47	5.85	18	FRI	MAR
03	005	SAC		17.19	12	B	02	N	5595	8.27	70.98	5.87	8	MON	AUG	S	5726	9.63	62.36	6	17	FRI	MAR
03	005	SAC		17.19	15	A	02	N	7007	8.45	73.4	6.2	7	THU	APR	S	6932	9.02	68.03	6.13	18	TUE	OCT
03	005	SAC		23.18	25	A	00	N	7728	8.96	56.6	5.07	8	THU	MAR	S	7471	9.35	52.41	4.9	17	FRI	FEB
03	005	SAC		23.80	30	A	00	N	7439	8.86	55.51	4.92	8	MON	NOV	N	7976	9.47	55.65	5.27	18	FRI	JUN
03	005	SAC		26.72	39	B	02	S	6623	8.22	58.89	4.84	8	THU	SEP	N	6731	8.13	60.51	4.92	18	TUE	JUL
03	005	SAC		26.72	40	A	02	S	5150	7.72	63.53	4.9	8	THU	JUN	N	5771	8.14	67.49	5.5	18	THU	JAN
03	005	SAC		29.91	50	A	02	N	2604	7.01	52.03	3.65	12	FRI	JUL	S	3043	8.09	52.74	4.26	18	FRI	JUL
03	005	YOL	R	6.5	70	A	02	S	1492	6.8	56.43	3.84	8	WED	JAN	S	1762	8.3	54.6	4.53	16	FRI	APR
03	005	YOL	R	7.086	75	A	02	N	1345	7.06	60.26	4.26	11	THU	JUL	S	1685	9.15	58.28	5.33	14	SUN	JUL
03	005	YOL	R	22.61	79	B	02	N	1115	9.03	56.57	5.11	12	FRI	AUG	S	1300	10.97	54.28	5.95	14	SUN	NOV
03	005	YOL	R	22.61	80	A	02	N	1763	10.9	50.82	5.54	12	THU	NOV	S	2161	9.38	72.44	6.79	19	MON	MAY
03	005	COL	R	6.793	82	B	02	N	1194	7.84	53.45	4.19	12	FRI	OCT	S	1691	9.37	63.31	5.93	15	SUN	OCT
03	005	COL	R	17.98	85	B	02	N	1633	10.5	57.52	6.04	12	SAT	AUG	S	2013	12.57	59.22	7.45	15	SUN	AUG
03	005	GLE	R	27.81	95	A	02	N	1375	9.22	61	5.62	12	WED	JUL	S	1781	10.19	71.47	7.28	19	SUN	JUL

Mile-post	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
4.39	Mingo Road	5,300	70,000	61,000
6.01	Arno Road	5,300	68,000	61,000
7.36	Dillard Road	5,300	68,000	60,000
8.96	Eschinger Road	5,100	66,000	60,000
10.07	Grant Line Road	4,750	65,000	55,000
12.76	Elk Grove Boulevard	6,800	95,000	80,000
13.84	Laguna Boulevard/Bond Road	9,100	116,000	106,000
14.87	Sheldon Road			
15.90	Cosumnes River Boulevard/ Calvine Road	8,300	131,000	117,000
		10,100	141,000	133,000
17.24	Sacramento, Stockton Boulevard	7,900	108,000	103,000
17.66	Sacramento, Mack Road	13,300	179,000	172,000
19.61	Florin Road	13,200	172,000	160,000
20.86	47th Avenue	17,400	195,000	193,000
21.57	Martin Luther King Jr. Boulevard	15,700	187,000	185,000
21.94	Sacramento, Fruitridge Road	17,800	199,000	195,000
23.13	Sacramento, 12th Avenue			
R24.35	Sacramento, Jct. Rte. 51, North Jct. Rte. 50; End Freeway	16,600	224,000	216,000
	(Break in Route)			
R32.12	Jct. Rte. 5, El Centro Road	4,800	45,500	41,000
33.36	Elkhorn Boulevard	3,600	36,500	31,000
35.37	Elverta Road			

Mile-post	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
35.37	Elverta Road	3,050	35,500	31,000
36.86 =0.00	**Sacramento County Sutter County**			
		3,050	35,500	31,000
0.95	Riego Road	2,450	29,000	26,000
R8.07	Jct. Rte. 70 North			
R8.11 =8.18	Milepost Equation	1,350	14,800	13,400
11.98	Garden Highway (to Nicolaus)			
12.03	Feather River Bridge	1,400	15,200	14,000
13.68	Sacramento Avenue	1,400	15,600	14,200
R19.69	Garden Highway; Tudor, East	1,150	13,300	12,000
20.99	Jct. Rte. 113	1,450	16,300	14,700
25.62	Oswald Road	1,600	18,300	17,000
26.12	Barry Road	1,650	19,400	18,400
27.65	Bogue Road	2,050	25,500	23,300
28.67	Lincoln Road	2,650	32,000	29,000
		3,050	36,000	34,500
29.67	Franklin Road	2,800	34,000	32,000
30.03	Yuba City, Bridge Street	2,800	32,000	31,000
30.39	Yuba City, Onstott Road	3,150	34,000	32,000
T30.63	Yuba City, Jct. Rte. 20	1,850	21,500	20,200
R30.88	Begin Freeway	1,800	20,300	19,300
R31.31	Yuba City, Queens Avenue	1,350	18,500	17,900
R33.95	Eager Road	1,550	18,200	16,300
T34.97	End Freeway			
T35.96	Lomo, Encinal Road/ Live Oak Highway	1,550	17,000	15,700

Mile-post	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
R21.44	Mathews Road			
		9,000	83,000	70,000
R22.51	French Camp Turnpike			
		9,500	93,000	84,000
		10,400	102,000	91,000
24.64	Stockton, Eighth Street			
25.37	Stockton, Jct. Rte. 4, Charter Way	11,200	113,000	100,000
		12,500	122,000	105,000
26.19	Stockton, Jct. Rte. 4			
		13,100	131,000	113,000
27.00	Stockton, Pershing Avenue			
27.92	Stockton, Monte Diablo Avenue	12,300	114,000	111,000
		12,200	107,000	105,000
28.53	Country Club Boulevard			
29.52	Plymouth Road/Ryde Avenue (Calaveras River)	13,400	126,000	116,000
		11,500	106,000	105,000
29.99	Stockton, March Lane			
		10,800	98,000	98,000
31.45	Stockton, Benjamin Holt Drive			
		10,600	104,000	100,000
32.66	Stockton, Hammer Lane			
		7,700	77,000	70,000
35.30	Atherton/Eight Mile Roads			
		5,100	56,000	56,000
39.57	Jct. Rte. 12			
		5,100	56,000	53,000
		4,850	59,000	55,000
44.71	Peltier Road			
		4,800	56,000	51,000
47.60	Walnut Grove Road			
49.82	**San Joaquin-Sacramento County** Line	4,950	55,000	51,000

DISTRICT 3

0.02	**San Joaquin-Sacramento County** Line			
		4,600	54,000	47,000
2.13	Twin Cities Road			
		5,000	57,000	49,000
8.49	Hood-Franklin Road			
		5,700	60,000	50,000
10.83	Elk Grove Boulevard			
		5,700	66,000	56,000
		4,900	55,000	55,000
12.04	Laguna Boulevard			
16.15	Sacramento, Pocket/ Meadowview Roads	8,300	96,000	85,000
		9,100	105,000	95,000
17.19	Sacramento, Florin Road			
		10,800	122,000	112,000
18.65	Sacramento, 43rd Avenue			
		10,700	138,000	126,000
19.30	Sacramento, Seamas Avenue			
		11,000	138,000	127,000
20.53	Sacramento, Sutterville Road			
		14,200	136,000	129,000
22.57	Sacramento, Jct. Rte. 50			
		14,400	160,000	156,000
23.18	Sacramento, P/Q Streets			
		14,100	167,000	158,000
23.80	Sacramento, I Street			
		14,200	169,000	157,000
24.65	Sacramento, Richards Boulevard			
		15,300	170,000	159,000
25.34	Sacramento, Garden Highway			
25.97	Sacramento, West El Camino Avenue	14,300	169,000	149,000
		12,000	141,000	136,000
26.72	Sacramento, Jct. Rte. 80			
		8,500	111,000	101,000
		9,500	109,000	97,000
29.02	Sacramento, Del Paso Road			
		9,200	107,000	97,000
29.91	Sacramento, Jct. Rte. 99 North			
		5,800	81,000	71,000
32.73	Airport Boulevard			
		4,400	61,000	56,000
33.72	Southbound Access to the Elkhorn Safety Roadside Rest Area			
34.65 =0.00	**Sacramento County Yolo County**			
		4,400	61,000	56,000
0.52	Elkhorn Road			

APPENDIX B – LEVEL OF SERVICE WORKSHEETS: EXISTING CONDITIONS

- Intersection Analysis
- Freeway Mainline Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	1	17	2	4	34	1	3	8	3	5	19	5
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)	1	18	2	4	37	1	3	9	3	5	21	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	42	15	32
Volume Left (vph)	1	4	3	5
Volume Right (vph)	2	1	3	5
Hadj (s)	0.0	0.0	-0.1	0.0
Departure Headway (s)	4.0	4.1	4.0	4.0
Degree Utilization, x	0.02	0.05	0.02	0.04
Capacity (veh/h)	879	622	872	887
Control Delay (s)	7.1	7.3	7.1	7.2
Approach Delay (s)	7.1	7.3	7.1	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay		7.2	
HCM Level of Service		A	
Intersection Capacity Utilization	13.3%	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)	1	31	2	3	10	4	1	14	15	1	4	1
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)	1	34	2	3	11	4	1	15	16	1	4	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	37	18	33	7
Volume Left (vph)	1	3	1	1
Volume Right (vph)	2	4	16	1
Hadj (s)	0.0	-0.1	-0.3	0.0
Departure Headway (s)	4.0	4.0	3.8	4.0
Degree Utilization, x	0.04	0.02	0.03	0.01
Capacity (veh/h)	886	629	932	885
Control Delay (s)	7.2	7.0	6.9	7.0
Approach Delay (s)	7.2	7.0	6.9	7.0
Approach LOS	A	A	A	A

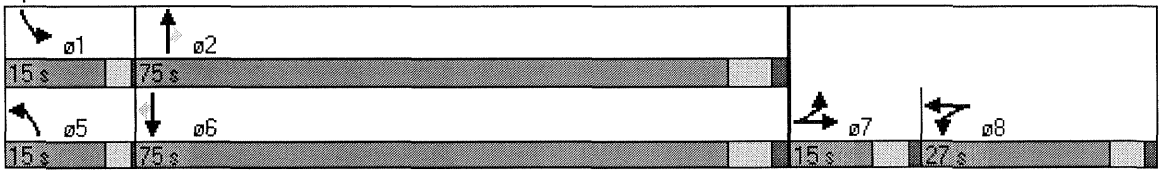
Intersection Summary			
Delay	7.0		
HCM Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Satd. Flow (prot)	0	1829	1583	1681	1692	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1829	1583	1681	1692	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			21			33			57			8
Volume (vph)	3	5	19	428	17	30	47	911	52	28	2322	16
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
Adj. Flow (vph)	3	5	21	465	18	33	51	990	57	30	2524	17
Lane Group Flow (vph)	0	8	21	235	248	33	51	990	57	30	2524	17
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Detector Phases	7	7		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		2.0	8.0	8.0	2.0	8.0	8.0
Minimum Split (s)	21.5	21.5		17.5	17.5		5.5	19.0	19.0	5.5	19.0	19.0
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	11%	11%	0%	20%	20%	0%	11%	57%	57%	11%	57%	57%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.5	1.5		1.5	1.5		0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		5.8	111.1	20.0	20.0	111.1	7.3	74.8	74.8	6.2	71.8	71.8
Actuated g/C Ratio		0.05	1.00	0.18	0.18	1.00	0.06	0.67	0.67	0.05	0.65	0.65
v/c Ratio		0.09	0.01	0.78	0.82	0.02	0.44	0.42	0.05	0.32	1.10	0.02
Uniform Delay, d1		56.4	0.0	46.8	47.1	0.0	54.0	10.6	0.0	55.6	22.3	4.5
Delay		57.4	0.0	49.2	50.9	0.0	53.0	10.1	2.8	54.4	82.7	7.6
LOS		E	A	D	D	A	D	B	A	D	F	A
Approach Delay		15.8			46.9			11.8			81.9	
Approach LOS		B			D			B			F	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 111.1
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 58.9 Intersection LOS: E
Intersection Capacity Utilization 96.5% ICU Level of Service E

Splits and Phases: 2: Elverta Road & SR 70/99

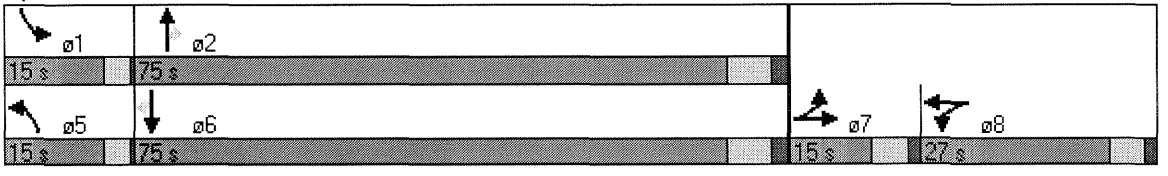


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1844	1583	1681	1694	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.990		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1844	1583	1681	1694	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			27			7			280			4
Volume (vph)	8	31	25	63	4	6	39	1806	410	54	1038	4
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
Adj. Flow (vph)	9	34	27	68	4	7	42	1963	446	59	1128	4
Lane Group Flow (vph)	0	43	27	35	37	7	42	1963	446	59	1128	4
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Detector Phases	7	7		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		2.0	8.0	8.0	2.0	8.0	8.0
Minimum Split (s)	21.5	21.5		17.5	17.5		5.5	19.0	19.0	5.5	19.0	19.0
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	11%	11%	0%	20%	20%	0%	11%	57%	57%	11%	57%	57%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.5	1.5		1.5	1.5		0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		7.7	110.2	7.6	7.6	110.2	6.8	79.4	79.4	7.7	82.5	82.5
Actuated g/C Ratio		0.07	1.00	0.07	0.07	1.00	0.06	0.72	0.72	0.07	0.75	0.75
v/c Ratio		0.35	0.02	0.31	0.32	0.00	0.40	0.77	0.37	0.48	0.43	0.00
Uniform Delay, d1		53.0	0.0	51.8	51.9	0.0	54.2	12.2	2.3	52.6	7.0	0.0
Delay		49.8	0.0	49.5	49.5	0.0	50.5	17.1	3.5	48.9	8.4	5.5
LOS		D	A	D	D	A	D	B	A	D	A	A
Approach Delay		30.6			45.1			15.2			10.4	
Approach LOS		C			D			B			B	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 110.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 69.6% ICU Level of Service B

Splits and Phases: 2: Elverta Road & SR 70/99



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	2	5	10	5	3	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	2	5	11	5	3	39

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	8	16	42
Volume Left (vph)	2	0	3
Volume Right (vph)	5	5	0
Hadj (s)	-0.3	-0.2	0.0
Departure Headway (s)	3.6	3.8	4.0
Degree Utilization, x	0.01	0.02	0.05
Capacity (veh/h)	667	944	899
Control Delay (s)	6.6	6.9	7.2
Approach Delay (s)	6.6	6.9	7.2
Approach LOS	A	A	A

Intersection Summary			
Delay		7.0	
HCM Level of Service		A	
Intersection Capacity Utilization	13.3%	ICU Level of Service	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	5	15	65	1	0	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	16	71	1	0	49

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	22	72	49
Volume Left (vph)	5	0	0
Volume Right (vph)	16	1	0
Hadj (s)	-0.4	0.0	0.0
Departure Headway (s)	3.7	4.0	4.0
Degree Utilization, x	0.02	0.08	0.05
Capacity (veh/h)	658	880	884
Control Delay (s)	6.8	7.4	7.3
Approach Delay (s)	6.8	7.4	7.3
Approach LOS	A	A	A

Intersection Summary			
Delay		7.2	
HCM Level of Service		A	
Intersection Capacity Utilization	13.8%	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)	8	0	0	7	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	9	0	0	8	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			9		16	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1611		1002	1073

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	9	8	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1611	1700
Volume to Capacity	0.01	0.00	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	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)	1	0	0	20	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1	0	0	22	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1		23	1
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1622		993	1083

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1	22	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1622	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	9	21	0	121	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	10	23	0	132	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	23				33	23
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				87	99
cM capacity (veh/h)	1592				981	1054

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	10	23	132	9
Volume Left	0	0	132	0
Volume Right	0	0	0	9
cSH	1700	1700	981	1054
Volume to Capacity	0.01	0.01	0.13	0.01
Queue Length (ft)	0	0	12	1
Control Delay (s)	0.0	0.0	9.2	8.4
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.2	
Approach LOS			A	

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	9	16	0	99	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	10	17	0	108	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	17				27	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				89	99
cM capacity (veh/h)	1600				988	1061

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	10	17	108	8
Volume Left	0	0	108	0
Volume Right	0	0	0	8
cSH	1700	1700	988	1061
Volume to Capacity	0.01	0.01	0.11	0.01
Queue Length (ft)	0	0	9	1
Control Delay (s)	0.0	0.0	9.1	8.4
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.0	
Approach LOS			A	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	121	0	0	845	8	327
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	132	0	0	918	9	355
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			132		1050	132
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	61
cM capacity (veh/h)			1454		252	918

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	132	918	9	355
Volume Left	0	0	9	0
Volume Right	0	0	0	355
cSH	1700	1700	252	918
Volume to Capacity	0.08	0.54	0.03	0.39
Queue Length (ft)	0	0	3	46
Control Delay (s)	0.0	0.0	19.8	11.4
Lane LOS			C	B
Approach Delay (s)	0.0	0.0	11.6	
Approach LOS			B	

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	58.3%	ICU Level of Service	A

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	86	0	0	277	13	1280
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	93	0	0	301	14	1391
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			93		395	93
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	0
cM capacity (veh/h)			1501		610	964

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	93	301	14	1391
Volume Left	0	0	14	0
Volume Right	0	0	0	1391
cSH	1700	1700	610	964
Volume to Capacity	0.05	0.18	0.02	1.44
Queue Length (ft)	0	0	2	1548
Control Delay (s)	0.0	0.0	11.0	220.0
Lane LOS			B	F
Approach Delay (s)	0.0	0.0	217.9	
Approach LOS			F	

Intersection Summary			
Average Delay	170.2		
Intersection Capacity Utilization	97.7%	ICU Level of Service	E

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	403	52	58	760	68	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	438	57	63	826	74	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			495		1390	438
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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		50	93
cM capacity (veh/h)			1069		148	619

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	438	57	63	826	74	45
Volume Left	0	0	63	0	74	0
Volume Right	0	57	0	0	0	45
cSH	1700	1700	1069	1700	148	619
Volume to Capacity	0.26	0.03	0.06	0.49	0.50	0.07
Queue Length (ft)	0	0	5	0	60	6
Control Delay (s)	0.0	0.0	8.6	0.0	51.7	11.3
Lane LOS			A		F	B
Approach Delay (s)	0.0		0.6		36.5	
Approach LOS					E	

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	54.2%	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)	954	60	34	333	33	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1037	65	37	362	36	50
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1102		1473	1037
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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		73	82
cM capacity (veh/h)			633		131	281

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	1037	65	37	362	36	50
Volume Left	0	0	37	0	36	0
Volume Right	0	65	0	0	0	50
cSH	1700	1700	633	1700	131	281
Volume to Capacity	0.61	0.04	0.06	0.21	0.27	0.18
Queue Length (ft)	0	0	5	0	26	16
Control Delay (s)	0.0	0.0	11.0	0.0	42.3	20.6
Lane LOS			B		E	C
Approach Delay (s)	0.0		1.0		29.7	
Approach LOS					D	

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	64.6%	ICU Level of Service	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	4	0	34	2	3	86
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	4	0	37	2	3	93
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	138	38			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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)	853	1034			1571	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	4	39	97
Volume Left	4	0	3
Volume Right	0	2	0
cSH	853	1700	1571
Volume to Capacity	0.01	0.02	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	9.2	0.0	0.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.3
Approach LOS	A		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	15.2%	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)	0	2	31	1	1	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	2	34	1	1	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	103	34			35	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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)	895	1039			1577	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	2	35	67
Volume Left	0	0	1
Volume Right	2	1	0
cSH	1039	1700	1577
Volume to Capacity	0.00	0.02	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	8.5	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	8.5	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2771	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	770	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1658	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1658	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2890	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	803	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1729	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1729	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	2	
Density, D	26.9	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2557	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	710	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1530	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1530	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	23.5	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3258	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	905	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1949	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1949	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.2	mi/h
Number of lanes, N	2	
Density, D	31.3	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3387	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	941	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1351	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1351	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.8	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6057	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1682	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2416	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2416	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5512	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1531	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2199	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2199	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	3	
Density, D	38.5	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/08/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3517	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	977	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1403	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1403	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	21.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3252	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	903	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1297	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1297	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	20.0	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6381	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1773	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2545	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2545	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5780	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1606	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2306	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2306	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.8	mi/h
Number of lanes, N	3	
Density, D	42.9	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3143	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	873	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1254	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1254	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	19.3	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1293	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	359	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	774	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	774	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.9	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3456	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	960	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2068	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2068	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.2	mi/h
Number of lanes, N	2	
Density, D	34.4	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3254	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	904	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1947	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1947	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.3	mi/h
Number of lanes, N	2	
Density, D	31.3	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1278	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	355	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	765	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	765	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.8	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1584	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	440	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	948	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	948	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4512	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1253	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2700	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2700	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3923	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1090	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2347	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2347	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.3	mi/h
Number of lanes, N	2	
Density, D	44.8	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1604	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	446	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	960	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

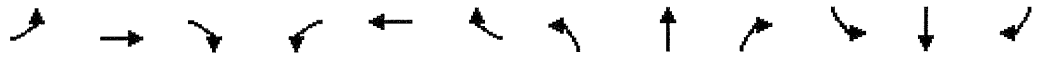
Flow rate, vp	960	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX C – LEVEL OF SERVICE WORKSHEETS: EXISTING PLUS APPROVED PROJECTS CONDITIONS

- Intersection Analysis
- Freeway Mainline Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	1	17	2	4	34	1	3	8	3	5	19	5
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)	1	18	2	4	37	1	3	9	3	5	21	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	42	15	32
Volume Left (vph)	1	4	3	5
Volume Right (vph)	2	1	3	5
Hadj (s)	0.0	0.0	-0.1	0.0
Departure Headway (s)	4.0	4.1	4.0	4.0
Degree Utilization, x	0.02	0.05	0.02	0.04
Capacity (veh/h)	879	622	872	887
Control Delay (s)	7.1	7.3	7.1	7.2
Approach Delay (s)	7.1	7.3	7.1	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	13.3%	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)	1	31	2	3	10	4	1	14	15	1	4	1
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)	1	34	2	3	11	4	1	15	16	1	4	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	37	18	33	7
Volume Left (vph)	1	3	1	1
Volume Right (vph)	2	4	16	1
Hadj (s)	0.0	-0.1	-0.3	0.0
Departure Headway (s)	4.0	4.0	3.8	4.0
Degree Utilization, x	0.04	0.02	0.03	0.01
Capacity (veh/h)	886	629	932	885
Control Delay (s)	7.2	7.0	6.9	7.0
Approach Delay (s)	7.2	7.0	6.9	7.0
Approach LOS	A	A	A	A

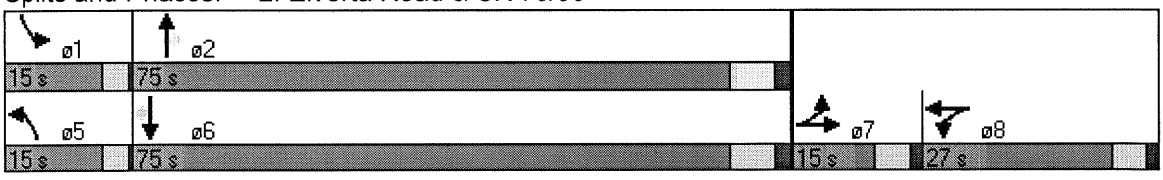
Intersection Summary			
Delay	7.0		
HCM Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Satd. Flow (prot)	0	1829	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.982		0.950	0.955		0.950			0.950		
Satd. Flow (perm)	0	1829	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			30			33			73			8
Volume (vph)	3	5	28	496	17	30	54	936	67	28	2428	16
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
Adj. Flow (vph)	3	5	30	539	18	33	59	1017	73	30	2639	17
Lane Group Flow (vph)	0	8	30	272	285	33	59	1017	73	30	2639	17
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Detector Phases	7	7		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		2.0	8.0	8.0	2.0	8.0	8.0
Minimum Split (s)	21.5	21.5		17.5	17.5		5.5	19.0	19.0	5.5	19.0	19.0
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	11%	11%	0%	20%	20%	0%	11%	57%	57%	11%	57%	57%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.5	1.5		1.5	1.5		0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		5.9	113.7	22.4	22.4	113.7	7.7	74.8	74.8	6.2	71.5	71.5
Actuated g/C Ratio		0.05	1.00	0.20	0.20	1.00	0.07	0.66	0.66	0.05	0.63	0.63
v/c Ratio		0.09	0.02	0.82	0.85	0.02	0.50	0.44	0.07	0.32	1.19	0.02
Uniform Delay, d1		57.6	0.0	47.0	47.4	0.0	55.2	11.8	0.0	56.7	23.6	5.0
Delay		57.6	0.0	56.6	59.9	0.0	53.3	10.7	2.5	54.7	110.5	7.6
LOS		E	A	E	E	A	D	B	A	D	F	A
Approach Delay		12.1			55.0			12.4			109.2	
Approach LOS		B			E			B			F	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 113.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 76.3 Intersection LOS: E
Intersection Capacity Utilization 101.7% ICU Level of Service F

Splits and Phases: 2: Elverta Road & SR 70/99

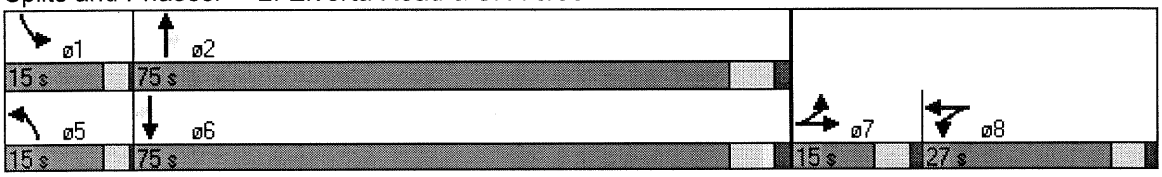


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1844	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.990		0.950	0.955		0.950			0.950		
Satd. Flow (perm)	0	1844	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			37			7			287			4
Volume (vph)	8	31	34	130	4	6	45	1835	428	54	1136	4
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
Adj. Flow (vph)	9	34	37	141	4	7	49	1995	465	59	1235	4
Lane Group Flow (vph)	0	43	37	71	74	7	49	1995	465	59	1235	4
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Detector Phases	7	7		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		2.0	8.0	8.0	2.0	8.0	8.0
Minimum Split (s)	21.5	21.5		17.5	17.5		5.5	19.0	19.0	5.5	19.0	19.0
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	11%	11%	0%	20%	20%	0%	11%	57%	57%	11%	57%	57%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.5	1.5		1.5	1.5		0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		7.8	113.6	9.9	9.9	113.6	7.3	77.9	77.9	7.8	80.6	80.6
Actuated g/C Ratio		0.07	1.00	0.09	0.09	1.00	0.06	0.69	0.69	0.07	0.71	0.71
v/c Ratio		0.35	0.02	0.49	0.50	0.00	0.44	0.82	0.40	0.50	0.49	0.00
Uniform Delay, d1		54.1	0.0	51.3	51.4	0.0	55.4	14.5	2.8	53.8	8.8	0.0
Delay		51.8	0.0	49.0	49.0	0.0	52.2	21.9	4.1	51.3	10.4	6.5
LOS		D	A	D	D	A	D	C	A	D	B	A
Approach Delay		27.8			46.7			19.2			12.2	
Approach LOS		C			D			B			B	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 113.6
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 18.2 Intersection LOS: B
Intersection Capacity Utilization 72.5% ICU Level of Service C

Splits and Phases: 2: Elverta Road & SR 70/99



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	14	5	10	8	3	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	15	5	11	9	3	39

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	21	20	42
Volume Left (vph)	15	0	3
Volume Right (vph)	5	9	0
Hadj (s)	0.0	-0.2	0.0
Departure Headway (s)	4.0	3.7	4.0
Degree Utilization, x	0.02	0.02	0.05
Capacity (veh/h)	624	951	892
Control Delay (s)	7.1	6.8	7.2
Approach Delay (s)	7.1	6.8	7.2
Approach LOS	A	A	A

Intersection Summary			
Delay		7.1	
HCM Level of Service		A	
Intersection Capacity Utilization	13.3%	ICU Level of Service	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	11	15	65	4	0	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	12	16	71	4	0	49

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	28	75	49
Volume Left (vph)	12	0	0
Volume Right (vph)	16	4	0
Hadj (s)	-0.2	0.0	0.0
Departure Headway (s)	3.9	4.0	4.1
Degree Utilization, x	0.03	0.08	0.06
Capacity (veh/h)	640	881	880
Control Delay (s)	7.0	7.4	7.3
Approach Delay (s)	7.0	7.4	7.3
Approach LOS	A	A	A

Intersection Summary			
Delay		7.3	
HCM Level of Service		A	
Intersection Capacity Utilization	14.0%	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)	10	0	0	17	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	11	0	0	18	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			11		29	11
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1608		985	1070

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	11	18	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1608	1700
Volume to Capacity	0.01	0.00	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	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)	3	0	0	24	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	3	0	0	26	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			3		29	3
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1619		985	1081

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	3	26	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1619	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	11	31	0	129	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	12	34	0	140	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	34				46	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				85	99
cM capacity (veh/h)	1578				964	1040

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	12	34	140	9
Volume Left	0	0	140	0
Volume Right	0	0	0	9
cSH	1700	1700	964	1040
Volume to Capacity	0.01	0.02	0.15	0.01
Queue Length (ft)	0	0	13	1
Control Delay (s)	0.0	0.0	9.4	8.5
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.3	
Approach LOS			A	

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	11	20	0	104	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	12	22	0	113	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	22				34	22
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	99
cM capacity (veh/h)	1594				980	1055

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	12	22	113	8
Volume Left	0	0	113	0
Volume Right	0	0	0	8
cSH	1700	1700	980	1055
Volume to Capacity	0.01	0.01	0.12	0.01
Queue Length (ft)	0	0	10	1
Control Delay (s)	0.0	0.0	9.2	8.4
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.1	
Approach LOS			A	

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	16.3%	ICU Level of Service	A

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	131	0	0	1065	8	419
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	142	0	0	1158	9	455
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			142		1300	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	50
cM capacity (veh/h)			1440		178	905

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	142	1158	9	455
Volume Left	0	0	9	0
Volume Right	0	0	0	455
cSH	1700	1700	178	905
Volume to Capacity	0.08	0.68	0.05	0.50
Queue Length (ft)	0	0	4	72
Control Delay (s)	0.0	0.0	26.3	12.9
Lane LOS			D	B
Approach Delay (s)	0.0	0.0	13.2	
Approach LOS			B	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑			↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	93	0	0	505	13	1373
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	101	0	0	549	14	1492
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			101		650	101
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	0
cM capacity (veh/h)			1491		434	954

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	101	549	14	1492
Volume Left	0	0	14	0
Volume Right	0	0	0	1492
cSH	1700	1700	434	954
Volume to Capacity	0.06	0.32	0.03	1.56
Queue Length (ft)	0	0	3	1869
Control Delay (s)	0.0	0.0	13.6	272.6
Lane LOS			B	F
Approach Delay (s)	0.0	0.0	270.2	
Approach LOS			F	

Intersection Summary			
Average Delay	188.8		
Intersection Capacity Utilization	104.4%	ICU Level of Service	F

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	403	154	139	770	282	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	438	167	151	837	307	136
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			605		1577	438
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		0	78
cM capacity (veh/h)			973		102	619

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	438	167	151	837	307	136
Volume Left	0	0	151	0	307	0
Volume Right	0	167	0	0	0	136
cSH	1700	1700	973	1700	102	619
Volume to Capacity	0.26	0.10	0.16	0.49	3.01	0.22
Queue Length (ft)	0	0	14	0	Err	21
Control Delay (s)	0.0	0.0	9.4	0.0	Err	12.4
Lane LOS			A		F	B
Approach Delay (s)	0.0		1.4		6931.9	
Approach LOS					F	

Intersection Summary			
Average Delay	1507.0		
Intersection Capacity Utilization	67.7%	ICU Level of Service	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	954	160	117	350	252	126
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1037	174	127	380	274	137
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1211		1672	1037
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			78		0	51
cM capacity (veh/h)			576		82	281

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	1037	174	127	380	274	137
Volume Left	0	0	127	0	274	0
Volume Right	0	174	0	0	0	137
cSH	1700	1700	576	1700	82	281
Volume to Capacity	0.61	0.10	0.22	0.22	3.34	0.49
Queue Length (ft)	0	0	21	0	Err	63
Control Delay (s)	0.0	0.0	13.0	0.0	Err	29.4
Lane LOS			B		F	D
Approach Delay (s)	0.0		3.3		6675.8	
Approach LOS					F	

Intersection Summary			
Average Delay	1288.9		
Intersection Capacity Utilization	86.8%	ICU Level of Service	D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	103	34	30	44	87
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	7	112	37	33	48	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	243	53			70	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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	89			97	
cM capacity (veh/h)	722	1014			1531	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	118	70	142
Volume Left	7	0	48
Volume Right	112	33	0
cSH	992	1700	1531
Volume to Capacity	0.12	0.04	0.03
Queue Length (ft)	10	0	2
Control Delay (s)	9.1	0.0	2.7
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	2.7
Approach LOS	A		

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	28.2%	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)	2	98	31	35	64	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	2	107	34	38	70	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	259	53			72	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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	90			95	
cM capacity (veh/h)	696	1015			1528	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	109	72	137
Volume Left	2	0	70
Volume Right	107	38	0
cSH	1006	1700	1528
Volume to Capacity	0.11	0.04	0.05
Queue Length (ft)	9	0	4
Control Delay (s)	9.0	0.0	4.0
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	4.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2984	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	829	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1785	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1785	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	2	
Density, D	27.9	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3114	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	865	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1863	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1863	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.3	mi/h
Number of lanes, N	2	
Density, D	29.4	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2692	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	748	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1611	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1611	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.8	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3354	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	932	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2007	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2007	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.3	mi/h
Number of lanes, N	2	
Density, D	32.7	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3657	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1016	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1459	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1459	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	3	
Density, D	22.4	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6335	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1760	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2527	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2527	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5954	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1654	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2375	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2375	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/08/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3922	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1089	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1564	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1564	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	3	
Density, D	24.1	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4465	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1240	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1781	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1781	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.1	mi/h
Number of lanes, N	3	
Density, D	27.8	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	7639	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2122	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3047	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3047	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6894	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1915	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2750	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2750	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4232	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1176	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1688	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1688	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	3	
Density, D	26.1	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

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E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1340	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	372	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	802	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	802	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.3	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3509	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	975	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2100	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2100	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.5	mi/h
Number of lanes, N	2	
Density, D	35.3	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3437	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	955	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2056	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2056	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.4	mi/h
Number of lanes, N	2	
Density, D	34.0	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1451	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	403	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	868	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	868	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.4	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1719	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	477	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1029	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1029	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.8	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4650	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1292	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2782	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2782	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4308	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1197	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2578	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2578	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/12/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1997	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	555	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1195	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1195	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln

Level of service, LOS C

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX D – LEVEL OF SERVICE WORKSHEETS: CUMULATIVE (2025) CONDITIONS

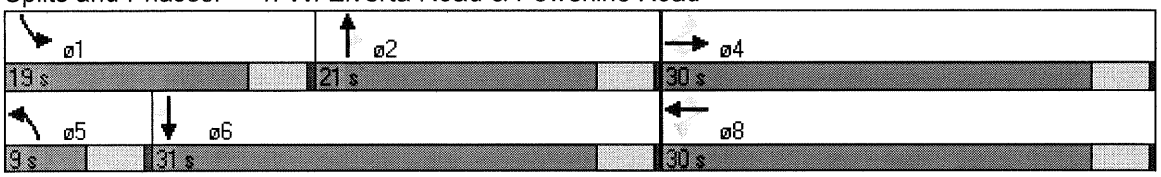
- Intersection Analysis
- Freeway Mainline Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	1863	1583	1770	1863	1583	3433	3539	1583
Flt Permitted	0.683			0.538			0.950			0.950		
Satd. Flow (perm)	1272	3539	1583	1944	1863	1583	1770	1863	1583	3433	3539	1583
Satd. Flow (RTOR)			433			36			54			43
Headway 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
Volume (vph)	30	304	680	27	106	33	40	120	50	577	362	40
Adj. Flow (vph)	33	330	739	29	115	36	43	130	54	627	393	43
Lane Group Flow (vph)	33	330	739	29	115	36	43	130	54	627	393	43
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
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	9.0	21.0	21.0	19.0	31.0	31.0
Act Effct Green (s)	19.6	19.6	19.6	19.6	19.6	19.6	5.1	9.3	9.3	13.7	22.6	22.6
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.35	0.09	0.17	0.17	0.25	0.41	0.41
v/c Ratio	0.07	0.26	0.88	0.04	0.17	0.06	0.28	0.41	0.17	0.74	0.27	0.06
Uniform Delay, d1	12.5	13.4	6.9	12.3	13.0	0.0	26.5	19.3	0.0	20.1	11.6	0.0
Delay	12.3	12.8	11.1	12.1	12.7	5.1	28.7	23.4	7.7	24.1	14.0	5.5
LOS	B	B	B	B	B	A	C	C	A	C	B	A
Approach Delay		11.7			11.1			20.7			19.6	
Approach LOS		B			B			C			B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 15.7 Intersection LOS: B
Intersection Capacity Utilization 70.0% ICU Level of Service B

Splits and Phases: 1: W. Elverta Road & Powerline Road

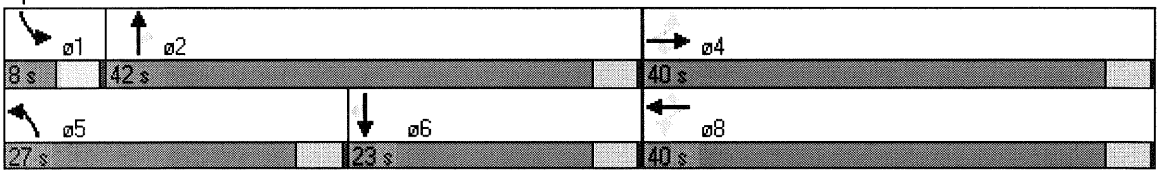


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	1863	1583	1770	1863	1583	3433	3539	1583
Flt Permitted	0.111			0.647			0.950			0.950		
Satd. Flow (perm)	207	3539	1583	2338	1863	1583	1770	1863	1583	3433	3539	1583
Satd. Flow (RTOR)			4			215			22			33
Headway 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
Volume (vph)	3	153	4	20	647	215	396	670	20	25	55	30
Adj. Flow (vph)	3	166	4	22	703	234	430	728	22	27	60	33
Lane Group Flow (vph)	3	166	4	22	703	234	430	728	22	27	60	33
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
Total Split (s)	40.0	40.0	40.0	40.0	40.0	40.0	27.0	42.0	42.0	8.0	23.0	23.0
Act Effct Green (s)	33.0	33.0	33.0	33.0	33.0	33.0	21.8	35.0	35.0	4.1	11.9	11.9
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42	0.28	0.44	0.44	0.05	0.15	0.15
v/c Ratio	0.03	0.11	0.01	0.02	0.90	0.30	0.88	0.88	0.03	0.16	0.11	0.12
Uniform Delay, d1	14.7	15.1	0.0	14.5	23.1	1.2	28.8	21.7	0.0	39.6	27.9	0.0
Delay	17.0	15.5	10.8	15.8	34.0	3.6	45.9	30.8	6.6	41.6	29.7	10.7
LOS	B	B	B	B	C	A	D	C	A	D	C	B
Approach Delay		15.4			26.1			35.9			27.1	
Approach LOS		B			C			D			C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 79.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 30.1 Intersection LOS: C
Intersection Capacity Utilization 82.0% ICU Level of Service D

Splits and Phases: 1: W. Elverta Road & Powerline Road

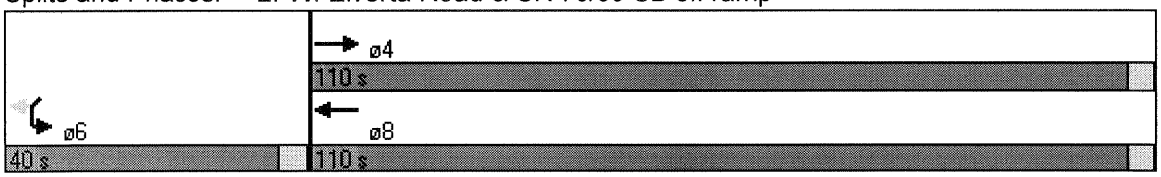


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	110	4295	0	28	756
Adj. Flow (vph)	0	120	4668	0	30	822
Lane Group Flow (vph)	0	120	4668	0	30	822
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	110.0	110.0	0.0	40.0	40.0
Act Effct Green (s)		106.1	106.1		36.0	36.0
Actuated g/C Ratio		0.71	0.71		0.24	0.24
v/c Ratio		0.03	1.30		0.04	1.23
Uniform Delay, d1		6.6	22.0		43.7	57.0
Delay		6.6	144.0		43.9	144.9
LOS		A	F		D	F
Approach Delay		6.6	144.0		141.3	
Approach LOS		A	F		F	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 140.6 Intersection LOS: F
Intersection Capacity Utilization 125.6% ICU Level of Service H

Splits and Phases: 2: W. Elverta Road & SR 70/99 SB off ramp

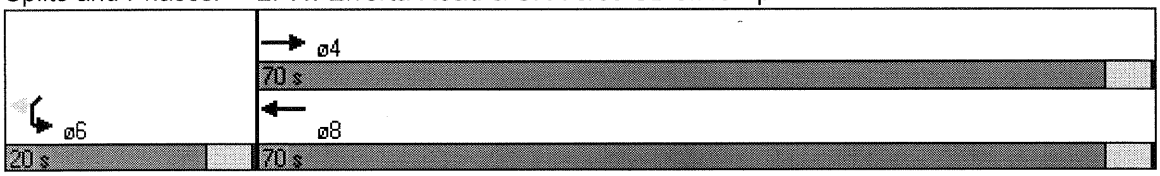


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						204
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	3451	225	0	61	188
Adj. Flow (vph)	0	3751	245	0	66	204
Lane Group Flow (vph)	0	3751	245	0	66	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	70.0	70.0	0.0	20.0	20.0
Act Effct Green (s)		66.0	66.0		7.1	7.1
Actuated g/C Ratio		0.81	0.81		0.09	0.09
v/c Ratio		0.91	0.06		0.22	0.47
Uniform Delay, d1		5.4	1.5		34.4	0.0
Delay		7.7	1.6		34.4	5.8
LOS		A	A		C	A
Approach Delay		7.7	1.6		12.7	
Approach LOS		A	A		B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 81.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 7.7 — Intersection LOS: A
Intersection Capacity Utilization 82.5% — ICU Level of Service D

Splits and Phases: 2: W. Elverta Road & SR 70/99 SB off ramp

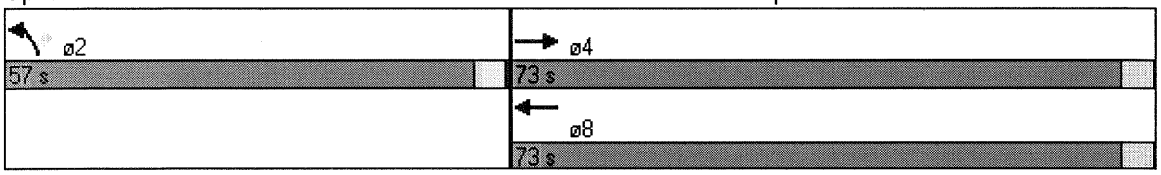


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						10
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	74	0	0	3068	1533	16
Adj. Flow (vph)	80	0	0	3335	1666	17
Lane Group Flow (vph)	80	0	0	3335	1666	17
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	73.0	0.0	0.0	73.0	57.0	57.0
Act Effct Green (s)	69.0			69.0	53.0	53.0
Actuated g/C Ratio	0.53			0.53	0.41	0.41
v/c Ratio	0.03			1.24	1.19	0.01
Uniform Delay, d1	14.5			30.5	38.5	9.4
Delay	14.6			125.7	114.9	14.4
LOS	B			F	F	B
Approach Delay	14.6			125.7	113.9	
Approach LOS	B			F	F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 120.1 — Intersection LOS: F
Intersection Capacity Utilization 118.6% — ICU Level of Service G

Splits and Phases: 21: W. Elverta Road & SR 70/99 NB off ramp

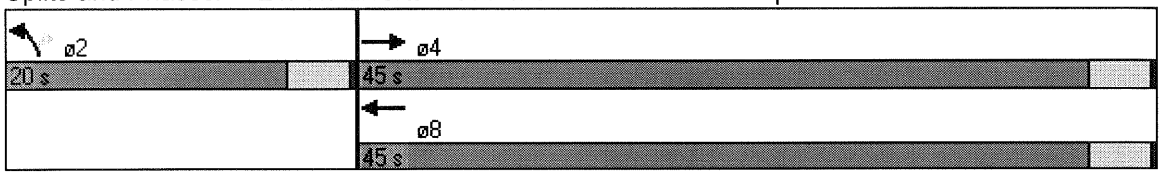


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						3
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2730	0	0	149	104	314
Adj. Flow (vph)	2967	0	0	162	113	341
Lane Group Flow (vph)	2967	0	0	162	113	341
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	45.0	0.0	0.0	45.0	20.0	20.0
Act Effct Green (s)	41.1			41.1	12.3	12.3
Actuated g/C Ratio	0.67			0.67	0.20	0.20
v/c Ratio	0.87			0.05	0.16	0.61
Uniform Delay, d1	8.1			3.5	20.3	22.1
Delay	11.5			4.0	19.9	22.1
LOS	B			A	B	C
Approach Delay	11.5			4.0	21.6	
Approach LOS	B			A	C	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 61.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 12.4 Intersection LOS: B
Intersection Capacity Utilization 75.9% ICU Level of Service C

Splits and Phases: 21: W. Elverta Road & SR 70/99 NB off ramp

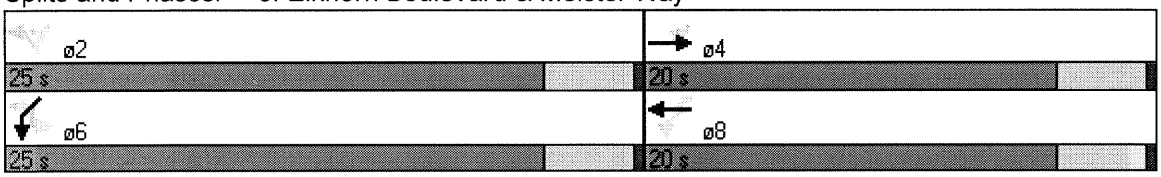


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.94	1.00	1.00	1.00	1.00	1.00	0.97	0.88	1.00	1.00	1.00	0.76
Frt		0.905				0.850		0.850				0.850
Flt Protected	0.950				0.998		0.950				0.950	
Satd. Flow (prot)	4990	1686	0	0	1859	1583	3433	2787	0	0	1770	3610
Flt Permitted	0.668				0.984		0.748				0.920	
Satd. Flow (perm)	3509	1686	0	0	1833	1583	2703	2787	0	0	1714	3610
Satd. Flow (RTOR)		152				87		130				
Headway 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
Volume (vph)	827	82	140	6	122	80	226	661	237	2	12	247
Adj. Flow (vph)	899	89	152	7	133	87	246	718	258	2	13	268
Lane Group Flow (vph)	899	241	0	0	140	87	246	976	0	0	15	268
Turn Type		custom		Perm		Perm	custom	custom		custom	Prot	
Protected Phases		4			8						6	
Permitted Phases	4			8		8	2	2		6		6
Total Split (s)	20.0	20.0	0.0	20.0	20.0	20.0	25.0	25.0	0.0	25.0	25.0	25.0
Act Effct Green (s)	14.4	14.4			14.4	14.4	17.8	17.8			17.8	17.8
Actuated g/C Ratio	0.36	0.36			0.36	0.36	0.44	0.44			0.44	0.44
v/c Ratio	0.72	0.35			0.21	0.14	0.21	0.75			0.02	0.17
Uniform Delay, d1	11.1	3.2			9.0	0.0	6.9	7.9			6.3	6.7
Delay	12.1	4.8			10.3	3.3	7.2	8.5			6.6	7.0
LOS	B	A			B	A	A	A			A	A
Approach Delay		10.6			7.6						7.0	
Approach LOS		B			A						A	

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 40.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 9.0 Intersection LOS: A
Intersection Capacity Utilization 75.2% ICU Level of Service C

Splits and Phases: 3: Elkhorn Boulevard & Meister Way

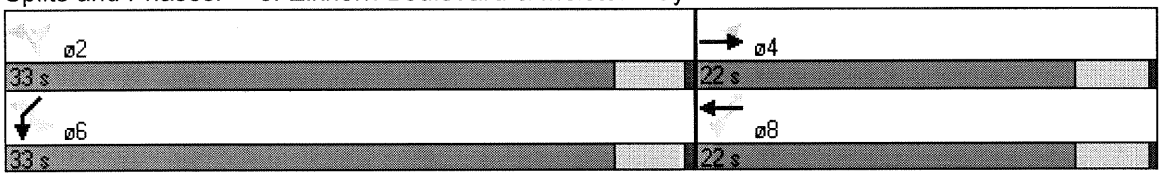


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.94	1.00	1.00	1.00	1.00	1.00	0.97	0.88	1.00	1.00	1.00	0.76
Frt		0.874				0.850		0.850				0.850
Flt Protected	0.950				0.967		0.950				0.950	
Satd. Flow (prot)	4990	1628	0	0	1801	1583	3433	2787	0	0	1770	3610
Flt Permitted	0.507				0.717		0.235				0.997	
Satd. Flow (perm)	2663	1628	0	0	1336	1583	849	2787	0	0	1857	3610
Satd. Flow (RTOR)		105				22		11				
Headway 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
Volume (vph)	427	18	97	173	77	20	64	43	10	9	625	856
Adj. Flow (vph)	464	20	105	188	84	22	70	47	11	10	679	930
Lane Group Flow (vph)	464	125	0	0	272	22	70	58	0	0	689	930
Turn Type		custom		Perm		Perm	custom	custom		custom	Prot	
Protected Phases		4			8						6	
Permitted Phases	4			8		8	2	2		6		6
Total Split (s)	22.0	22.0	0.0	22.0	22.0	22.0	33.0	33.0	0.0	33.0	33.0	33.0
Act Effct Green (s)	13.6	13.6			13.6	13.6	23.1	23.1			23.1	23.1
Actuated g/C Ratio	0.30	0.30			0.30	0.30	0.51	0.51			0.51	0.51
v/c Ratio	0.58	0.22			0.68	0.04	0.16	0.04			0.73	0.50
Uniform Delay, d1	13.1	1.8			13.6	0.0	5.7	4.3			8.3	7.0
Delay	14.6	4.9			16.4	6.5	6.8	5.3			9.5	7.6
LOS	B	A			B	A	A	A			A	A
Approach Delay		12.5			15.6						8.4	
Approach LOS		B			B						A	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 45.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 10.0 Intersection LOS: B
Intersection Capacity Utilization 78.5% ICU Level of Service C

Splits and Phases: 3: Elkhorn Boulevard & Meister Way

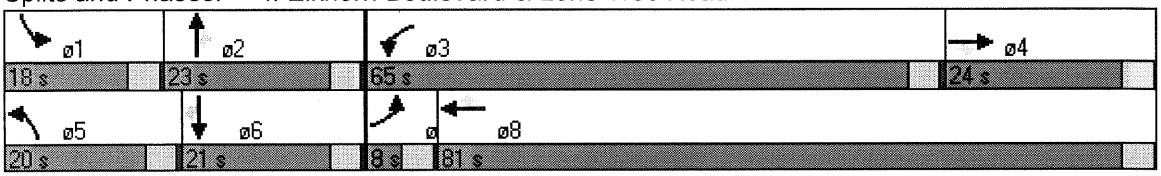


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			16			660			26			10
Headway 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
Volume (vph)	71	96	15	1181	1775	1254	395	92	24	281	36	9
Adj. Flow (vph)	77	104	16	1284	1929	1363	429	100	26	305	39	10
Lane Group Flow (vph)	77	104	16	1284	1929	1363	429	100	26	305	39	10
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
Total Split (s)	8.0	24.0	24.0	65.0	81.0	81.0	20.0	23.0	23.0	18.0	21.0	21.0
Act Effct Green (s)	4.0	29.4	29.4	51.6	77.1	77.1	16.0	9.4	9.4	13.6	7.0	7.0
Actuated g/C Ratio	0.03	0.24	0.24	0.43	0.64	0.64	0.13	0.08	0.08	0.11	0.06	0.06
v/c Ratio	0.68	0.08	0.04	0.87	0.59	1.09	0.94	0.36	0.17	0.78	0.19	0.10
Uniform Delay, d1	57.4	34.9	0.0	31.2	12.5	10.2	51.5	52.4	0.0	51.8	53.7	0.0
Delay	68.4	37.8	17.8	30.8	12.7	61.3	70.7	52.8	18.5	55.2	53.7	26.6
LOS	E	D	B	C	B	E	E	D	B	E	D	C
Approach Delay		48.1			32.2			65.0			54.2	
Approach LOS		D			C			E			D	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 120.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 37.4 Intersection LOS: D
Intersection Capacity Utilization 101.1% ICU Level of Service F

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

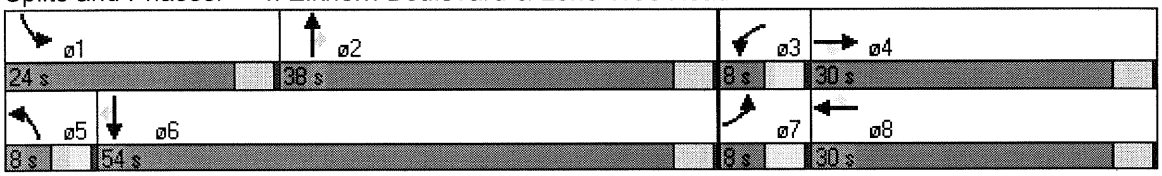


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			43			504			95			55
Headway 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
Volume (vph)	12	2005	93	66	236	464	20	84	1051	1418	71	51
Adj. Flow (vph)	13	2179	101	72	257	504	22	91	1142	1541	77	55
Lane Group Flow (vph)	13	2179	101	72	257	504	22	91	1142	1541	77	55
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
Total Split (s)	8.0	30.0	30.0	8.0	30.0	30.0	8.0	38.0	38.0	24.0	54.0	54.0
Act Effct Green (s)	4.0	26.0	26.0	4.0	30.8	30.8	4.0	34.0	34.0	20.0	54.9	54.9
Actuated g/C Ratio	0.04	0.26	0.26	0.04	0.31	0.31	0.04	0.35	0.35	0.20	0.56	0.56
v/c Ratio	0.10	1.62	0.22	0.53	0.16	0.60	0.17	0.07	1.87	2.20	0.04	0.06
Uniform Delay, d1	51.4	37.8	16.4	50.0	27.2	0.0	50.8	22.5	28.6	42.1	11.9	0.0
Delay	48.4	233.5	18.0	47.4	25.1	2.9	47.6	22.4	273.1	316.2	11.5	3.7
LOS	D	F	B	D	C	A	D	C	F	F	B	A
Approach Delay		223.0			13.6			251.0			291.9	
Approach LOS		F			B			F			F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 98.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.20
Intersection Signal Delay: 219.0 Intersection LOS: F
Intersection Capacity Utilization 166.8% ICU Level of Service H

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

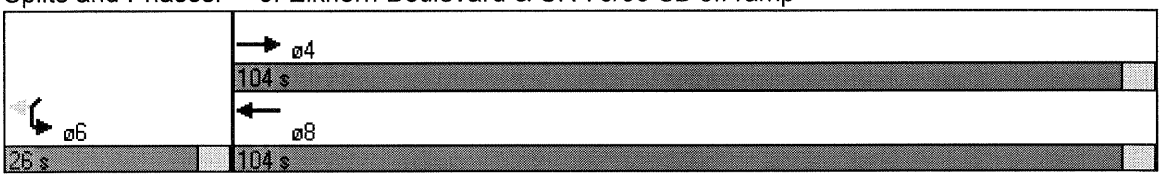


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						1
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	141	3753	0	80	456
Adj. Flow (vph)	0	153	4079	0	87	496
Lane Group Flow (vph)	0	153	4079	0	87	496
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	104.0	104.0	0.0	26.0	26.0
Act Effct Green (s)		100.0	100.0		22.0	22.0
Actuated g/C Ratio		0.77	0.77		0.17	0.17
v/c Ratio		0.04	1.04		0.15	1.05
Uniform Delay, d1		3.6	15.0		46.0	53.8
Delay		3.6	39.9		46.3	94.8
LOS		A	D		D	F
Approach Delay		3.6	39.9		87.6	
Approach LOS		A	D		F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 44.5 Intersection LOS: D
Intersection Capacity Utilization 102.8% ICU Level of Service F

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

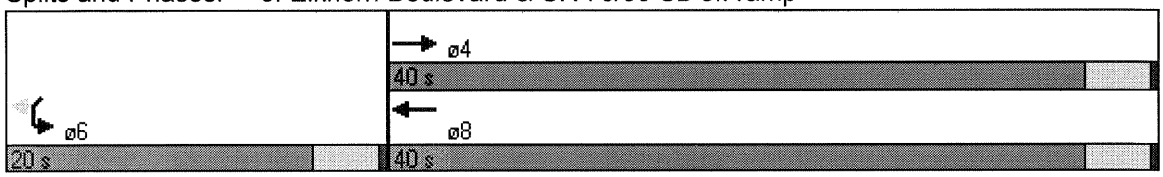


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						62
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	2637	711	0	350	57
Adj. Flow (vph)	0	2866	773	0	380	62
Lane Group Flow (vph)	0	2866	773	0	380	62
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	40.0	40.0	0.0	20.0	20.0
Act Effct Green (s)		36.1	36.1		11.4	11.4
Actuated g/C Ratio		0.65	0.65		0.21	0.21
v/c Ratio		0.87	0.23		0.54	0.10
Uniform Delay, d1		7.8	4.0		19.7	0.0
Delay		11.5	4.4		19.6	5.7
LOS		B	A		B	A
Approach Delay		11.5	4.4		17.7	
Approach LOS		B	A		B	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 55.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 10.8 Intersection LOS: B
Intersection Capacity Utilization 72.9% ICU Level of Service C

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

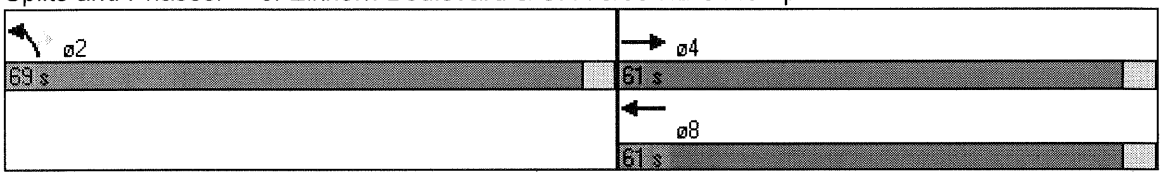


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						49
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	190	0	0	2375	1833	76
Adj. Flow (vph)	207	0	0	2582	1992	83
Lane Group Flow (vph)	207	0	0	2582	1992	83
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	61.0	0.0	0.0	61.0	69.0	69.0
Act Effct Green (s)	56.9			56.9	65.0	65.0
Actuated g/C Ratio	0.44			0.44	0.50	0.50
v/c Ratio	0.09			1.16	1.16	0.06
Uniform Delay, d1	21.3			36.5	32.5	6.7
Delay	21.4			102.2	100.5	7.9
LOS	C			F	F	A
Approach Delay	21.4			102.2	96.8	
Approach LOS	C			F	F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 96.4 — Intersection LOS: F
Intersection Capacity Utilization 113.4% — ICU Level of Service G

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

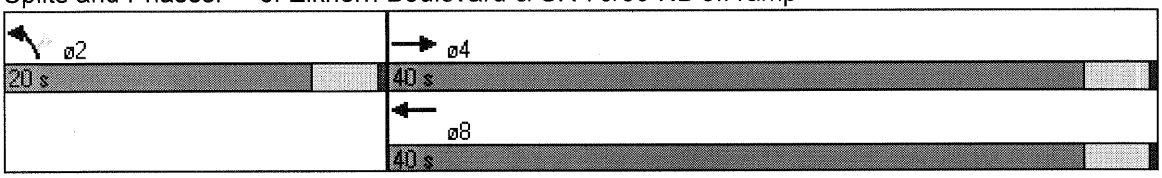


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						2
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2611	0	0	367	428	388
Adj. Flow (vph)	2838	0	0	399	465	422
Lane Group Flow (vph)	2838	0	0	399	465	422
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	40.0	0.0	0.0	40.0	20.0	20.0
Act Effct Green (s)	36.1			36.1	13.8	13.8
Actuated g/C Ratio	0.62			0.62	0.24	0.24
v/c Ratio	0.90			0.13	0.57	0.63
Uniform Delay, d1	9.3			4.4	19.4	19.7
Delay	13.3			4.9	19.4	19.7
LOS	B			A	B	B
Approach Delay	13.3			4.9	19.6	
Approach LOS	B			A	B	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 76.3% ICU Level of Service C

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

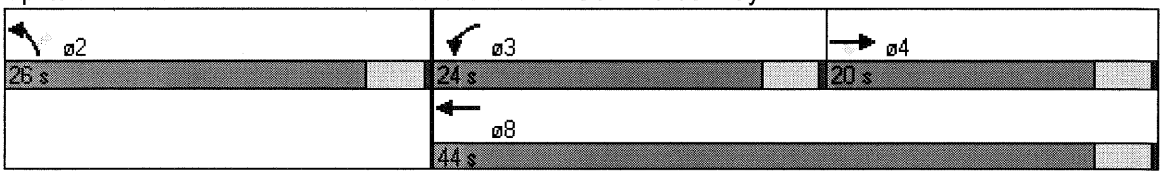


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱	↰	↑↑↑	↰↰	↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	5085	1583	1770	5085	3433	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	5085	1583	1770	5085	3433	1583
Satd. Flow (RTOR)		109				159
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	166	100	398	2145	867	146
Adj. Flow (vph)	180	109	433	2332	942	159
Lane Group Flow (vph)	180	109	433	2332	942	159
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	24.0	44.0	26.0	26.0
Act Effct Green (s)	13.9	13.9	22.8	38.2	20.9	20.9
Actuated g/C Ratio	0.20	0.20	0.34	0.57	0.31	0.31
v/c Ratio	0.18	0.27	0.72	0.81	0.88	0.26
Uniform Delay, d1	23.7	0.0	19.9	11.4	22.4	0.0
Delay	22.2	5.5	32.1	12.0	27.0	3.7
LOS	C	A	C	B	C	A
Approach Delay	15.9			15.1	23.6	
Approach LOS	B			B	C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 67.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 17.4 Intersection LOS: B
Intersection Capacity Utilization 78.6% ICU Level of Service C

Splits and Phases: 7: Elkhorn Boulevard & E. Commerce Way

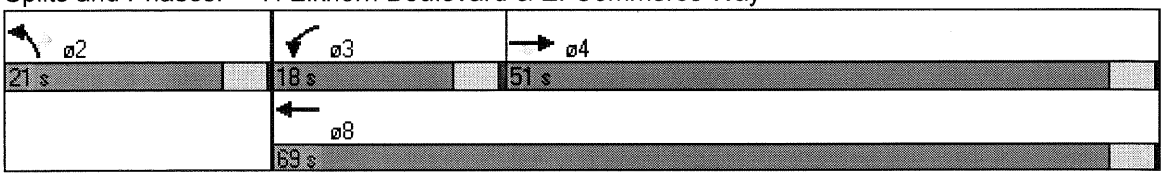


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	5085	1583	1770	5085	3433	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	5085	1583	1770	5085	3433	1583
Satd. Flow (RTOR)		660				253
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2006	994	225	345	101	297
Adj. Flow (vph)	2180	1080	245	375	110	323
Lane Group Flow (vph)	2180	1080	245	375	110	323
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	51.0	51.0	18.0	69.0	21.0	21.0
Act Effct Green (s)	47.1	47.1	13.6	64.8	10.4	10.4
Actuated g/C Ratio	0.57	0.57	0.16	0.78	0.12	0.12
v/c Ratio	0.76	0.91	0.84	0.09	0.26	0.77
Uniform Delay, d1	13.7	5.6	33.7	2.2	32.9	7.3
Delay	14.7	15.9	52.4	2.6	32.4	9.2
LOS	B	B	D	A	C	A
Approach Delay	15.1			22.3	15.1	
Approach LOS	B			C	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 83.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 16.2 Intersection LOS: B
Intersection Capacity Utilization 87.1% ICU Level of Service D

Splits and Phases: 7: Elkhorn Boulevard & E. Commerce Way

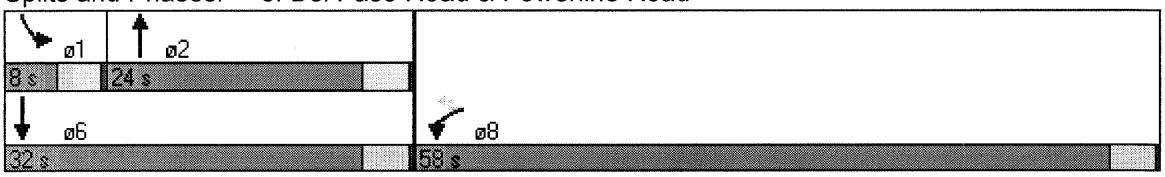


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	0.95	0.97	1.00
Frt		0.850	0.996			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3525	0	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3525	0	3433	1863
Satd. Flow (RTOR)		193	3			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	616	923	660	17	80	17
Adj. Flow (vph)	670	1003	717	18	87	18
Lane Group Flow (vph)	670	1003	735	0	87	18
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Total Split (s)	58.0	58.0	24.0	0.0	8.0	32.0
Act Effct Green (s)	51.4	51.4	19.2		4.0	25.3
Actuated g/C Ratio	0.61	0.61	0.23		0.05	0.30
v/c Ratio	0.62	0.97	0.92		0.54	0.03
Uniform Delay, d1	11.0	13.2	32.3		40.8	20.7
Delay	11.6	30.6	44.2		45.4	21.8
LOS	B	C	D		D	C
Approach Delay	23.0		44.2			41.3
Approach LOS	C		D			D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 84.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 30.0 Intersection LOS: C
Intersection Capacity Utilization 89.2% ICU Level of Service D

Splits and Phases: 8: Del Paso Road & Powerline Road

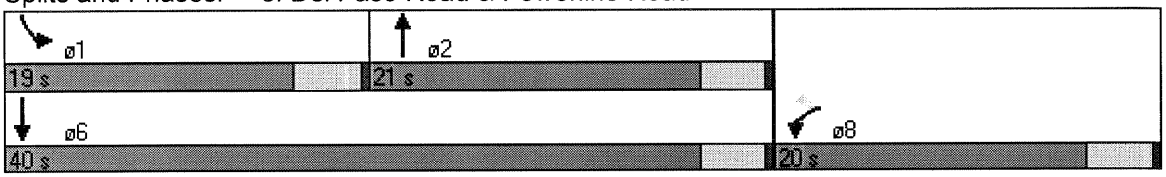


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	0.95	0.97	1.00
Frt		0.850	0.866			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3065	0	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3065	0	3433	1863
Satd. Flow (RTOR)		224	596			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	13	206	72	595	477	724
Adj. Flow (vph)	14	224	78	647	518	787
Lane Group Flow (vph)	14	224	725	0	518	787
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Total Split (s)	20.0	20.0	21.0	0.0	19.0	40.0
Act Effct Green (s)	7.1	7.1	9.3		11.2	26.5
Actuated g/C Ratio	0.18	0.18	0.25		0.30	0.70
v/c Ratio	0.04	0.48	0.60		0.51	0.60
Uniform Delay, d1	14.3	0.0	2.0		11.3	4.0
Delay	16.6	3.9	3.2		13.0	5.1
LOS	B	A	A		B	A
Approach Delay	4.6		3.2			8.2
Approach LOS	A		A			A

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 37.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 6.3 Intersection LOS: A
Intersection Capacity Utilization 51.4% ICU Level of Service A

Splits and Phases: 8: Del Paso Road & Powerline Road

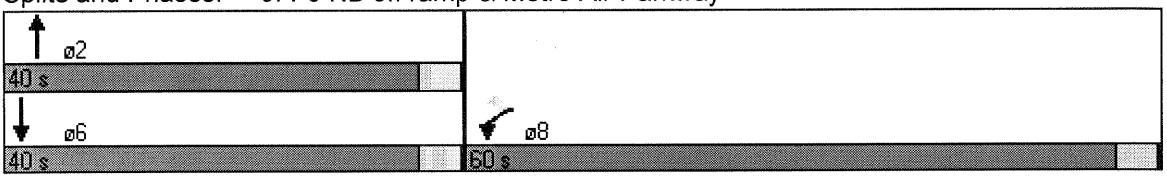


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.91	1.00	1.00	0.91
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	3433	2787	5085	0	0	5085
Flt Permitted	0.950					
Satd. Flow (perm)	3433	2787	5085	0	0	5085
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	3795	2858	0	0	564
Adj. Flow (vph)	22	4125	3107	0	0	613
Lane Group Flow (vph)	22	4125	3107	0	0	613
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	60.0	60.0	40.0	0.0	0.0	40.0
Act Effct Green (s)	56.0	56.0	36.0			36.0
Actuated g/C Ratio	0.56	0.56	0.36			0.36
v/c Ratio	0.01	2.64	1.70			0.33
Uniform Delay, d1	9.7	22.0	32.0			23.3
Delay	9.8	314.5	227.4			23.4
LOS	A	F	F			C
Approach Delay	312.8		227.4			23.4
Approach LOS	F		F			C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.64
Intersection Signal Delay: 256.6 Intersection LOS: F
Intersection Capacity Utilization 211.0% ICU Level of Service H

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

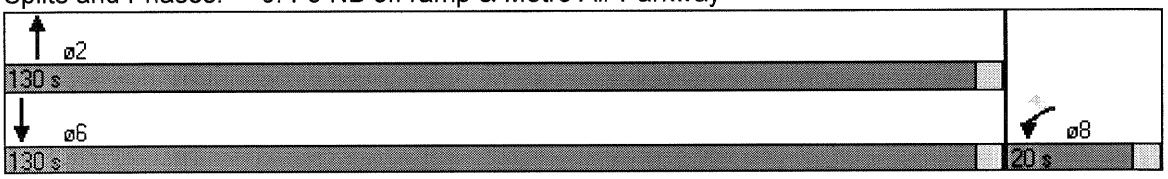


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.91	1.00	1.00	0.91
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	3433	2787	5085	0	0	5085
Flt Permitted	0.950					
Satd. Flow (perm)	3433	2787	5085	0	0	5085
Satd. Flow (RTOR)		780				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	853	540	0	0	4783
Adj. Flow (vph)	22	927	587	0	0	5199
Lane Group Flow (vph)	22	927	587	0	0	5199
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	20.0	20.0	130.0	0.0	0.0	130.0
Act Effct Green (s)	14.7	14.7	126.0			126.0
Actuated g/C Ratio	0.10	0.10	0.85			0.85
v/c Ratio	0.07	0.95	0.14			1.21
Uniform Delay, d1	60.7	10.3	2.0			11.4
Delay	60.5	18.9	2.0			115.5
LOS	E	B	A			F
Approach Delay	19.9		2.0			115.5
Approach LOS	B		A			F

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 92.1 Intersection LOS: F
Intersection Capacity Utilization 110.5% ICU Level of Service G

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

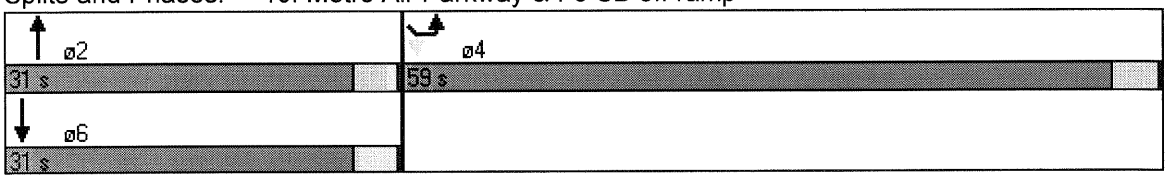


Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						183
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	1315	70	0	1894	168
Adj. Flow (vph)	0	1429	76	0	2059	183
Lane Group Flow (vph)	0	1429	76	0	2059	183
Turn Type						Perm
Protected Phases		2	6		4	
Permitted Phases						4
Total Split (s)	0.0	31.0	31.0	0.0	59.0	59.0
Act Effct Green (s)		27.0	27.0		55.0	55.0
Actuated g/C Ratio		0.30	0.30		0.61	0.61
v/c Ratio		0.94	0.05		0.98	0.10
Uniform Delay, d1		30.7	22.4		17.0	0.0
Delay		37.9	22.5		29.5	1.2
LOS		D	C		C	A
Approach Delay		37.9	22.5		27.2	
Approach LOS		D	C		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 31.2 — Intersection LOS: C
Intersection Capacity Utilization 93.0% — ICU Level of Service E

Splits and Phases: 10: Metro Air Parkway & I-5 SB off ramp

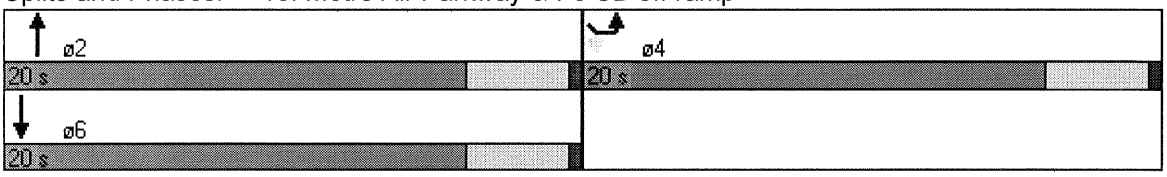


Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						28
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	428	1141	0	366	373
Adj. Flow (vph)	0	465	1240	0	398	405
Lane Group Flow (vph)	0	465	1240	0	398	405
Turn Type						Perm
Protected Phases		2	6		4	
Permitted Phases						4
Total Split (s)	0.0	20.0	20.0	0.0	20.0	20.0
Act Effct Green (s)		14.2	14.2		10.6	10.6
Actuated g/C Ratio		0.43	0.43		0.32	0.32
v/c Ratio		0.21	0.57		0.36	0.44
Uniform Delay, d1		5.8	6.9		8.5	8.1
Delay		6.5	7.7		8.8	8.5
LOS		A	A		A	A
Approach Delay		6.5	7.7		8.6	
Approach LOS		A	A		A	

Intersection Summary

Cycle Length: 40
Actuated Cycle Length: 33.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 7.8 — Intersection LOS: A
Intersection Capacity Utilization 44.8% — ICU Level of Service A

Splits and Phases: 10: Metro Air Parkway & I-5 SB off ramp

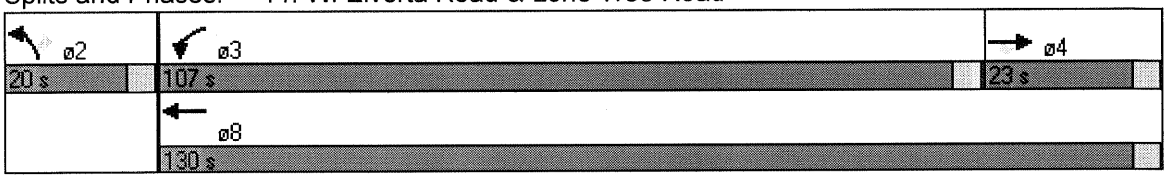


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		143				33
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	120	132	2165	2886	20	30
Adj. Flow (vph)	130	143	2353	3137	22	33
Lane Group Flow (vph)	130	143	2353	3137	22	33
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	23.0	23.0	107.0	130.0	20.0	20.0
Act Effct Green (s)	19.0	19.0	103.0	126.0	6.3	6.3
Actuated g/C Ratio	0.14	0.14	0.73	0.90	0.04	0.04
v/c Ratio	0.27	0.42	0.93	0.99	0.14	0.21
Uniform Delay, d1	54.5	0.0	15.8	6.5	64.3	0.0
Delay	54.9	8.5	19.7	17.3	64.4	19.8
LOS	D	A	B	B	E	B
Approach Delay	30.6			18.3	37.6	
Approach LOS	C			B	D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 140.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 19.1 — Intersection LOS: B
Intersection Capacity Utilization 96.7% — ICU Level of Service E

Splits and Phases: 11: W. Elverta Road & Lone Tree Road

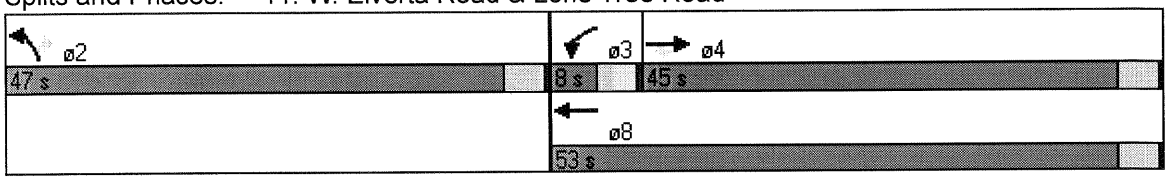


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰↰	↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		8				171
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2510	25	87	326	17	2252
Adj. Flow (vph)	2728	27	95	354	18	2448
Lane Group Flow (vph)	2728	27	95	354	18	2448
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	45.0	45.0	8.0	53.0	47.0	47.0
Act Effct Green (s)	41.0	41.0	4.0	49.0	43.0	43.0
Actuated g/C Ratio	0.41	0.41	0.04	0.49	0.43	0.43
v/c Ratio	1.88	0.04	0.69	0.20	0.01	1.89
Uniform Delay, d1	29.5	12.4	47.4	14.4	16.3	24.7
Delay	253.5	14.0	58.6	14.6	16.4	253.1
LOS	F	B	E	B	B	F
Approach Delay	251.1			23.9	251.4	
Approach LOS	F			C	F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.89
Intersection Signal Delay: 233.2 — Intersection LOS: F
Intersection Capacity Utilization 167.7% — ICU Level of Service H

Splits and Phases: 11: W. Elverta Road & Lone Tree Road

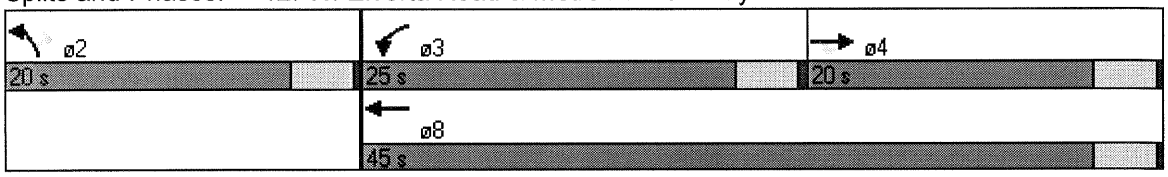


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		481				37
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	319	534	925	1094	20	34
Adj. Flow (vph)	347	580	1005	1189	22	37
Lane Group Flow (vph)	347	580	1005	1189	22	37
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	25.0	45.0	20.0	20.0
Act Effct Green (s)	11.9	11.9	19.2	35.2	6.0	6.0
Actuated g/C Ratio	0.24	0.24	0.39	0.71	0.12	0.12
v/c Ratio	0.41	0.78	0.75	0.47	0.05	0.10
Uniform Delay, d1	15.6	2.6	12.9	3.0	19.0	0.0
Delay	16.0	4.9	14.4	3.0	21.7	9.4
LOS	B	A	B	A	C	A
Approach Delay	9.1			8.2	14.0	
Approach LOS	A			A	B	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 49.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 8.6 Intersection LOS: A
Intersection Capacity Utilization 71.3% ICU Level of Service C

Splits and Phases: 12: W. Elverta Road & Metro Air Parkway

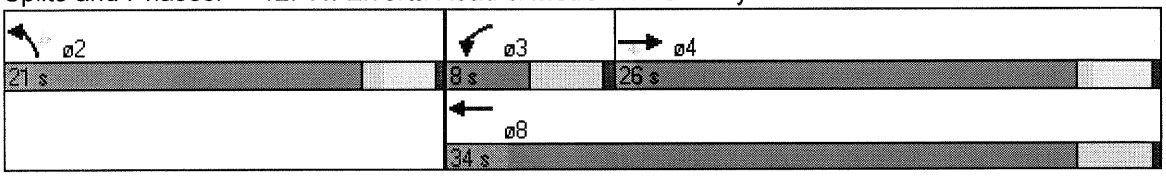


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		15				327
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	1063	14	114	259	636	649
Adj. Flow (vph)	1155	15	124	282	691	705
Lane Group Flow (vph)	1155	15	124	282	691	705
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	26.0	26.0	8.0	34.0	21.0	21.0
Act Effct Green (s)	20.1	20.1	4.1	25.9	15.4	15.4
Actuated g/C Ratio	0.40	0.40	0.08	0.52	0.31	0.31
v/c Ratio	0.81	0.02	0.45	0.15	0.65	0.65
Uniform Delay, d1	13.5	0.0	23.2	5.9	15.2	7.7
Delay	15.8	5.6	24.9	6.2	16.1	8.6
LOS	B	A	C	A	B	A
Approach Delay	15.7			11.9	12.3	
Approach LOS	B			B	B	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 49.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 65.2% ICU Level of Service B

Splits and Phases: 12: W. Elverta Road & Metro Air Parkway

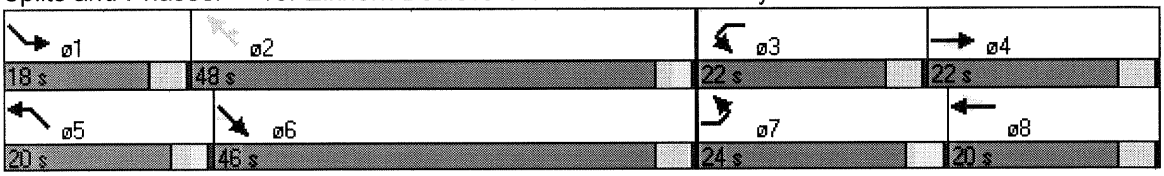


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			20			184			63			416
Headway 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
Volume (vph)	550	664	20	502	268	184	382	930	63	45	1740	834
Adj. Flow (vph)	550	664	20	502	268	184	382	930	63	45	1740	834
Lane Group Flow (vph)	550	664	20	502	268	184	382	930	63	45	1740	834
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		custom
Protected Phases	7	4		3	8		1	6		5		
Permitted Phases			4			8			6		2	2
Total Split (s)	24.0	22.0	22.0	22.0	20.0	20.0	18.0	46.0	46.0	20.0	48.0	48.0
Act Effct Green (s)	19.5	17.4	17.4	17.8	15.6	15.6	13.9	55.0	55.0	6.8	43.9	43.9
Actuated g/C Ratio	0.18	0.16	0.16	0.16	0.14	0.14	0.13	0.51	0.51	0.06	0.40	0.40
v/c Ratio	0.89	0.82	0.07	0.90	0.37	0.48	0.87	0.36	0.08	0.22	0.85	0.94
Uniform Delay, d1	44.6	45.1	0.0	45.6	43.0	0.0	47.5	17.1	0.0	51.6	29.1	14.9
Delay	51.2	45.3	16.0	54.6	42.5	6.5	57.3	17.4	4.4	49.3	30.2	28.3
LOS	D	D	B	D	D	A	E	B	A	D	C	C
Approach Delay		47.4			41.9			27.9			29.9	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 108.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 34.8 Intersection LOS: C
Intersection Capacity Utilization 85.4% ICU Level of Service D

Splits and Phases: 13: Elkhorn Boulevard & Metro Air Parkway

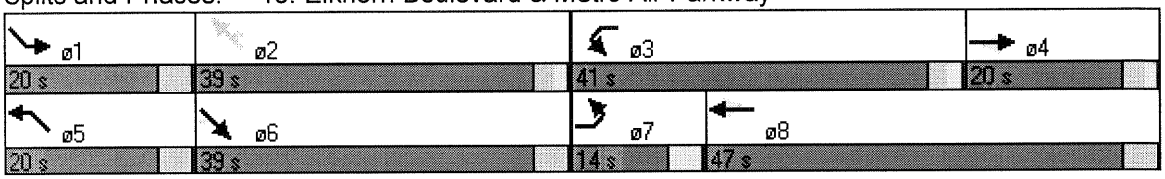


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			95			306			356			170
Headway 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
Volume (vph)	142	350	95	1005	527	411	405	1384	608	25	1263	266
Adj. Flow (vph)	142	350	95	1005	527	411	405	1384	608	25	1263	266
Lane Group Flow (vph)	142	350	95	1005	527	411	405	1384	608	25	1263	266
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		custom
Protected Phases	7	4		3	8		1	6		5		
Permitted Phases			4			8			6		2	2
Total Split (s)	14.0	20.0	20.0	41.0	47.0	47.0	20.0	39.0	39.0	20.0	39.0	39.0
Act Effct Green (s)	9.1	12.8	12.8	35.3	39.1	39.1	15.4	46.3	46.3	6.3	33.0	33.0
Actuated g/C Ratio	0.08	0.11	0.11	0.31	0.35	0.35	0.14	0.41	0.41	0.05	0.29	0.29
v/c Ratio	0.51	0.60	0.36	0.93	0.30	0.55	0.86	0.66	0.71	0.13	0.85	0.46
Uniform Delay, d1	50.5	48.4	0.0	38.7	27.6	6.9	48.5	27.8	10.6	53.8	36.8	10.7
Delay	51.6	48.3	9.7	47.6	27.3	8.0	57.2	28.6	12.4	53.8	38.9	12.6
LOS	D	D	A	D	C	A	E	C	B	D	D	B
Approach Delay		42.9			33.7			29.3			34.6	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 112.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 33.1 Intersection LOS: C
Intersection Capacity Utilization 84.7% ICU Level of Service D

Splits and Phases: 13: Elkhorn Boulevard & Metro Air Parkway

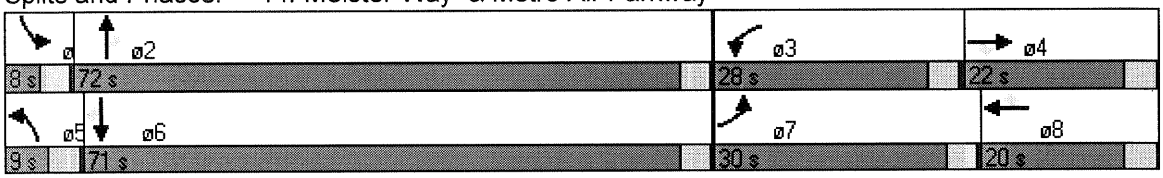


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			112			93			453			391
Headway 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
Volume (vph)	201	35	312	301	101	86	20	2332	952	30	1053	377
Adj. Flow (vph)	218	38	339	327	110	93	22	2535	1035	33	1145	410
Lane Group Flow (vph)	218	38	339	327	110	93	22	2535	1035	33	1145	410
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
Total Split (s)	30.0	22.0	22.0	28.0	20.0	20.0	9.0	72.0	72.0	8.0	71.0	71.0
Act Effct Green (s)	20.0	18.0	18.0	24.1	22.0	22.0	5.0	68.0	68.0	4.0	69.0	69.0
Actuated g/C Ratio	0.16	0.14	0.14	0.19	0.17	0.17	0.04	0.53	0.53	0.03	0.54	0.54
v/c Ratio	0.79	0.15	1.06	0.99	0.34	0.27	0.33	0.94	0.98	0.61	0.42	0.40
Uniform Delay, d1	53.1	49.2	36.2	53.0	47.6	0.0	62.8	28.7	16.7	63.0	18.5	0.7
Delay	51.8	49.8	86.5	83.8	50.1	10.2	61.8	33.0	33.6	84.3	18.2	2.1
LOS	D	D	F	F	D	B	E	C	C	F	B	A
Approach Delay		71.5			63.9			33.3			15.4	
Approach LOS		E			E			C			B	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 128.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 35.0 — Intersection LOS: C
Intersection Capacity Utilization 80.7% — ICU Level of Service D

Splits and Phases: 14: Meister Way & Metro Air Parkway

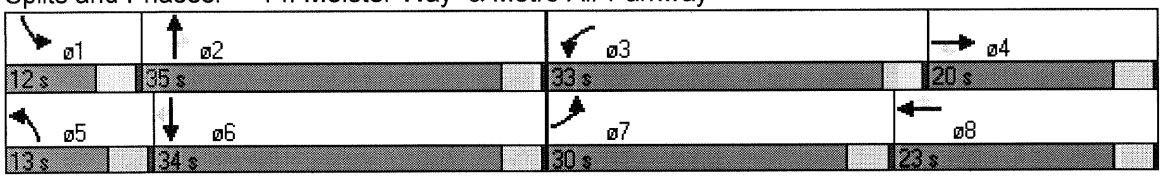


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			22			11			340			140
Headway 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
Volume (vph)	353	92	20	955	26	10	238	1175	401	94	2092	298
Adj. Flow (vph)	384	100	22	1038	28	11	259	1277	436	102	2274	324
Lane Group Flow (vph)	384	100	22	1038	28	11	259	1277	436	102	2274	324
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
Total Split (s)	30.0	20.0	20.0	33.0	23.0	23.0	13.0	35.0	35.0	12.0	34.0	34.0
Act Effct Green (s)	30.0	10.3	10.3	29.1	11.4	11.4	9.0	33.9	33.9	7.7	30.2	30.2
Actuated g/C Ratio	0.33	0.11	0.11	0.32	0.12	0.12	0.10	0.37	0.37	0.08	0.33	0.33
v/c Ratio	0.67	0.49	0.11	1.86	0.13	0.06	1.49	0.68	0.55	0.70	1.37	0.53
Uniform Delay, d1	28.3	40.5	0.0	32.9	39.6	0.0	43.0	26.2	4.7	44.0	31.9	14.0
Delay	35.0	39.5	15.1	261.1	35.7	17.7	207.8	27.0	6.7	55.0	166.5	15.3
LOS	C	D	B	F	D	B	F	C	A	D	F	B
Approach Delay		35.0			252.7			46.2			144.2	
Approach LOS		D			F			D			F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 92.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.86
Intersection Signal Delay: 123.2 Intersection LOS: F
Intersection Capacity Utilization 132.4% ICU Level of Service H

Splits and Phases: 14: Meister Way & Metro Air Parkway

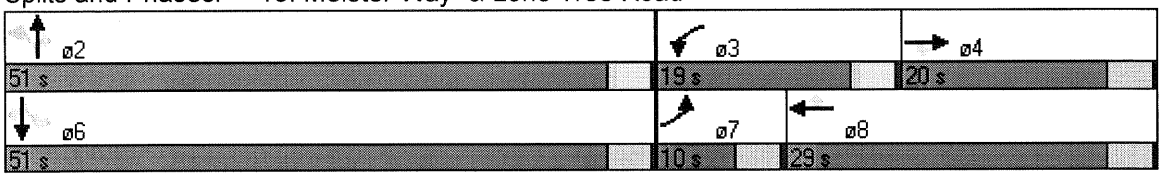


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.119			0.714		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	222	1863	1583	1330	1863	1583
Satd. Flow (RTOR)			27			438			27			505
Headway 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
Volume (vph)	46	37	25	340	167	403	98	61	25	30	748	465
Adj. Flow (vph)	50	40	27	370	182	438	107	66	27	33	813	505
Lane Group Flow (vph)	50	40	27	370	182	438	107	66	27	33	813	505
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	10.0	20.0	20.0	19.0	29.0	29.0	51.0	51.0	51.0	51.0	51.0	51.0
Act Effct Green (s)	6.0	7.5	7.5	15.7	17.1	17.1	41.6	41.6	41.6	41.6	41.6	41.6
Actuated g/C Ratio	0.08	0.10	0.10	0.22	0.24	0.24	0.57	0.57	0.57	0.57	0.57	0.57
v/c Ratio	0.36	0.22	0.15	0.96	0.41	0.62	0.84	0.06	0.03	0.04	0.76	0.45
Uniform Delay, d1	34.8	33.2	0.0	28.9	24.2	0.0	13.6	7.3	0.0	7.2	12.5	0.0
Delay	37.2	34.0	13.5	86.1	27.4	3.4	48.1	7.9	3.4	8.1	13.7	1.0
LOS	D	C	B	F	C	A	D	A	A	A	B	A
Approach Delay		30.6			38.7			28.8			8.8	
Approach LOS		C			D			C			A	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 72.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 22.4 Intersection LOS: C
Intersection Capacity Utilization 85.8% ICU Level of Service D

Splits and Phases: 15: Meister Way & Lone Tree Road

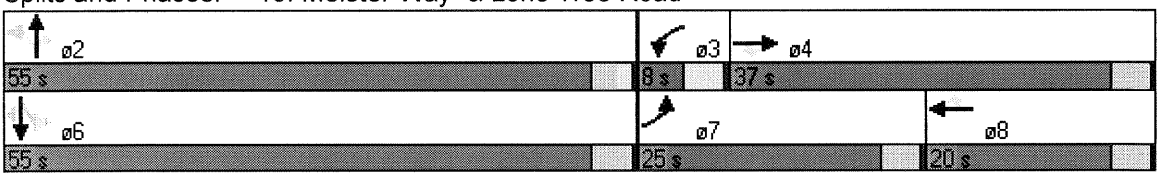


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.747			0.140		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1391	1863	1583	261	1863	1583
Satd. Flow (RTOR)			18			22			216			143
Headway 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
Volume (vph)	431	185	17	5	77	20	20	702	294	92	15	132
Adj. Flow (vph)	468	201	18	5	84	22	22	763	320	100	16	143
Lane Group Flow (vph)	468	201	18	5	84	22	22	763	320	100	16	143
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	25.0	37.0	37.0	8.0	20.0	20.0	55.0	55.0	55.0	55.0	55.0	55.0
Act Effct Green (s)	22.7	31.7	31.7	4.2	9.1	9.1	37.1	37.1	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.29	0.40	0.40	0.05	0.11	0.11	0.47	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.92	0.27	0.03	0.06	0.40	0.11	0.03	0.87	0.37	0.81	0.02	0.17
Uniform Delay, d1	28.7	17.0	0.0	40.2	33.1	0.0	12.2	20.4	4.2	19.5	12.1	0.0
Delay	80.6	20.3	10.1	45.8	37.4	15.7	11.0	18.8	4.4	35.2	10.9	2.3
LOS	F	C	B	D	D	B	B	B	A	D	B	A
Approach Delay		61.1			33.4			14.5			15.5	
Approach LOS		E			C			B			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 78.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 88.3% ICU Level of Service D

Splits and Phases: 15: Meister Way & Lone Tree Road

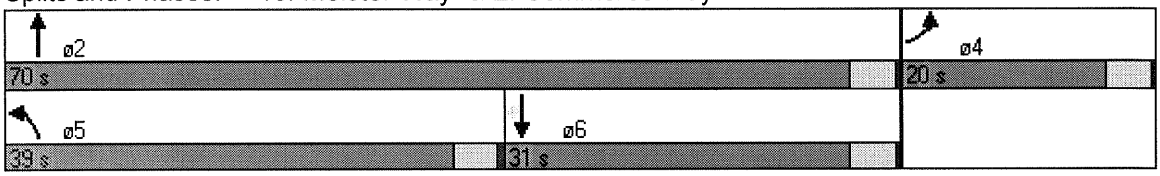


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	0.921					0.850
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1681	0	1770	3539	3539	1583
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1681	0	1770	3539	3539	1583
Satd. Flow (RTOR)	64					165
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	42	59	623	775	950	289
Adj. Flow (vph)	46	64	677	842	1033	314
Lane Group Flow (vph)	110	0	677	842	1033	314
Turn Type			Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Total Split (s)	20.0	0.0	39.0	70.0	31.0	31.0
Act Effct Green (s)	8.1		33.4	64.8	26.1	26.1
Actuated g/C Ratio	0.10		0.43	0.84	0.34	0.34
v/c Ratio	0.48		0.88	0.28	0.86	0.49
Uniform Delay, d1	14.1		20.7	1.8	24.5	9.2
Delay	17.4		32.3	2.1	31.2	11.1
LOS	B		C	A	C	B
Approach Delay	17.4			15.6	26.5	
Approach LOS	B			B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 77.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 20.6 Intersection LOS: C
Intersection Capacity Utilization 82.5% ICU Level of Service D

Splits and Phases: 16: Meister Way & E. Commerce Way

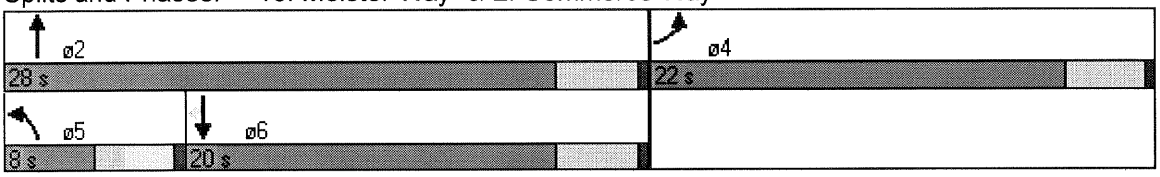


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	0.908					0.850
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1664	0	1770	3539	3539	1583
Flt Permitted	0.984		0.950			
Satd. Flow (perm)	1664	0	1770	3539	3539	1583
Satd. Flow (RTOR)	235					36
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	182	390	52	817	854	33
Adj. Flow (vph)	198	424	57	888	928	36
Lane Group Flow (vph)	622	0	57	888	928	36
Turn Type			Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Total Split (s)	22.0	0.0	8.0	28.0	20.0	20.0
Act Effct Green (s)	14.9		4.1	18.5	14.5	14.5
Actuated g/C Ratio	0.35		0.09	0.44	0.35	0.35
v/c Ratio	0.84		0.36	0.57	0.76	0.06
Uniform Delay, d1	8.0		20.4	8.0	13.0	0.0
Delay	14.1		22.2	8.9	16.6	5.3
LOS	B		C	A	B	A
Approach Delay	14.1			9.7	16.2	
Approach LOS	B			A	B	

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 42
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 13.3 Intersection LOS: B
Intersection Capacity Utilization 69.4% ICU Level of Service B

Splits and Phases: 16: Meister Way & E. Commerce Way



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	486	119	287	829	232	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	528	129	312	901	252	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	1213				1948	762
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	8				0	93
cM capacity (veh/h)	575				6	405

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	658	1213	252	28
Volume Left	528	0	252	0
Volume Right	0	901	0	28
cSH	575	1700	6	405
Volume to Capacity	0.92	0.71	43.76	0.07
Queue Length (ft)	286	0	Err	6
Control Delay (s)	47.0	0.0	Err	14.6
Lane LOS	E		F	B
Approach Delay (s)	47.0	0.0	8992.8	
Approach LOS			F	

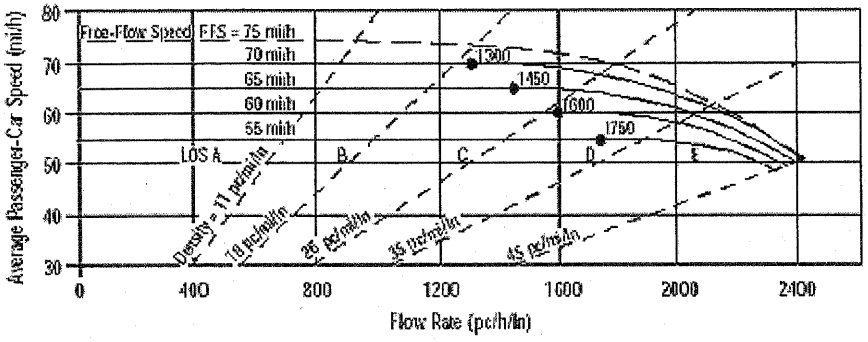
Intersection Summary			
Average Delay	1186.7		
Intersection Capacity Utilization	131.9%	ICU Level of Service	H

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	285	244	148	413	1483	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	310	265	161	449	1612	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	610				1270	385
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	68				0	95
cM capacity (veh/h)	969				126	662

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	575	610	1612	34
Volume Left	310	0	1612	0
Volume Right	0	449	0	34
cSH	969	1700	126	662
Volume to Capacity	0.32	0.36	12.77	0.05
Queue Length (ft)	35	0	Err	4
Control Delay (s)	7.5	0.0	Err	10.7
Lane LOS	A		F	B
Approach Delay (s)	7.5	0.0	9794.5	
Approach LOS			F	

Intersection Summary			
Average Delay	5696.2		
Intersection Capacity Utilization	166.5%	ICU Level of Service	H

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6202 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	3711	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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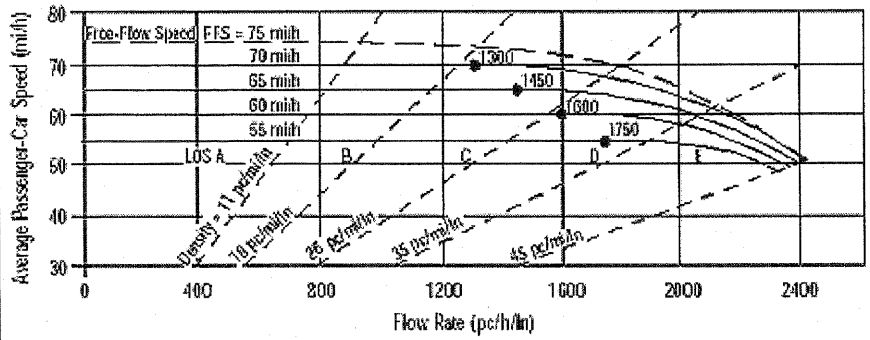

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3755 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2247	pc/h/ln
S	55.7	mi/h
D = v_p / S	40.4	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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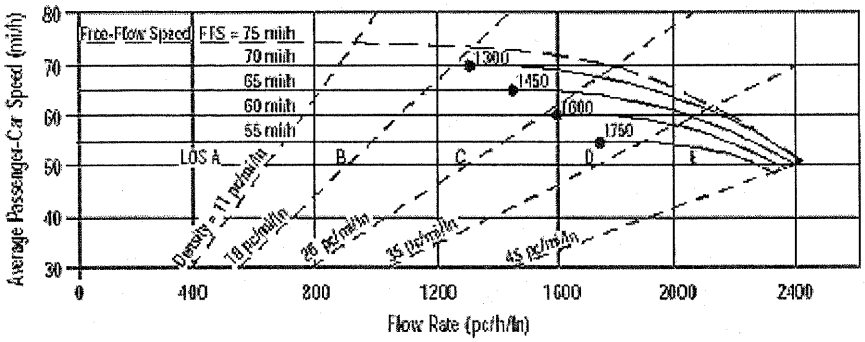

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	9648 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2886	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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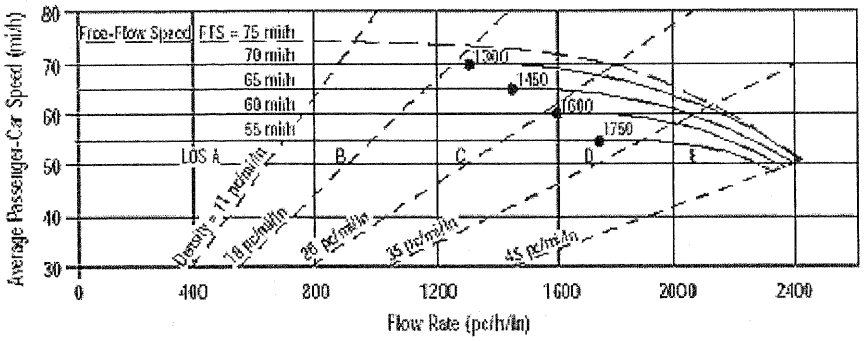

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6150 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1840	pc/h/ln
S	63.5	mi/h
D = v_p / S	29.0	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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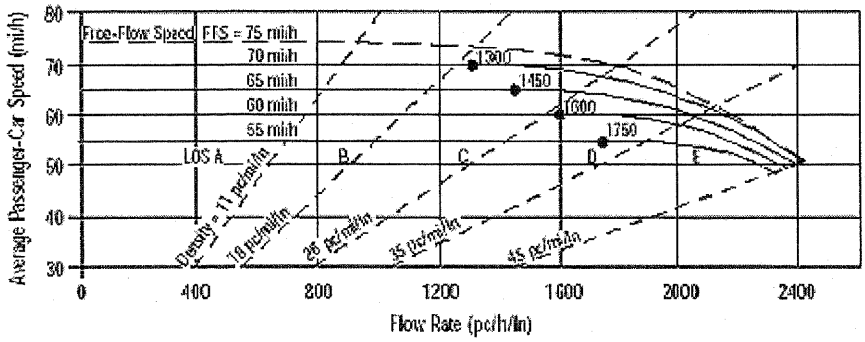

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	10294 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	3080	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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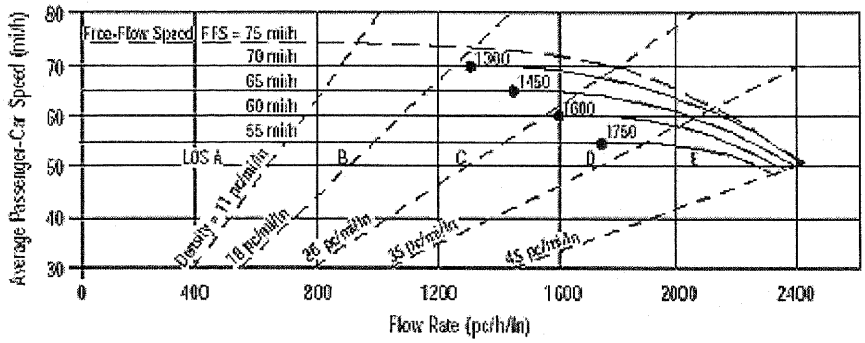

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7201 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2154	pc/h/ln
S	58.3	mi/h
D = v_p / S	37.0	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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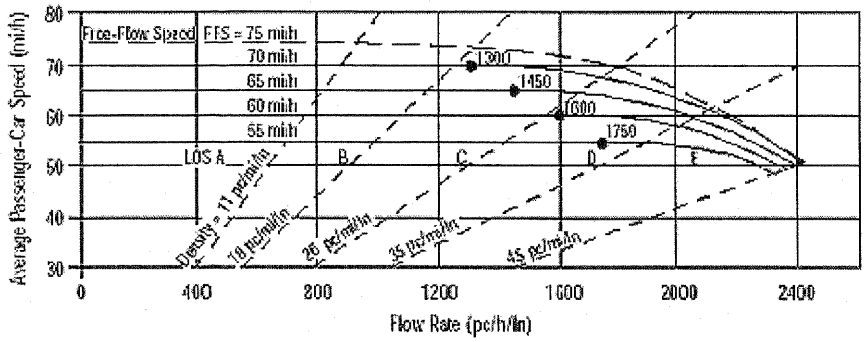

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2231 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1335	pc/h/ln
S	65.0	mi/h
D = v_p / S	20.5	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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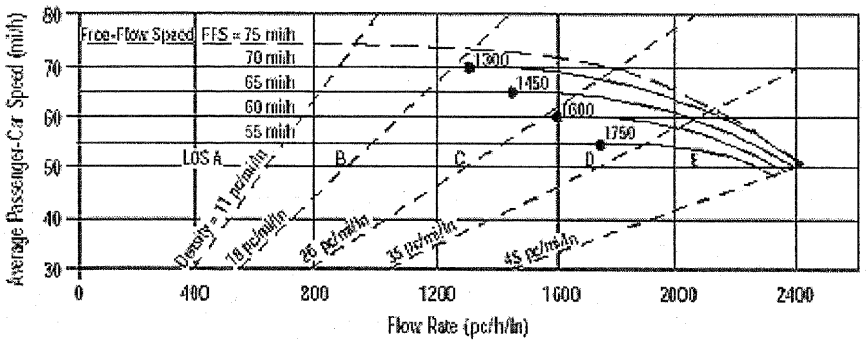
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2778 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1662	pc/h/ln
S	64.7	mi/h
D = v_p / S	25.7	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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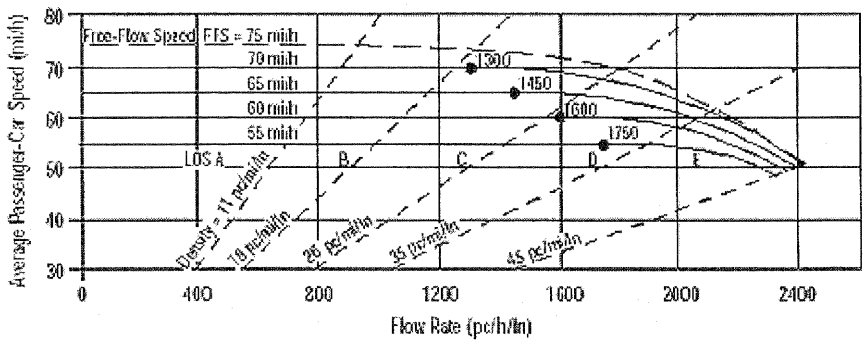

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3988 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1591	pc/h/ln
S	64.9	mi/h
D = v_p / S	24.5	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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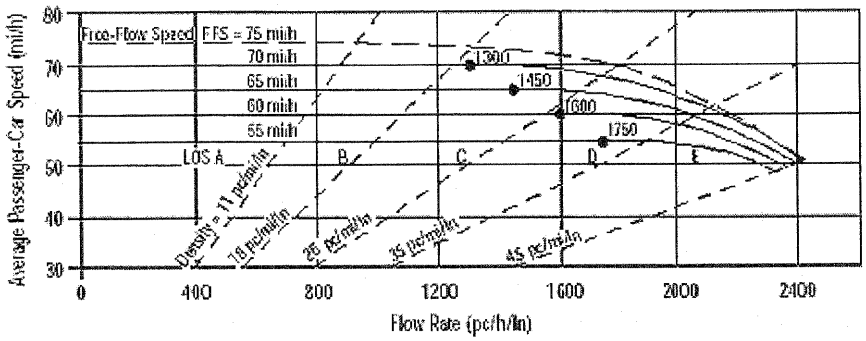

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2947 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1176	pc/h/ln
S	65.0	mi/h
D = v_p / S	18.1	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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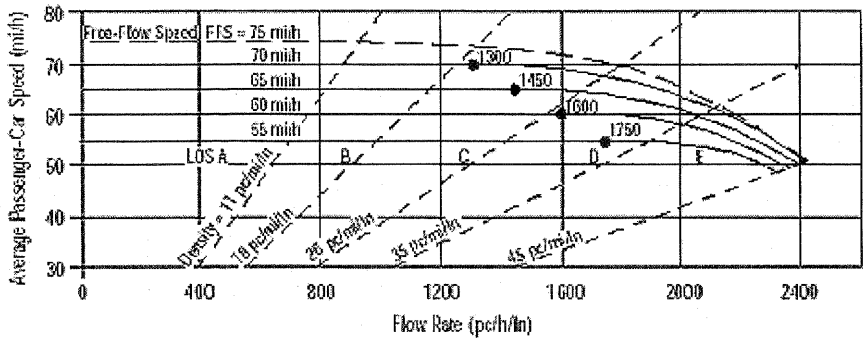

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3873 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2317	pc/h/ln
S	53.4	mi/h
D = v_p / S	43.4	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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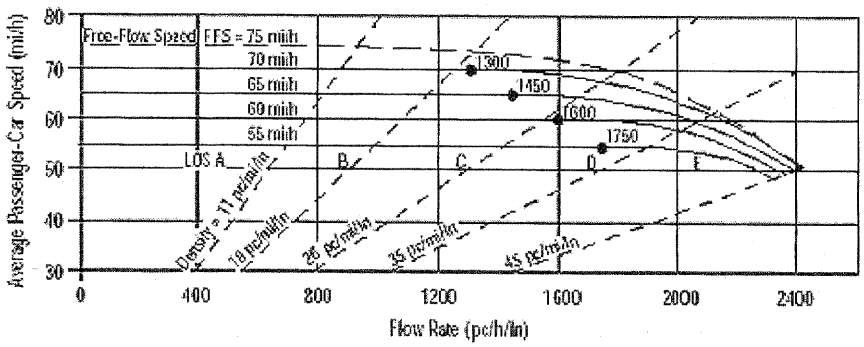

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7288 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	4361	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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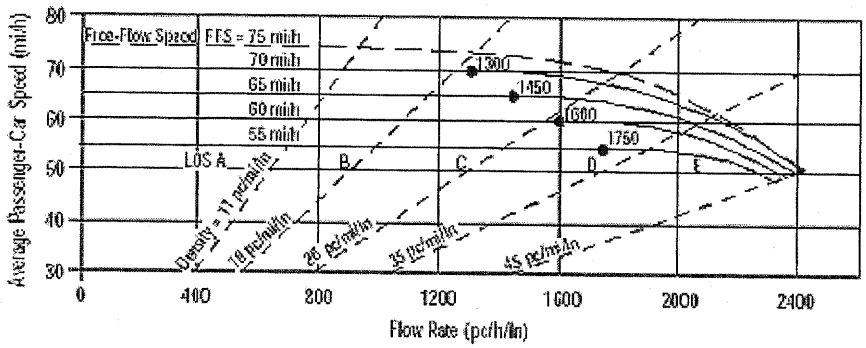

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6246 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1869	pc/h/ln
S	63.2	mi/h
D = v_p / S	29.5	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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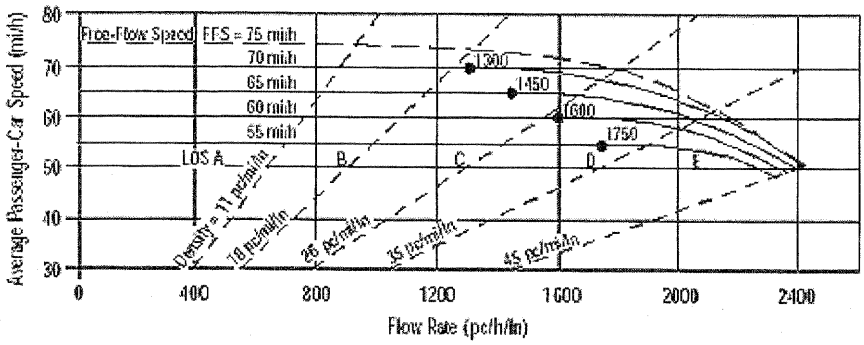
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	9997 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2991	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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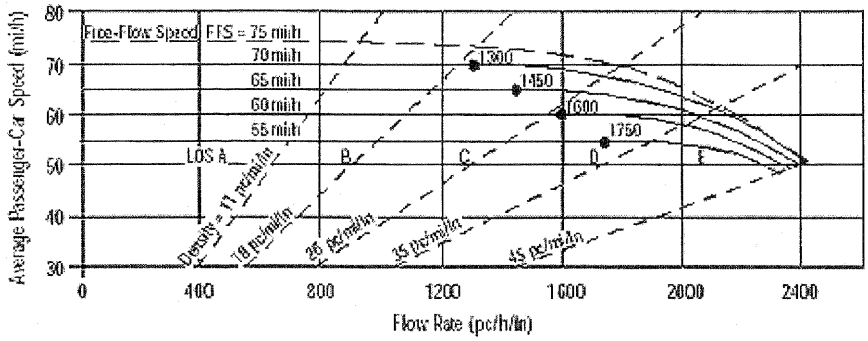
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7621 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2280	pc/h/ln
S	54.6	mi/h
D = v_p / S	41.7	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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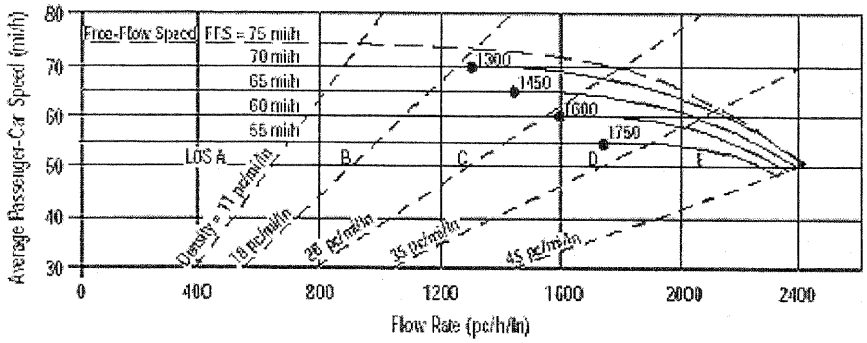

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	11146 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	3335	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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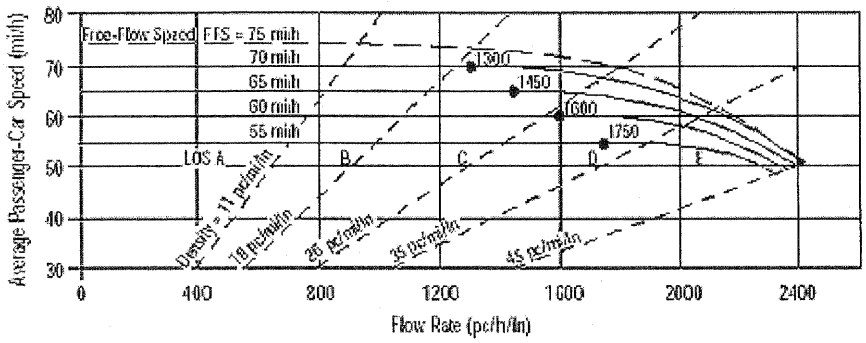

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2606 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1559	pc/h/ln
S	64.9	mi/h
D = v_p / S	24.0	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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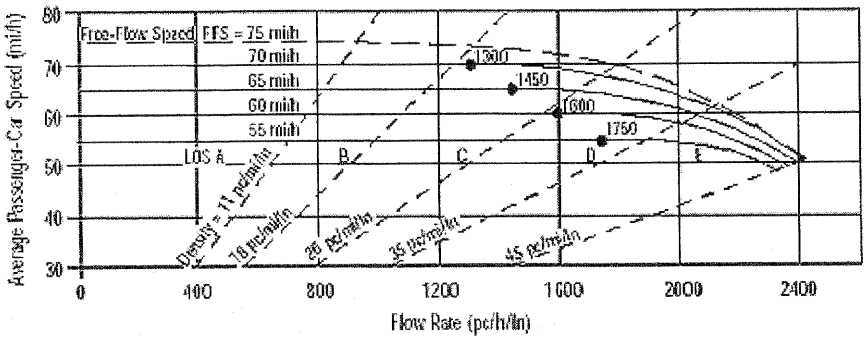

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2154 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1289	pc/h/ln
S	65.0	mi/h
D = v_p / S	19.8	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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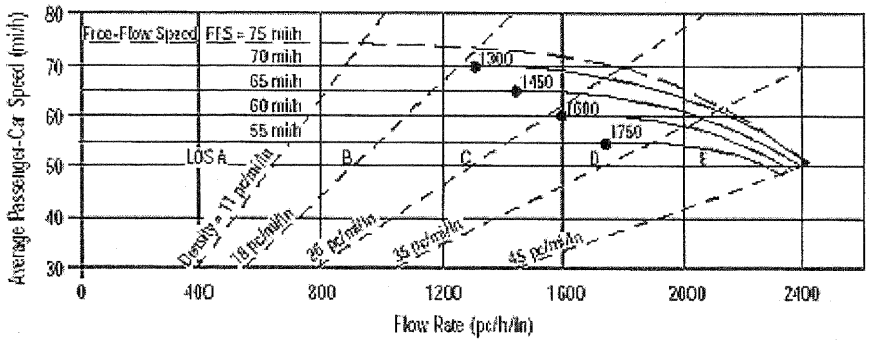
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3081 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1229	pc/h/ln
S	65.0	mi/h
D = v_p / S	18.9	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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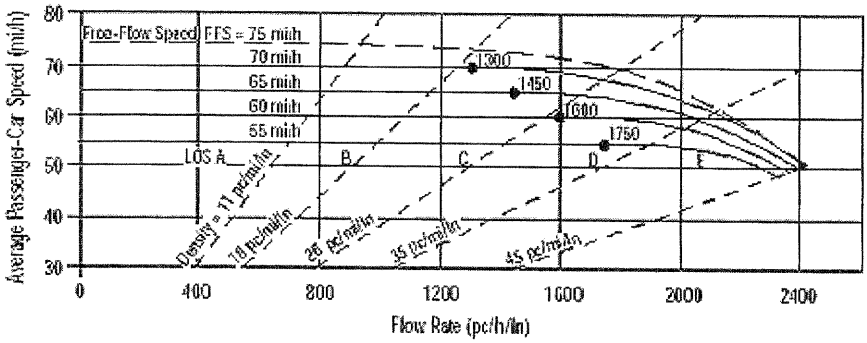

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3417 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1363	pc/h/ln
S	65.0	mi/h
D = v_p / S	21.0	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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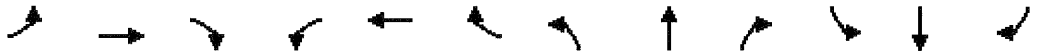
APPENDIX E – LEVEL OF SERVICE WORKSHEETS: EXISTING PLUS APPROVED PROJECTS PLUS PROJECT CONDITIONS

- Intersection Analysis
- Freeway Mainline Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	1	17	2	4	34	1	3	8	45	5	19	5
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)	1	18	2	4	37	1	3	9	49	5	21	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	42	61	32
Volume Left (vph)	1	4	3	5
Volume Right (vph)	2	1	49	5
Hadj (s)	0.0	0.0	-0.4	0.0
Departure Headway (s)	4.1	4.2	3.6	4.0
Degree Utilization, x	0.02	0.05	0.06	0.04
Capacity (veh/h)	854	614	964	877
Control Delay (s)	7.2	7.4	6.9	7.2
Approach Delay (s)	7.2	7.4	6.9	7.2
Approach LOS	A	A	A	A

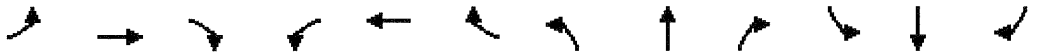
Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	1	31	3	117	10	4	2	14	81	1	4	1
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)	1	34	3	127	11	4	2	15	88	1	4	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	38	142	105	7
Volume Left (vph)	1	127	2	1
Volume Right (vph)	3	4	88	1
Hadj (s)	0.0	0.2	-0.5	0.0
Departure Headway (s)	4.3	4.7	3.9	4.4
Degree Utilization, x	0.05	0.18	0.11	0.01
Capacity (veh/h)	815	588	890	806
Control Delay (s)	7.5	8.7	7.4	7.4
Approach Delay (s)	7.5	8.7	7.4	7.4
Approach LOS	A	A	A	A

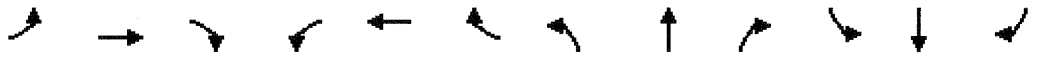
Intersection Summary			
Delay	8.0		
HCM Level of Service	A		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (veh/h)	1	17	2	4	34	1	3	8	12	5	19	5
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)	1	18	2	4	37	1	3	9	13	5	21	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	42	25	32
Volume Left (vph)	1	4	3	5
Volume Right (vph)	2	1	13	5
Hadj (s)	0.0	0.0	-0.3	0.0
Departure Headway (s)	4.0	4.1	3.8	4.0
Degree Utilization, x	0.02	0.05	0.03	0.04
Capacity (veh/h)	873	621	917	885
Control Delay (s)	7.1	7.3	6.9	7.2
Approach Delay (s)	7.1	7.3	6.9	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay		7.2	
HCM Level of Service		A	
Intersection Capacity Utilization	13.3%	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)	1	31	3	15	10	4	1	14	15	1	4	1
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)	1	34	3	16	11	4	1	15	16	1	4	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	38	32	33	7
Volume Left (vph)	1	16	1	1
Volume Right (vph)	3	4	16	1
Hadj (s)	0.0	0.1	-0.3	0.0
Departure Headway (s)	4.0	4.1	3.8	4.0
Degree Utilization, x	0.04	0.04	0.03	0.01
Capacity (veh/h)	886	615	922	878
Control Delay (s)	7.2	7.3	6.9	7.1
Approach Delay (s)	7.2	7.3	6.9	7.1
Approach LOS	A	A	A	A

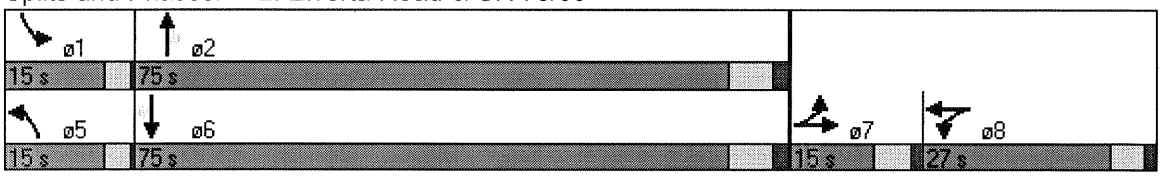
Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.966		0.950	0.955		0.950			0.950		
Satd. Flow (prot)	0	1799	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.966		0.950	0.955		0.950			0.950		
Satd. Flow (perm)	0	1799	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			32			31			102			8
Headway 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
Volume (vph)	35	15	29	556	17	30	54	1046	94	28	2545	16
Adj. Flow (vph)	38	16	32	604	18	33	59	1137	102	30	2766	17
Lane Group Flow (vph)	0	54	32	303	319	33	59	1137	102	30	2766	17
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Act Effct Green (s)		8.4	123.0	23.2	23.2	123.0	7.9	75.0	75.0	6.4	71.6	71.6
Actuated g/C Ratio		0.07	1.00	0.19	0.19	1.00	0.06	0.61	0.61	0.05	0.58	0.58
v/c Ratio		0.44	0.02	0.96	1.00	0.02	0.53	0.53	0.10	0.34	1.34	0.02
Uniform Delay, d1		57.3	0.0	51.0	51.3	0.0	58.3	15.1	0.0	59.8	26.7	6.1
Delay		57.7	0.0	89.0	100.1	0.0	58.1	15.5	2.6	59.5	164.6	9.6
LOS		E	A	F	F	A	E	B	A	E	F	A
Approach Delay		36.2			89.9			16.5			162.6	
Approach LOS		D			F			B			F	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 123
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.34
Intersection Signal Delay: 111.4 Intersection LOS: F
Intersection Capacity Utilization 107.0% ICU Level of Service F

Splits and Phases: 2: Elverta Road & SR 70/99

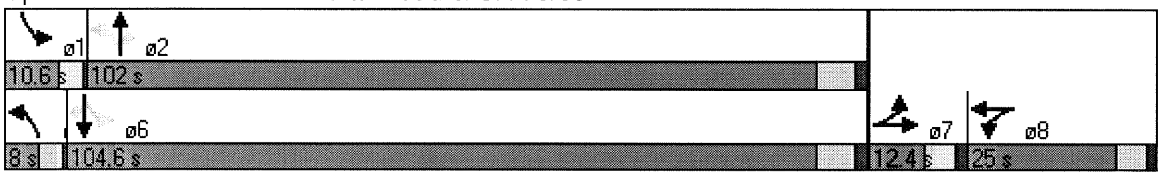


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.904				0.850			0.850
Flt Protected		0.966		0.950			0.950			0.950		
Satd. Flow (prot)	0	1799	1583	3433	1684	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.966		0.950			0.041			0.215		
Satd. Flow (perm)	0	1799	1583	3433	1684	0	76	3539	1583	400	3539	1583
Satd. Flow (RTOR)			29		30				94			10
Headway 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
Volume (vph)	35	15	29	556	17	30	54	1046	94	28	2545	16
Adj. Flow (vph)	35	15	29	556	17	30	54	1046	94	28	2545	16
Lane Group Flow (vph)	0	50	29	556	47	0	54	1046	94	28	2545	16
Turn Type	Split		Free	Split			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free				2		2	6		6
Total Split (s)	12.4	12.4	0.0	25.0	25.0	0.0	8.0	102.0	102.0	10.6	104.6	104.6
Act Effct Green (s)		7.7	145.8	21.1	21.1		105.6	101.8	101.8	106.3	101.0	101.0
Actuated g/C Ratio		0.05	1.00	0.14	0.14		0.71	0.70	0.70	0.71	0.69	0.69
v/c Ratio		0.54	0.02	1.12	0.17		0.55	0.42	0.08	0.09	1.04	0.01
Uniform Delay, d1		69.6	0.0	63.6	20.0		5.7	10.4	0.0	5.5	23.4	2.8
Delay		69.5	0.0	131.0	27.5		16.1	10.4	1.6	5.9	57.9	4.9
LOS		E	A	F	C		B	B	A	A	E	A
Approach Delay		44.0			123.0			10.0			57.0	
Approach LOS		D			F			A			E	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 145.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 53.1 — Intersection LOS: D
Intersection Capacity Utilization 99.5% — ICU Level of Service E

Splits and Phases: 2: Elverta Road & SR 70/99

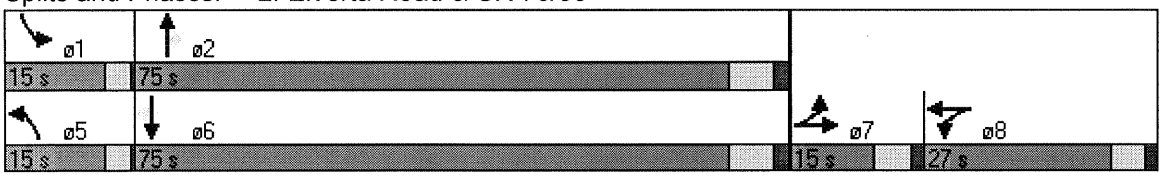


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.978		0.950	0.968		0.950			0.950		
Satd. Flow (prot)	0	1822	1583	1681	1713	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.978		0.950	0.968		0.950			0.950		
Satd. Flow (perm)	0	1822	1583	1681	1713	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			42			7			301			76
Headway 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
Volume (vph)	47	55	39	170	36	6	55	1986	485	54	1277	79
Adj. Flow (vph)	51	60	42	185	39	7	60	2159	527	59	1388	86
Lane Group Flow (vph)	0	111	42	109	115	7	60	2159	527	59	1388	86
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Act Effct Green (s)		10.1	118.0	12.6	12.6	118.0	7.9	73.3	73.3	7.8	73.3	73.3
Actuated g/C Ratio		0.09	1.00	0.11	0.11	1.00	0.07	0.62	0.62	0.07	0.62	0.62
v/c Ratio		0.72	0.03	0.61	0.62	0.00	0.52	0.98	0.48	0.51	0.63	0.08
Uniform Delay, d1		52.9	0.0	50.7	50.9	0.0	54.6	22.2	4.5	54.7	14.3	1.0
Delay		61.5	0.0	50.6	50.7	0.0	54.9	49.3	5.9	54.9	16.0	3.5
LOS		E	A	D	D	A	D	D	A	D	B	A
Approach Delay		44.6			49.1			41.1			16.8	
Approach LOS		D			D			D			B	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 118
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 33.6 — Intersection LOS: C
Intersection Capacity Utilization 79.2% — ICU Level of Service C

Splits and Phases: 2: Elverta Road & SR 70/99

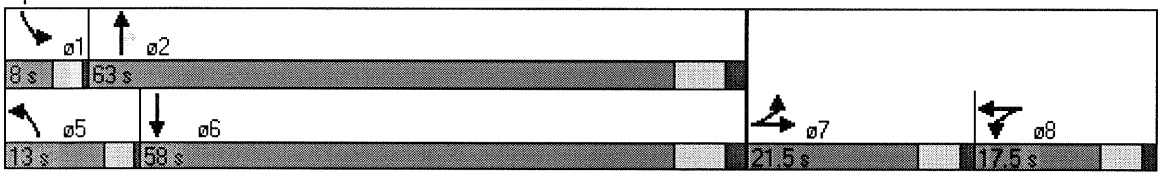


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.979				0.850			0.850
Flt Protected		0.977		0.950			0.950			0.950		
Satd. Flow (prot)	0	1820	1583	3433	1824	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.977		0.950			0.950			0.950		
Satd. Flow (perm)	0	1820	1583	3433	1824	0	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			39		6				360			42
Headway 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
Volume (vph)	47	55	39	170	36	6	55	1986	485	54	1277	79
Adj. Flow (vph)	47	55	39	170	36	6	55	1986	485	54	1277	79
Lane Group Flow (vph)	0	102	39	170	42	0	55	1986	485	54	1277	79
Turn Type	Split		Free	Split			Prot		Perm	Prot		NA
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free						2			
Total Split (s)	21.5	21.5	0.0	17.5	17.5	0.0	13.0	63.0	63.0	8.0	58.0	0.0
Act Effct Green (s)		10.4	98.9	9.7	9.7		6.9	60.9	60.9	4.0	59.9	0.0
Actuated g/C Ratio		0.10	1.00	0.10	0.10		0.07	0.62	0.62	0.04	0.61	0.00
v/c Ratio		0.54	0.02	0.50	0.23		0.45	0.91	0.44	0.75	0.60	1.88
Uniform Delay, d1		43.8	0.0	43.2	35.9		46.1	17.3	2.2	47.9	13.0	0.0
Delay		42.7	0.0	42.7	37.6		45.9	29.4	3.2	89.4	15.2	271.7
LOS		D	A	D	D		D	C	A	F	B	F
Approach Delay		30.9			41.7			24.8			32.4	
Approach LOS		C			D			C			C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 98.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.88
Intersection Signal Delay: 28.3 Intersection LOS: C
Intersection Capacity Utilization 73.7% ICU Level of Service C

Splits and Phases: 2: Elverta Road & SR 70/99

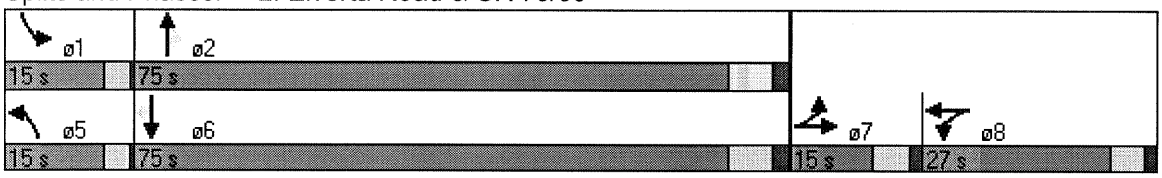


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.982		0.950	0.955		0.950			0.950		
Satd. Flow (prot)	0	1829	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.982		0.950	0.955		0.950			0.950		
Satd. Flow (perm)	0	1829	1583	1681	1690	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			30			33			96			8
Headway 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
Volume (vph)	3	5	28	530	17	30	54	1063	88	28	2536	16
Adj. Flow (vph)	3	5	30	576	18	33	59	1155	96	30	2757	17
Lane Group Flow (vph)	0	8	30	290	304	33	59	1155	96	30	2757	17
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Act Effct Green (s)		5.9	114.3	23.1	23.1	114.3	7.7	74.7	74.7	6.2	71.4	71.4
Actuated g/C Ratio		0.05	1.00	0.20	0.20	1.00	0.07	0.65	0.65	0.05	0.62	0.62
v/c Ratio		0.09	0.02	0.85	0.89	0.02	0.50	0.50	0.09	0.32	1.25	0.02
Uniform Delay, d1		58.0	0.0	47.4	47.8	0.0	55.5	12.8	0.0	57.1	24.1	5.1
Delay		57.6	0.0	62.1	67.8	0.0	53.3	11.5	2.2	54.7	128.3	7.6
LOS		E	A	E	E	A	D	B	A	D	F	A
Approach Delay		12.1			61.6			12.7			126.8	
Approach LOS		B			E			B			F	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 114.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 86.1 — Intersection LOS: F
Intersection Capacity Utilization 106.0% — ICU Level of Service F

Splits and Phases: 2: Elverta Road & SR 70/99

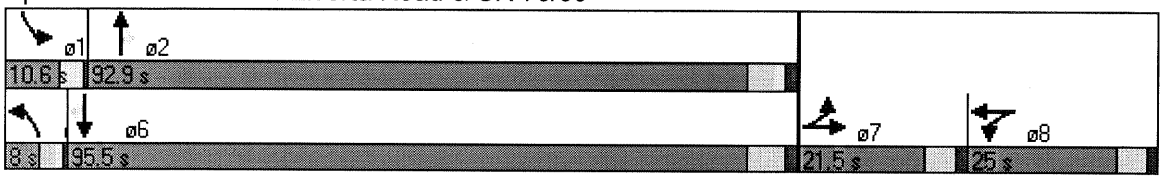


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.904				0.850			0.850
Flt Protected		0.982		0.950			0.950			0.950		
Satd. Flow (prot)	0	1829	1583	3433	1684	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.982		0.950			0.950			0.950		
Satd. Flow (perm)	0	1829	1583	3433	1684	0	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			28		30				88			8
Headway 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
Volume (vph)	3	5	28	530	17	30	54	1063	88	28	2536	16
Adj. Flow (vph)	3	5	28	530	17	30	54	1063	88	28	2536	16
Lane Group Flow (vph)	0	8	28	530	47	0	54	1063	88	28	2536	16
Turn Type	Split		Free	Split			Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free						2			6
Total Split (s)	21.5	21.5	0.0	25.0	25.0	0.0	8.0	92.9	92.9	10.6	95.5	95.5
Act Effct Green (s)		5.9	130.7	21.0	21.0		4.0	93.4	93.4	5.7	91.6	91.6
Actuated g/C Ratio		0.04	1.00	0.16	0.16		0.03	0.71	0.71	0.04	0.70	0.70
v/c Ratio		0.10	0.02	0.96	0.16		1.00	0.42	0.08	0.37	1.02	0.01
Uniform Delay, d1		66.0	0.0	57.7	17.9		66.2	9.7	0.0	65.7	21.7	3.5
Delay		63.9	0.0	74.2	24.3		142.6	8.6	1.7	62.4	40.2	4.8
LOS		E	A	E	C		F	A	A	E	D	A
Approach Delay		14.2			70.1			14.1			40.2	
Approach LOS		B			E			B			D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 130.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 36.8 Intersection LOS: D
Intersection Capacity Utilization 98.6% ICU Level of Service E

Splits and Phases: 2: Elverta Road & SR 70/99

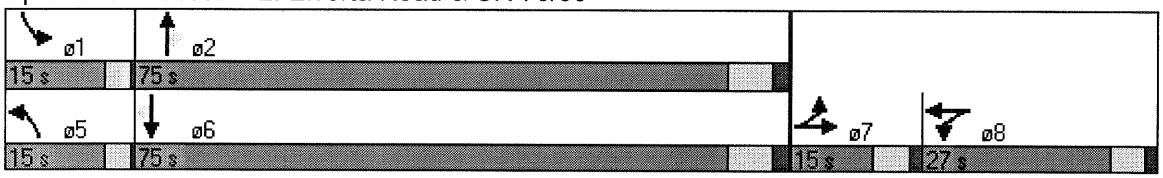


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.990		0.950	0.954		0.950			0.950		
Satd. Flow (prot)	0	1844	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Flt Permitted		0.990		0.950	0.954		0.950			0.950		
Satd. Flow (perm)	0	1844	1583	1681	1688	1583	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			37			7			296			3
Headway 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
Volume (vph)	8	31	34	163	4	6	45	2022	485	54	1319	4
Adj. Flow (vph)	9	34	37	177	4	7	49	2198	527	59	1434	4
Lane Group Flow (vph)	0	43	37	89	92	7	49	2198	527	59	1434	4
Turn Type	Split		Free	Split		Free	Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free			Free			2			6
Total Split (s)	15.0	15.0	0.0	27.0	27.0	0.0	15.0	75.0	75.0	15.0	75.0	75.0
Act Effct Green (s)		7.8	115.1	11.1	11.1	115.1	7.3	78.2	78.2	7.8	78.6	78.6
Actuated g/C Ratio		0.07	1.00	0.10	0.10	1.00	0.06	0.68	0.68	0.07	0.68	0.68
v/c Ratio		0.36	0.02	0.55	0.56	0.00	0.44	0.91	0.45	0.50	0.59	0.00
Uniform Delay, d1		54.5	0.0	51.1	51.2	0.0	54.2	17.7	3.6	54.2	11.1	1.8
Delay		52.7	0.0	48.8	48.8	0.0	52.6	38.1	5.1	52.2	12.7	7.8
LOS		D	A	D	D	A	D	D	A	D	B	A
Approach Delay		28.3			47.0			32.1			14.3	
Approach LOS		C			D			C			B	

Intersection Summary

Cycle Length: 132
Actuated Cycle Length: 115.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 26.8 — Intersection LOS: C
Intersection Capacity Utilization 79.1% — ICU Level of Service C

Splits and Phases: 2: Elverta Road & SR 70/99

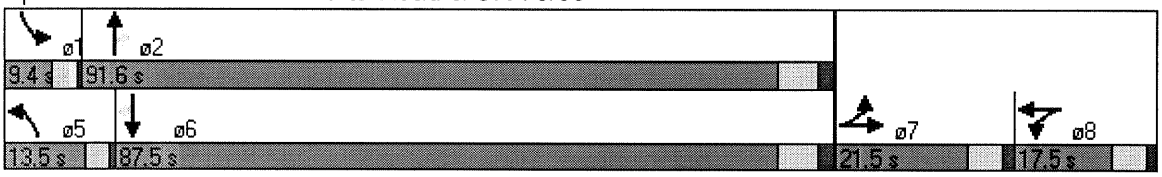


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.905				0.850			0.850
Flt Protected		0.990		0.950			0.950			0.950		
Satd. Flow (prot)	0	1844	1583	3433	1686	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.990		0.950			0.950			0.950		
Satd. Flow (perm)	0	1844	1583	3433	1686	0	1770	3539	1583	1770	3539	1583
Satd. Flow (RTOR)			37		7				344			4
Headway 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
Volume (vph)	8	31	34	163	4	6	45	2022	485	54	1319	4
Adj. Flow (vph)	9	34	37	177	4	7	49	2198	527	59	1434	4
Lane Group Flow (vph)	0	43	37	177	11	0	49	2198	527	59	1434	4
Turn Type	Split		Free	Split			Prot		Perm	Prot		Perm
Protected Phases	7	7		8	8		5	2		1	6	
Permitted Phases			Free						2			6
Total Split (s)	21.5	21.5	0.0	17.5	17.5	0.0	13.5	91.6	91.6	9.4	87.5	87.5
Act Effct Green (s)		8.0	122.9	10.9	10.9		7.2	84.7	84.7	5.5	85.1	85.1
Actuated g/C Ratio		0.06	1.00	0.09	0.09		0.06	0.69	0.69	0.04	0.69	0.69
v/c Ratio		0.36	0.02	0.58	0.07		0.48	0.90	0.44	0.75	0.59	0.00
Uniform Delay, d1		57.0	0.0	54.9	19.0		58.2	16.3	2.5	59.0	10.7	0.0
Delay		58.4	0.0	55.3	35.4		59.5	21.0	3.1	97.9	12.0	5.5
LOS		E	A	E	D		E	C	A	F	B	A
Approach Delay		31.4			54.1			18.3			15.4	
Approach LOS		C			D			B			B	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 122.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 79.1% ICU Level of Service C

Splits and Phases: 2: Elverta Road & SR 70/99



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	264	47	10	149	3	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	287	51	11	162	3	39

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	338	173	42
Volume Left (vph)	287	0	3
Volume Right (vph)	51	162	0
Hadj (s)	0.1	-0.5	0.0
Departure Headway (s)	5.2	4.3	5.0
Degree Utilization, x	0.49	0.21	0.06
Capacity (veh/h)	594	784	702
Control Delay (s)	13.1	8.4	8.4
Approach Delay (s)	13.1	8.4	8.4
Approach LOS	B	A	A

Intersection Summary			
Delay		11.3	
HCM Level of Service		B	
Intersection Capacity Utilization	36.3%	ICU Level of Service	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	264	47	10	149	3	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	287	51	11	162	3	39

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	338	65	108	42
Volume Left (vph)	287	0	0	3
Volume Right (vph)	51	54	108	0
Hadj (s)	0.1	-0.5	-0.6	0.0
Departure Headway (s)	5.2	5.0	4.9	5.2
Degree Utilization, x	0.49	0.09	0.15	0.06
Capacity (veh/h)	593	684	697	688
Control Delay (s)	13.2	7.3	7.5	8.5
Approach Delay (s)	13.2	7.4		8.5
Approach LOS	B	A		A

Intersection Summary			
Delay	11.0		
HCM Level of Service	B		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	380	80	67	673	114	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	413	87	73	732	124	51

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	500	804	175
Volume Left (vph)	413	0	124
Volume Right (vph)	87	732	0
Hadj (s)	0.1	-0.5	0.2
Departure Headway (s)	6.9	5.5	6.9
Degree Utilization, x	0.96	1.23	0.34
Capacity (veh/h)	517	661	514
Control Delay (s)	55.6	137.0	13.4
Approach Delay (s)	55.6	137.0	13.4
Approach LOS	F	F	B

Intersection Summary			
Delay	94.9		
HCM Level of Service	F		
Intersection Capacity Utilization	96.8%	ICU Level of Service	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	380	80	67	673	114	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (veh/h)	380	80	67	673	114	47

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	460	291	449	161
Volume Left (vph)	380	0	0	114
Volume Right (vph)	80	224	449	0
Hadj (s)	0.1	-0.4	-0.6	0.2
Departure Headway (s)	6.6	5.9	5.8	6.6
Degree Utilization, x	0.84	0.48	0.72	0.30
Capacity (veh/h)	520	599	609	531
Control Delay (s)	35.0	13.0	20.8	12.3
Approach Delay (s)	35.0	17.7		12.3
Approach LOS	E	C		B

Intersection Summary			
Delay	22.9		
HCM Level of Service	C		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	108	5	10	126	3	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	117	5	11	137	3	39

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	123	148	42
Volume Left (vph)	117	0	3
Volume Right (vph)	5	137	0
Hadj (s)	0.2	-0.5	0.0
Departure Headway (s)	4.7	3.7	4.4
Degree Utilization, x	0.16	0.15	0.05
Capacity (veh/h)	587	935	814
Control Delay (s)	8.5	7.4	7.6
Approach Delay (s)	8.5	7.4	7.6
Approach LOS	A	A	A

Intersection Summary			
Delay		7.9	
HCM Level of Service		A	
Intersection Capacity Utilization	22.5%	ICU Level of Service	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (veh/h)	171	15	65	205	1	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	186	16	71	223	1	49

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	202	293	50
Volume Left (vph)	186	0	1
Volume Right (vph)	16	223	0
Hadj (s)	0.2	-0.4	0.0
Departure Headway (s)	5.1	4.1	4.8
Degree Utilization, x	0.29	0.33	0.07
Capacity (veh/h)	565	852	744
Control Delay (s)	10.2	9.1	8.1
Approach Delay (s)	10.2	9.1	8.1
Approach LOS	B	A	A

Intersection Summary			
Delay	9.4		
HCM Level of Service	A		
Intersection Capacity Utilization	35.4%	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)	36	122	631	72	298	783
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	39	133	686	78	324	851
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			172		1555	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			51		0	10
cM capacity (veh/h)			1405		64	949

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	172	764	1175
Volume Left	0	686	324
Volume Right	133	0	851
cSH	1700	1405	196
Volume to Capacity	0.10	0.49	5.99
Queue Length (ft)	0	69	Err
Control Delay (s)	0.0	9.5	Err
Lane LOS		A	F
Approach Delay (s)	0.0	9.5	Err
Approach LOS			F

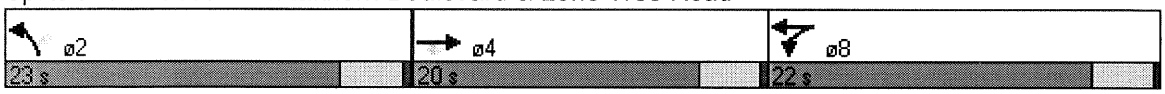
Intersection Summary			
Average Delay	5569.3		
Intersection Capacity Utilization	132.7%	ICU Level of Service	H

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.915	0.850				0.850
Flt Protected			0.950	0.961	0.950	
Satd. Flow (prot)	1619	1504	1681	1701	1770	1583
Flt Permitted			0.950	0.961	0.950	
Satd. Flow (perm)	1619	1504	1681	1701	1770	1583
Satd. Flow (RTOR)	51	82				851
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	36	122	631	72	298	783
Adj. Flow (vph)	39	133	686	78	324	851
Lane Group Flow (vph)	90	82	372	392	324	851
Turn Type		Perm	Split			Perm
Protected Phases	4		8	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	22.0	22.0	23.0	23.0
Act Effct Green (s)	7.3	7.3	15.7	15.7	14.7	14.7
Actuated g/C Ratio	0.15	0.15	0.33	0.33	0.31	0.31
v/c Ratio	0.32	0.28	0.67	0.70	0.59	0.79
Uniform Delay, d1	8.3	0.0	13.9	14.1	13.9	0.0
Delay	12.3	6.7	19.2	20.2	15.9	3.0
LOS	B	A	B	C	B	A
Approach Delay	9.6			19.7	6.5	
Approach LOS	A			B	A	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 47.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 64.1% ICU Level of Service B

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	146	700	703	72	400	741
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	159	761	764	78	435	805
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			920		2146	539
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	0
cM capacity (veh/h)			742		0	542

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	920	842	1240
Volume Left	0	764	435
Volume Right	761	0	805
cSH	1700	742	0
Volume to Capacity	0.54	1.03	Err
Queue Length (ft)	0	459	Err
Control Delay (s)	0.0	64.7	Err
Lane LOS		F	F
Approach Delay (s)	0.0	64.7	Err
Approach LOS			F

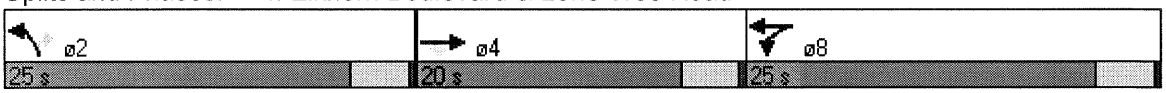
Intersection Summary			
Average Delay		Err	
Intersection Capacity Utilization	185.3%	ICU Level of Service	H

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.919	0.850				0.850
Flt Protected			0.950	0.961	0.950	
Satd. Flow (prot)	1626	1504	1681	1701	1770	1583
Flt Permitted			0.950	0.961	0.950	
Satd. Flow (perm)	1626	1504	1681	1701	1770	1583
Satd. Flow (RTOR)	78	563				805
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	146	700	703	72	400	741
Adj. Flow (vph)	159	761	764	78	435	805
Lane Group Flow (vph)	344	576	410	432	435	805
Turn Type		Perm	Split			Perm
Protected Phases	4		8	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	25.0	25.0	25.0	25.0
Act Effct Green (s)	14.1	14.1	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.22	0.22	0.29	0.29	0.29	0.29
v/c Ratio	0.83	0.75	0.83	0.86	0.83	0.78
Uniform Delay, d1	18.2	0.4	21.0	21.2	21.0	0.0
Delay	26.4	4.0	29.0	31.1	28.8	3.0
LOS	C	A	C	C	C	A
Approach Delay	12.4			30.1	12.0	
Approach LOS	B			C	B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 64.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 17.2 Intersection LOS: B
Intersection Capacity Utilization 81.2% ICU Level of Service D

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	28	107	264	38	133	480
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	30	116	287	41	145	522
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			147		704	89
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		55	46
cM capacity (veh/h)			1435		323	970

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	147	328	666
Volume Left	0	287	145
Volume Right	116	0	522
cSH	1700	1435	676
Volume to Capacity	0.09	0.20	0.99
Queue Length (ft)	0	19	381
Control Delay (s)	0.0	7.3	55.9
Lane LOS		A	F
Approach Delay (s)	0.0	7.3	55.9
Approach LOS			F

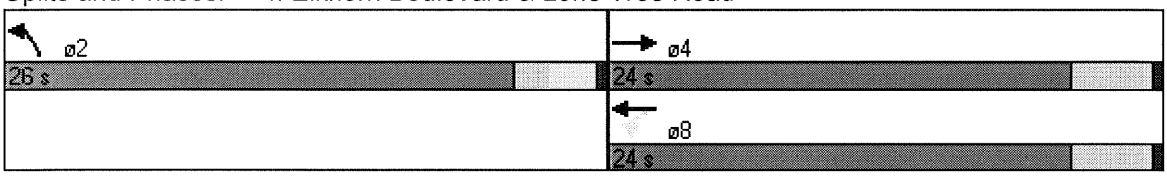
Intersection Summary			
Average Delay	34.7		
Intersection Capacity Utilization	77.0%	ICU Level of Service	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.893				0.894	
Flt Protected				0.958	0.989	
Satd. Flow (prot)	1663	0	0	1785	1647	0
Flt Permitted				0.654	0.989	
Satd. Flow (perm)	1663	0	0	1218	1647	0
Satd. Flow (RTOR)	116				463	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	28	107	264	38	133	480
Adj. Flow (vph)	30	116	287	41	145	522
Lane Group Flow (vph)	146	0	0	328	667	0
Turn Type			Perm			
Protected Phases	4			8	2	
Permitted Phases			8			
Total Split (s)	24.0	0.0	24.0	24.0	26.0	0.0
Act Effct Green (s)	14.4			14.4	15.2	
Actuated g/C Ratio	0.38			0.38	0.40	
v/c Ratio	0.21			0.71	0.71	
Uniform Delay, d1	1.5			9.8	2.5	
Delay	3.4			12.7	3.8	
LOS	A			B	A	
Approach Delay	3.4			12.7	3.8	
Approach LOS	A			B	A	

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 38.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 6.3 Intersection LOS: A
Intersection Capacity Utilization 77.0% ICU Level of Service C

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	64	204	452	40	161	507
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	70	222	491	43	175	551
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			291		1207	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			61		0	36
cM capacity (veh/h)			1270		124	862

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	291	535	726
Volume Left	0	491	175
Volume Right	222	0	551
cSH	1700	1270	355
Volume to Capacity	0.17	0.39	2.05
Queue Length (ft)	0	46	1292
Control Delay (s)	0.0	9.1	505.5
Lane LOS		A	F
Approach Delay (s)	0.0	9.1	505.5
Approach LOS			F

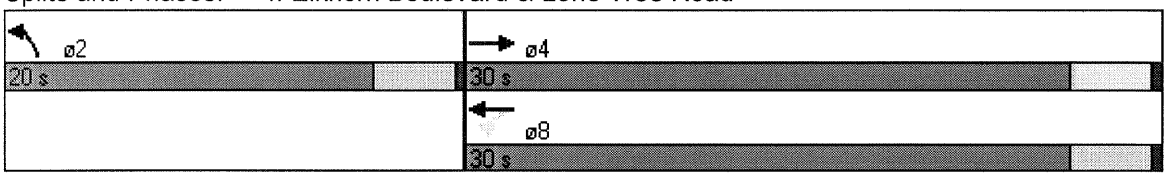
Intersection Summary			
Average Delay	239.6		
Intersection Capacity Utilization	100.5%	ICU Level of Service	F

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.897				0.898	
Flt Protected				0.956	0.988	
Satd. Flow (prot)	1671	0	0	1781	1653	0
Flt Permitted				0.543	0.988	
Satd. Flow (perm)	1671	0	0	1011	1653	0
Satd. Flow (RTOR)	222				333	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	64	204	452	40	161	507
Adj. Flow (vph)	70	222	491	43	175	551
Lane Group Flow (vph)	292	0	0	534	726	0
Turn Type			Perm			
Protected Phases	4			8	2	
Permitted Phases			8			
Total Split (s)	30.0	0.0	30.0	30.0	20.0	0.0
Act Effct Green (s)	26.0			26.0	15.9	
Actuated g/C Ratio	0.52			0.52	0.32	
v/c Ratio	0.30			1.01	0.96	
Uniform Delay, d1	1.4			12.0	8.9	
Delay	2.2			50.8	30.7	
LOS	A			D	C	
Approach Delay	2.2			50.8	30.7	
Approach LOS	A			D	C	

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 49.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 32.3 Intersection LOS: C
Intersection Capacity Utilization 100.5% ICU Level of Service F

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	305	652	0	129	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	332	709	0	140	202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	709				1040	709
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				45	53
cM capacity (veh/h)	890				255	434

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	332	709	140	202
Volume Left	0	0	140	0
Volume Right	0	0	0	202
cSH	1700	1700	255	434
Volume to Capacity	0.20	0.42	0.55	0.47
Queue Length (ft)	0	0	76	60
Control Delay (s)	0.0	0.0	35.1	20.3
Lane LOS			E	C
Approach Delay (s)	0.0	0.0	26.4	
Approach LOS			D	

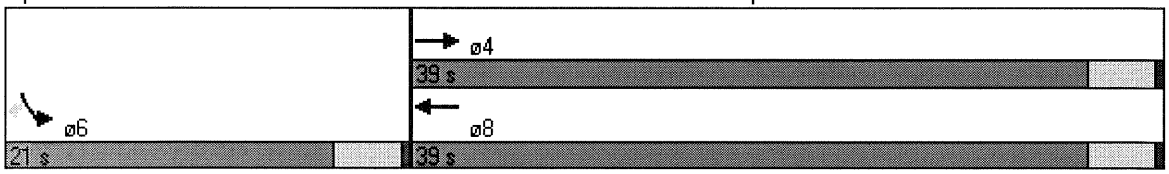
Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	56.5%	ICU Level of Service	A

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
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	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Satd. Flow (RTOR)						202
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	305	652	0	129	186
Adj. Flow (vph)	0	332	709	0	140	202
Lane Group Flow (vph)	0	332	709	0	140	202
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	39.0	39.0	0.0	21.0	21.0
Act Effct Green (s)		19.1	19.1		8.8	8.8
Actuated g/C Ratio		0.52	0.52		0.24	0.24
v/c Ratio		0.34	0.73		0.33	0.38
Uniform Delay, d1		4.8	6.3		11.1	0.0
Delay		5.1	7.0		14.3	3.5
LOS		A	A		B	A
Approach Delay		5.1	7.0		7.9	
Approach LOS		A	A		A	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 36.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 6.8 — Intersection LOS: A
Intersection Capacity Utilization 56.5% — ICU Level of Service A

Splits and Phases: 5: Elkhorn Boulevard & SR 99 SB off ramp



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	420	958	0	104	192
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	457	1041	0	113	209
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	1041				1498	1041
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				16	25
cM capacity (veh/h)	668				135	279

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	457	1041	113	209
Volume Left	0	0	113	0
Volume Right	0	0	0	209
cSH	1700	1700	135	279
Volume to Capacity	0.27	0.61	0.84	0.75
Queue Length (ft)	0	0	132	137
Control Delay (s)	0.0	0.0	102.1	48.1
Lane LOS			F	E
Approach Delay (s)	0.0	0.0	67.1	
Approach LOS			F	

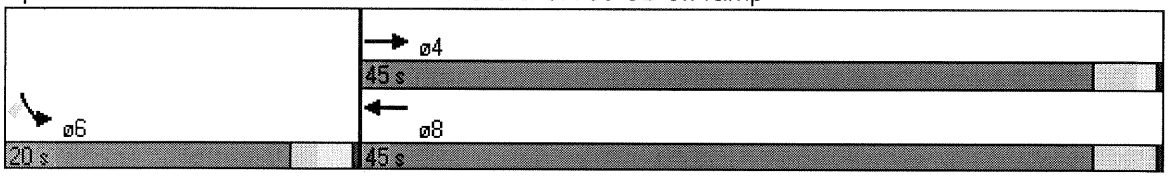
Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	74.4%	ICU Level of Service	C

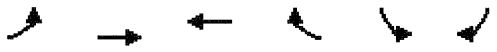
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Satd. Flow (RTOR)						123
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	420	958	0	104	192
Adj. Flow (vph)	0	457	1041	0	113	209
Lane Group Flow (vph)	0	457	1041	0	113	209
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	45.0	45.0	0.0	20.0	20.0
Act Effct Green (s)		32.5	32.5		9.2	9.2
Actuated g/C Ratio		0.65	0.65		0.18	0.18
v/c Ratio		0.38	0.86		0.35	0.54
Uniform Delay, d1		3.9	6.7		17.6	7.2
Delay		4.4	11.6		20.6	10.2
LOS		A	B		C	B
Approach Delay		4.4	11.6		13.9	
Approach LOS		A	B		B	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 50.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 10.2 — Intersection LOS: B
Intersection Capacity Utilization 74.4% — ICU Level of Service C

Splits and Phases: 5: Elkhorn Boulevard & SR 99 SB off ramp

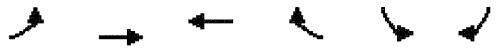




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	185	322	0	161	117
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	201	350	0	175	127
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	350				551	350
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				65	82
cM capacity (veh/h)	1209				495	693

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	201	350	175	127
Volume Left	0	0	175	0
Volume Right	0	0	0	127
cSH	1700	1700	495	693
Volume to Capacity	0.12	0.21	0.35	0.18
Queue Length (ft)	0	0	39	17
Control Delay (s)	0.0	0.0	16.2	11.4
Lane LOS			C	B
Approach Delay (s)	0.0	0.0	14.2	
Approach LOS			B	

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	245	647	0	151	175
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	266	703	0	164	190
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	703				970	703
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				42	57
cM capacity (veh/h)	894				281	437

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	266	703	164	190
Volume Left	0	0	164	0
Volume Right	0	0	0	190
cSH	1700	1700	281	437
Volume to Capacity	0.16	0.41	0.58	0.43
Queue Length (ft)	0	0	85	54
Control Delay (s)	0.0	0.0	34.3	19.4
Lane LOS			D	C
Approach Delay (s)	0.0	0.0	26.3	
Approach LOS			D	

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	55.5%	ICU Level of Service	A

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	288	0	0	1209	485	419
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	313	0	0	1314	527	455
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			313		1627	313
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	37
cM capacity (veh/h)			1247		112	727

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	313	1314	527	455
Volume Left	0	0	527	0
Volume Right	0	0	0	455
cSH	1700	1700	112	727
Volume to Capacity	0.18	0.77	4.70	0.63
Queue Length (ft)	0	0	Err	111
Control Delay (s)	0.0	0.0	Err	17.9
Lane LOS			F	C
Approach Delay (s)	0.0	0.0	5372.8	
Approach LOS			F	

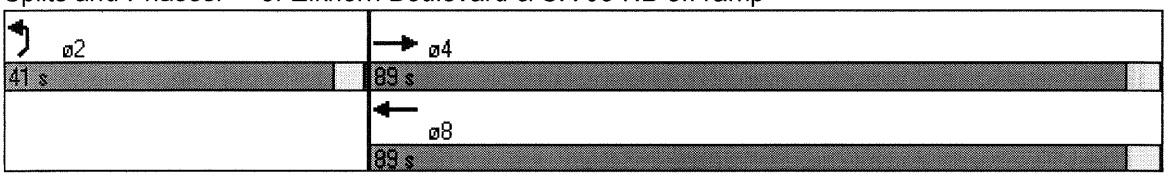
Intersection Summary			
Average Delay	2022.9		
Intersection Capacity Utilization	105.0%	ICU Level of Service	F

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑			↑	↰	↱
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	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	1863	0	0	1863	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	1863	0	0	1863	1770	1583
Satd. Flow (RTOR)						263
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	288	0	0	1209	485	419
Adj. Flow (vph)	313	0	0	1314	527	455
Lane Group Flow (vph)	313	0	0	1314	527	455
Turn Type						Free
Protected Phases	4			8	2	
Permitted Phases						Free
Total Split (s)	89.0	0.0	0.0	89.0	41.0	0.0
Act Effct Green (s)	85.0			85.0	37.1	130.0
Actuated g/C Ratio	0.65			0.65	0.29	1.00
v/c Ratio	0.26			1.08	1.05	0.29
Uniform Delay, d1	9.3			22.5	46.5	0.0
Delay	9.5			65.7	86.1	0.0
LOS	A			E	F	A
Approach Delay	9.5			65.7	46.2	
Approach LOS	A			E	D	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 51.6 Intersection LOS: D
Intersection Capacity Utilization 105.0% ICU Level of Service F

Splits and Phases: 6: Elkhorn Boulevard & SR 99 NB off ramp



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	288	0	0	663	793	1373
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	313	0	0	721	862	1492
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			313		1034	313
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	0
cM capacity (veh/h)			1247		257	727

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	313	721	862	1492
Volume Left	0	0	862	0
Volume Right	0	0	0	1492
cSH	1700	1700	257	727
Volume to Capacity	0.18	0.42	3.35	2.05
Queue Length (ft)	0	0	Err	2529
Control Delay (s)	0.0	0.0	Err	492.9
Lane LOS			F	F
Approach Delay (s)	0.0	0.0	3973.2	
Approach LOS			F	

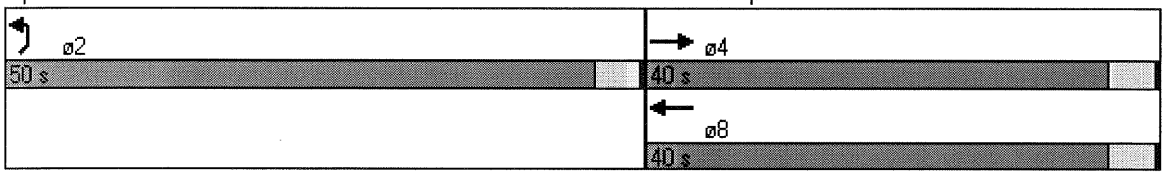
Intersection Summary			
Average Delay	2761.0		
Intersection Capacity Utilization	115.6%	ICU Level of Service	G

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
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	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	1863	0	0	1863	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	1863	0	0	1863	1770	1583
Satd. Flow (RTOR)						762
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	288	0	0	663	793	1373
Adj. Flow (vph)	313	0	0	721	862	1492
Lane Group Flow (vph)	313	0	0	721	862	1492
Turn Type						Free
Protected Phases	4			8	2	
Permitted Phases						Free
Total Split (s)	40.0	0.0	0.0	40.0	50.0	0.0
Act Effct Green (s)	34.6			34.6	43.5	86.2
Actuated g/C Ratio	0.40			0.40	0.50	1.00
v/c Ratio	0.42			0.96	0.96	0.94
Uniform Delay, d1	18.5			25.1	20.5	0.0
Delay	19.5			44.4	34.8	8.6
LOS	B			D	C	A
Approach Delay	19.5			44.4	18.2	
Approach LOS	B			D	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 86.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 92.3% ICU Level of Service E

Splits and Phases: 6: Elkhorn Boulevard & SR 99 NB off ramp



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	221	0	0	1265	258	587
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	240	0	0	1375	280	638
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			240		1615	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	20
cM capacity (veh/h)			1326		114	799

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	240	1375	280	638
Volume Left	0	0	280	0
Volume Right	0	0	0	638
cSH	1700	1700	114	799
Volume to Capacity	0.14	0.81	2.46	0.80
Queue Length (ft)	0	0	625	210
Control Delay (s)	0.0	0.0	741.2	24.8
Lane LOS			F	C
Approach Delay (s)	0.0	0.0	243.5	
Approach LOS			F	

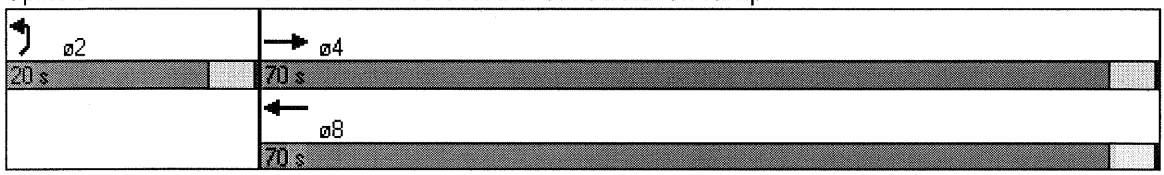
Intersection Summary			
Average Delay	88.3		
Intersection Capacity Utilization	94.6%	ICU Level of Service	E

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
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	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	1863	0	0	1863	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	1863	0	0	1863	1770	1583
Satd. Flow (RTOR)						638
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	221	0	0	1265	258	587
Adj. Flow (vph)	240	0	0	1375	280	638
Lane Group Flow (vph)	240	0	0	1375	280	638
Turn Type						Free
Protected Phases	4			8	2	
Permitted Phases						Free
Total Split (s)	70.0	0.0	0.0	70.0	20.0	0.0
Act Effct Green (s)	66.0			66.0	15.7	89.7
Actuated g/C Ratio	0.74			0.74	0.18	1.00
v/c Ratio	0.18			1.00	0.90	0.40
Uniform Delay, d1	3.6			11.9	36.3	0.0
Delay	3.7			34.5	56.3	0.0
LOS	A			C	E	A
Approach Delay	3.7			34.5	17.2	
Approach LOS	A			C	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 89.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 25.3 Intersection LOS: C
Intersection Capacity Utilization 94.6% ICU Level of Service E

Splits and Phases: 6: Elkhorn Boulevard & SR 99 NB off ramp



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	202	0	0	675	577	1522
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	220	0	0	734	627	1654
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			220		953	220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	0
cM capacity (veh/h)			1350		287	820

Direction, Lane #	EB 1	WB 1	NE 1	NE 2
Volume Total	220	734	627	1654
Volume Left	0	0	627	0
Volume Right	0	0	0	1654
cSH	1700	1700	287	820
Volume to Capacity	0.13	0.43	2.18	2.02
Queue Length (ft)	0	0	1186	2748
Control Delay (s)	0.0	0.0	571.9	475.7
Lane LOS			F	F
Approach Delay (s)	0.0	0.0	502.1	
Approach LOS			F	

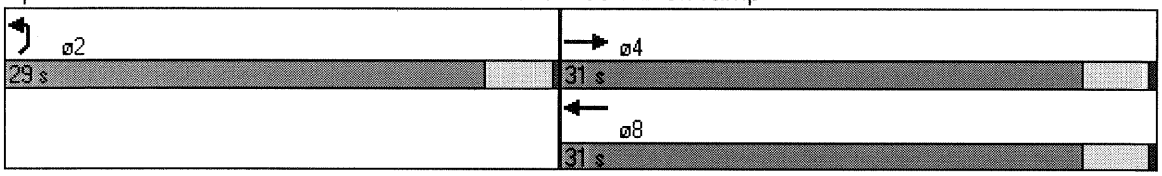
Intersection Summary			
Average Delay	354.2		
Intersection Capacity Utilization	120.7%	ICU Level of Service	H

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑			↑	↰	↱
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	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	1863	0	0	1863	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	1863	0	0	1863	1770	1583
Satd. Flow (RTOR)						827
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	202	0	0	675	577	1522
Adj. Flow (vph)	220	0	0	734	627	1654
Lane Group Flow (vph)	220	0	0	734	627	1654
Turn Type						Free
Protected Phases	4			8	2	
Permitted Phases						Free
Total Split (s)	31.0	0.0	0.0	31.0	29.0	0.0
Act Effct Green (s)	24.1			24.1	22.0	54.5
Actuated g/C Ratio	0.44			0.44	0.40	1.00
v/c Ratio	0.27			0.89	0.88	1.04
Uniform Delay, d1	9.4			13.7	14.7	0.0
Delay	10.4			21.7	22.1	31.8
LOS	B			C	C	C
Approach Delay	10.4			21.7	29.1	
Approach LOS	B			C	C	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 54.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 26.2 — Intersection LOS: C
Intersection Capacity Utilization 80.0% — ICU Level of Service D

Splits and Phases: 6: Elkhorn Boulevard & SR 99 NB off ramp



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	554	160	139	911	285	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	602	174	151	990	310	136
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			776		1895	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		0	73
cM capacity (veh/h)			840		63	499

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	602	174	151	990	310	136
Volume Left	0	0	151	0	310	0
Volume Right	0	174	0	0	0	136
cSH	1700	1700	840	1700	63	499
Volume to Capacity	0.35	0.10	0.18	0.58	4.93	0.27
Queue Length (ft)	0	0	16	0	Err	27
Control Delay (s)	0.0	0.0	10.2	0.0	Err	14.9
Lane LOS			B		F	B
Approach Delay (s)	0.0		1.4		6955.1	
Approach LOS					F	

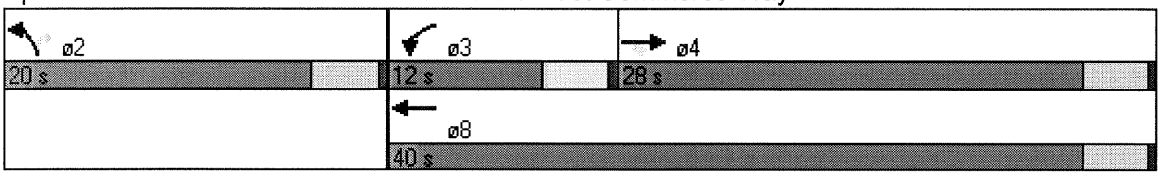
Intersection Summary			
Average Delay	1312.3		
Intersection Capacity Utilization	75.9%	ICU Level of Service	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Satd. Flow (RTOR)		174				136
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	554	160	139	911	285	125
Adj. Flow (vph)	602	174	151	990	310	136
Lane Group Flow (vph)	602	174	151	990	310	136
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	28.0	28.0	12.0	40.0	20.0	20.0
Act Effct Green (s)	22.6	22.6	7.6	31.4	13.2	13.2
Actuated g/C Ratio	0.43	0.43	0.14	0.59	0.25	0.25
v/c Ratio	0.76	0.22	0.62	0.90	0.70	0.27
Uniform Delay, d1	13.3	0.0	23.2	8.9	18.5	0.0
Delay	19.3	2.6	29.8	15.9	20.7	4.3
LOS	B	A	C	B	C	A
Approach Delay	15.5			17.7	15.7	
Approach LOS	B			B	B	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 53
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 16.6 — Intersection LOS: B
Intersection Capacity Utilization 75.9% — ICU Level of Service C

Splits and Phases: 7: Elkhorn Boulevard & East Commerce Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1144	165	117	500	263	126
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1243	179	127	543	286	137
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1423		2041	1243
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		0	36
cM capacity (veh/h)			478		46	213

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	1243	179	127	543	286	137
Volume Left	0	0	127	0	286	0
Volume Right	0	179	0	0	0	137
cSH	1700	1700	478	1700	46	213
Volume to Capacity	0.73	0.11	0.27	0.32	6.28	0.64
Queue Length (ft)	0	0	27	0	Err	96
Control Delay (s)	0.0	0.0	15.2	0.0	Err	48.2
Lane LOS			C		F	E
Approach Delay (s)	0.0		2.9		6775.9	
Approach LOS					F	

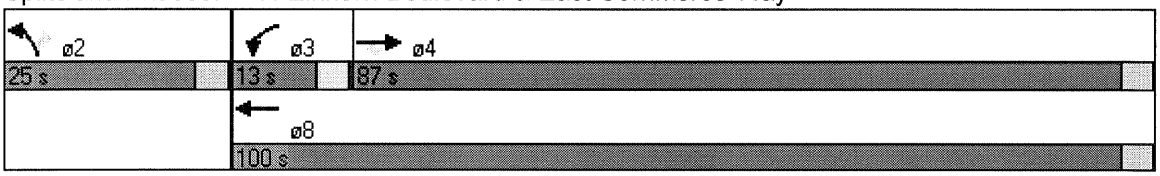
Intersection Summary			
Average Delay	1139.4		
Intersection Capacity Utilization	98.3%	ICU Level of Service	E

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1770	1583
Satd. Flow (RTOR)		136				134
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	1144	165	117	500	263	126
Adj. Flow (vph)	1217	176	124	532	280	134
Lane Group Flow (vph)	1217	176	124	532	280	134
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	87.0	87.0	13.0	100.0	25.0	25.0
Act Effct Green (s)	82.2	82.2	9.0	95.2	20.8	20.8
Actuated g/C Ratio	0.66	0.66	0.07	0.77	0.17	0.17
v/c Ratio	0.99	0.16	0.97	0.37	0.94	0.36
Uniform Delay, d1	20.3	1.6	57.3	4.7	51.0	0.0
Delay	36.6	2.2	112.1	4.8	77.8	7.7
LOS	D	A	F	A	E	A
Approach Delay	32.2			25.1	55.1	
Approach LOS	C			C	E	

Intersection Summary

Cycle Length: 125
Actuated Cycle Length: 124
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 34.2 — Intersection LOS: C
Intersection Capacity Utilization 96.5% — ICU Level of Service E

Splits and Phases: 7: Elkhorn Boulevard & East Commerce Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	451	365	283	808	476	285
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	490	397	308	878	517	310
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			887		1984	490
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			60		0	46
cM capacity (veh/h)			763		40	578

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	490	397	308	878	517	310
Volume Left	0	0	308	0	517	0
Volume Right	0	397	0	0	0	310
cSH	1700	1700	763	1700	40	578
Volume to Capacity	0.29	0.23	0.40	0.52	12.86	0.54
Queue Length (ft)	0	0	49	0	Err	79
Control Delay (s)	0.0	0.0	12.9	0.0	Err	18.2
Lane LOS			B		F	C
Approach Delay (s)	0.0		3.3		6261.1	
Approach LOS					F	

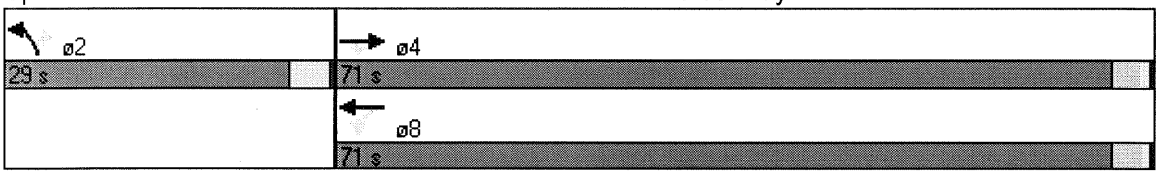
Intersection Summary			
Average Delay	1787.2		
Intersection Capacity Utilization	81.6%	ICU Level of Service	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	3433	1583
Flt Permitted			0.424		0.950	
Satd. Flow (perm)	1863	1583	790	1863	3433	1583
Satd. Flow (RTOR)		397				310
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	451	365	283	808	476	285
Adj. Flow (vph)	490	397	308	878	517	310
Lane Group Flow (vph)	490	397	308	878	517	310
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Total Split (s)	71.0	71.0	71.0	71.0	29.0	29.0
Act Effct Green (s)	33.5	33.5	33.5	33.5	15.3	15.3
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.26	0.26
v/c Ratio	0.46	0.37	0.68	0.82	0.58	0.48
Uniform Delay, d1	6.5	0.0	7.8	9.0	17.8	0.0
Delay	6.9	0.7	9.3	9.9	21.7	3.8
LOS	A	A	A	A	C	A
Approach Delay	4.2			9.7	15.0	
Approach LOS	A			A	B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 58.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 9.5 Intersection LOS: A
Intersection Capacity Utilization 67.7% ICU Level of Service B

Splits and Phases: 7: Elkhorn Boulevard & East Commerce Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1009	364	312	407	437	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1097	396	339	442	475	327
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1492		2217	1097
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			25		0	0
cM capacity (veh/h)			450		12	259

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	1097	396	339	442	475	327
Volume Left	0	0	339	0	475	0
Volume Right	0	396	0	0	0	327
cSH	1700	1700	450	1700	12	259
Volume to Capacity	0.65	0.23	0.75	0.26	40.20	1.26
Queue Length (ft)	0	0	158	0	Err	403
Control Delay (s)	0.0	0.0	33.7	0.0	Err	184.5
Lane LOS			D		F	F
Approach Delay (s)	0.0		14.6		5996.1	
Approach LOS					F	

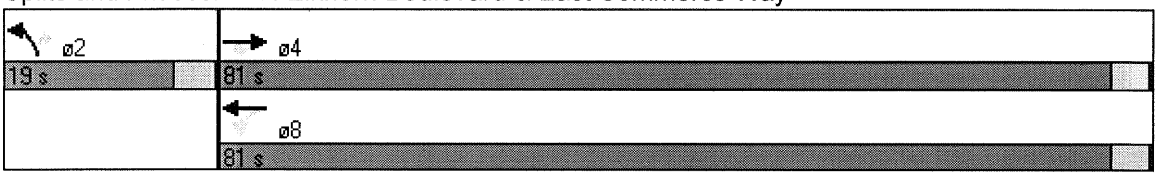
Intersection Summary			
Average Delay	1567.4		
Intersection Capacity Utilization	112.8%	ICU Level of Service	G

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	3433	1583
Flt Permitted			0.161		0.950	
Satd. Flow (perm)	1863	1583	300	1863	3433	1583
Satd. Flow (RTOR)		396				168
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	1009	364	312	407	437	301
Adj. Flow (vph)	1097	396	339	442	475	327
Lane Group Flow (vph)	1097	396	339	442	475	327
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Total Split (s)	81.0	81.0	81.0	81.0	19.0	19.0
Act Effct Green (s)	77.0	77.0	77.0	77.0	15.0	15.0
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.15	0.15
v/c Ratio	0.76	0.30	1.47	0.31	0.92	0.86
Uniform Delay, d1	6.4	0.0	11.5	3.5	41.9	19.8
Delay	7.1	0.3	173.0	3.6	57.5	31.4
LOS	A	A	F	A	E	C
Approach Delay	5.3			77.1	46.9	
Approach LOS	A			E	D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.47
Intersection Signal Delay: 34.4 Intersection LOS: C
Intersection Capacity Utilization 100.1% ICU Level of Service F

Splits and Phases: 7: Elkhorn Boulevard & East Commerce Way



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	109	36	30	47	119
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	7	118	39	33	51	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	287	55			72	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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	88			97	
cM capacity (veh/h)	680	1011			1528	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	125	72	180
Volume Left	7	0	51
Volume Right	118	33	0
cSH	986	1700	1528
Volume to Capacity	0.13	0.04	0.03
Queue Length (ft)	11	0	3
Control Delay (s)	9.2	0.0	2.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	2.3
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	30.7%	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)	7	106	226	35	71	95
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	8	115	246	38	77	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	522	265			284	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	85			94	
cM capacity (veh/h)	484	774			1279	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	123	284	180
Volume Left	8	0	77
Volume Right	115	38	0
cSH	746	1700	1279
Volume to Capacity	0.16	0.17	0.06
Queue Length (ft)	15	0	5
Control Delay (s)	10.8	0.0	3.7
Lane LOS	B		A
Approach Delay (s)	10.8	0.0	3.7
Approach LOS	B		

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	42.5%	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)	6	107	35	30	44	87
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	7	116	38	33	48	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	245	54			71	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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	89			97	
cM capacity (veh/h)	721	1013			1530	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	123	71	142
Volume Left	7	0	48
Volume Right	116	33	0
cSH	991	1700	1530
Volume to Capacity	0.12	0.04	0.03
Queue Length (ft)	11	0	2
Control Delay (s)	9.1	0.0	2.7
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	2.7
Approach LOS	A		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	28.5%	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)	7	104	33	35	69	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	8	113	36	38	75	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
vC, conflicting volume	273	55			74	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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	89			95	
cM capacity (veh/h)	681	1012			1526	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	121	74	143
Volume Left	8	0	75
Volume Right	113	38	0
cSH	982	1700	1526
Volume to Capacity	0.12	0.04	0.05
Queue Length (ft)	10	0	4
Control Delay (s)	9.2	0.0	4.1
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	4.1
Approach LOS	A		

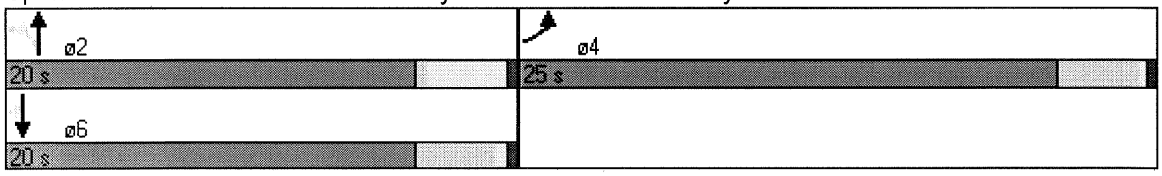
Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
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	0.949					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1715	0	1770	3539	3539	1583
Flt Permitted	0.970		0.558			
Satd. Flow (perm)	1715	0	1039	3539	3539	1583
Satd. Flow (RTOR)	92					385
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	354	216	73	407	294	354
Adj. Flow (vph)	385	235	79	442	320	385
Lane Group Flow (vph)	620	0	79	442	320	385
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Total Split (s)	25.0	0.0	20.0	20.0	20.0	20.0
Act Effct Green (s)	15.6		10.2	10.2	10.2	10.2
Actuated g/C Ratio	0.45		0.30	0.30	0.30	0.30
v/c Ratio	0.75		0.26	0.42	0.30	0.52
Uniform Delay, d1	6.2		8.9	9.4	9.0	0.0
Delay	8.8		10.8	10.4	10.1	1.9
LOS	A		B	B	B	A
Approach Delay	8.8			10.5	5.6	
Approach LOS	A			B	A	

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 34.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 58.9% ICU Level of Service A

Splits and Phases: 16: Meister Way & East Commerce Way

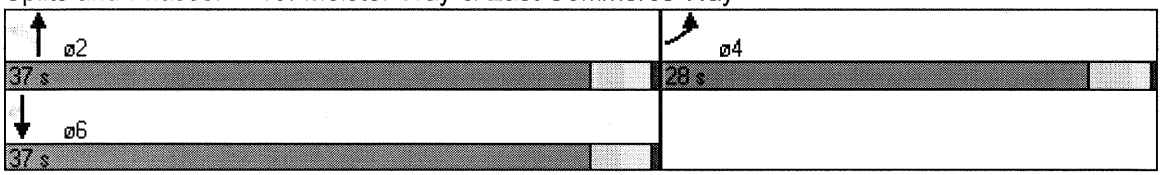


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	0.947					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1711	0	1770	3539	3539	1583
Flt Permitted	0.970		0.570			
Satd. Flow (perm)	1711	0	1062	3539	3539	1583
Satd. Flow (RTOR)	56					438
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	362	231	476	376	273	403
Adj. Flow (vph)	393	251	517	409	297	438
Lane Group Flow (vph)	644	0	517	409	297	438
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Total Split (s)	28.0	0.0	37.0	37.0	37.0	37.0
Act Effct Green (s)	23.9		32.3	32.3	32.3	32.3
Actuated g/C Ratio	0.37		0.50	0.50	0.50	0.50
v/c Ratio	0.96		0.97	0.23	0.17	0.43
Uniform Delay, d1	17.9		15.4	8.9	8.6	0.0
Delay	40.4		39.1	9.0	8.7	1.2
LOS	D		D	A	A	A
Approach Delay	40.4			25.8	4.2	
Approach LOS	D			C	A	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 64.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 23.0 Intersection LOS: C
Intersection Capacity Utilization 84.0% ICU Level of Service D

Splits and Phases: 16: Meister Way & East Commerce Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	995	27	104	695	53	157
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1082	29	113	755	58	171
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1111		2078	1096
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		0	34
cM capacity (veh/h)			629		48	259

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1111	113	755	228
Volume Left	0	113	0	58
Volume Right	29	0	0	171
cSH	1700	629	1700	123
Volume to Capacity	0.65	0.18	0.44	1.85
Queue Length (ft)	0	16	0	448
Control Delay (s)	0.0	12.0	0.0	473.1
Lane LOS		B		F
Approach Delay (s)	0.0	1.6		473.1
Approach LOS				F

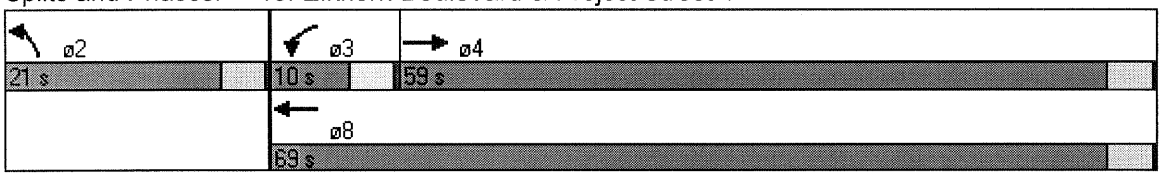
Intersection Summary			
Average Delay	49.5		
Intersection Capacity Utilization	88.7%	ICU Level of Service	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.996				0.899	
Flt Protected			0.950		0.987	
Satd. Flow (prot)	1855	0	1770	1863	1653	0
Flt Permitted			0.950		0.987	
Satd. Flow (perm)	1855	0	1770	1863	1653	0
Satd. Flow (RTOR)	3				145	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	995	27	104	695	53	157
Adj. Flow (vph)	1082	29	113	755	58	171
Lane Group Flow (vph)	1111	0	113	755	229	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	59.0	0.0	10.0	69.0	21.0	0.0
Act Effct Green (s)	52.1		6.1	62.2	10.2	
Actuated g/C Ratio	0.65		0.08	0.77	0.13	
v/c Ratio	0.93		0.84	0.52	0.68	
Uniform Delay, d1	12.4		36.6	3.5	11.9	
Delay	24.3		81.8	4.3	13.9	
LOS	C		F	A	B	
Approach Delay	24.3			14.4	13.9	
Approach LOS	C			B	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 80.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 19.3 Intersection LOS: B
Intersection Capacity Utilization 88.7% ICU Level of Service D

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	921	60	209	915	41	172
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	1001	65	227	995	45	187
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			1066		2483	1034
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			65		0	34
cM capacity (veh/h)			653		21	282

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1066	227	995	232
Volume Left	0	227	0	45
Volume Right	65	0	0	187
cSH	1700	653	1700	84
Volume to Capacity	0.63	0.35	0.59	2.76
Queue Length (ft)	0	39	0	559
Control Delay (s)	0.0	13.4	0.0	903.5
Lane LOS		B		F
Approach Delay (s)	0.0	2.5		903.5
Approach LOS				F

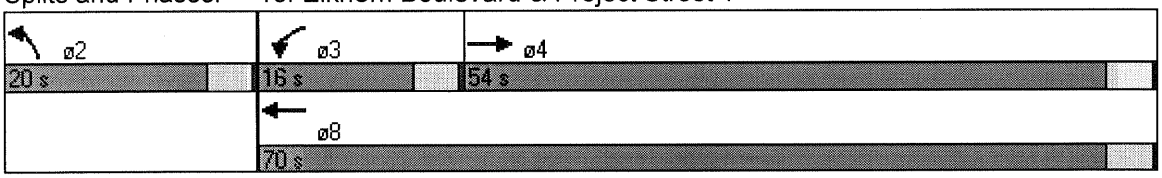
Intersection Summary			
Average Delay	84.2		
Intersection Capacity Utilization	93.2%	ICU Level of Service	E

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.992				0.891	
Flt Protected			0.950		0.990	
Satd. Flow (prot)	1848	0	1770	1863	1643	0
Flt Permitted			0.950		0.990	
Satd. Flow (perm)	1848	0	1770	1863	1643	0
Satd. Flow (RTOR)	6				187	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	921	60	209	915	41	172
Adj. Flow (vph)	1001	65	227	995	45	187
Lane Group Flow (vph)	1066	0	227	995	232	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	54.0	0.0	16.0	70.0	20.0	0.0
Act Effct Green (s)	50.1		12.0	66.1	8.9	
Actuated g/C Ratio	0.60		0.14	0.80	0.11	
v/c Ratio	0.95		0.89	0.67	0.68	
Uniform Delay, d1	15.3		34.8	3.7	6.6	
Delay	35.1		65.2	4.8	9.3	
LOS	D		E	A	A	
Approach Delay	35.1			16.0	9.3	
Approach LOS	D			B	A	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 83
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 23.5 — Intersection LOS: C
Intersection Capacity Utilization 93.2% — ICU Level of Service E

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	655	21	87	314	36	137
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.95
Hourly flow rate (veh/h)	712	23	95	341	39	144
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			735		1254	723
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		77	66
cM capacity (veh/h)			870		169	426

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	735	95	341	183
Volume Left	0	95	0	39
Volume Right	23	0	0	144
cSH	1700	870	1700	322
Volume to Capacity	0.43	0.11	0.20	0.57
Queue Length (ft)	0	9	0	83
Control Delay (s)	0.0	9.6	0.0	30.0
Lane LOS		A		D
Approach Delay (s)	0.0	2.1		30.0
Approach LOS				D

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	65.2%	ICU Level of Service	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	655	21	87	314	36	137
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.95
Hourly flow rate (veh/h)	712	23	95	341	39	144
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			735		1254	723
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		77	66
cM capacity (veh/h)			870		169	426

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	735	95	341	39	144
Volume Left	0	95	0	39	0
Volume Right	23	0	0	0	144
cSH	1700	870	1700	169	426
Volume to Capacity	0.43	0.11	0.20	0.23	0.34
Queue Length (ft)	0	9	0	21	37
Control Delay (s)	0.0	9.6	0.0	32.6	17.7
Lane LOS		A		D	C
Approach Delay (s)	0.0	2.1		20.9	
Approach LOS				C	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	57.4%	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)	624	61	160	636	33	142
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	678	66	174	691	36	154
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			745		1751	711
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		52	64
cM capacity (veh/h)			863		75	433

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	745	174	691	190
Volume Left	0	174	0	36
Volume Right	66	0	0	154
cSH	1700	863	1700	228
Volume to Capacity	0.44	0.20	0.41	0.83
Queue Length (ft)	0	19	0	160
Control Delay (s)	0.0	10.2	0.0	68.9
Lane LOS		B		F
Approach Delay (s)	0.0	2.1		68.9
Approach LOS				F

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	624	61	160	636	33	142
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (veh/h)	624	61	160	636	33	142
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			685		1610	654
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		65	70
cM capacity (veh/h)			908		95	466

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	685	160	636	33	142
Volume Left	0	160	0	33	0
Volume Right	61	0	0	0	142
cSH	1700	908	1700	95	466
Volume to Capacity	0.40	0.18	0.37	0.35	0.30
Queue Length (ft)	0	16	0	34	32
Control Delay (s)	0.0	9.8	0.0	62.1	16.1
Lane LOS		A		F	C
Approach Delay (s)	0.0	2.0		24.7	
Approach LOS				C	

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	58.7%	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)	884	25	94	654	53	138
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	961	27	102	711	58	150
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			988		1890	974
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		13	51
cM capacity (veh/h)			699		66	305

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	988	102	711	208
Volume Left	0	102	0	58
Volume Right	27	0	0	150
cSH	1700	699	1700	152
Volume to Capacity	0.58	0.15	0.42	1.37
Queue Length (ft)	0	13	0	324
Control Delay (s)	0.0	11.0	0.0	256.9
Lane LOS		B		F
Approach Delay (s)	0.0	1.4		256.9
Approach LOS				F

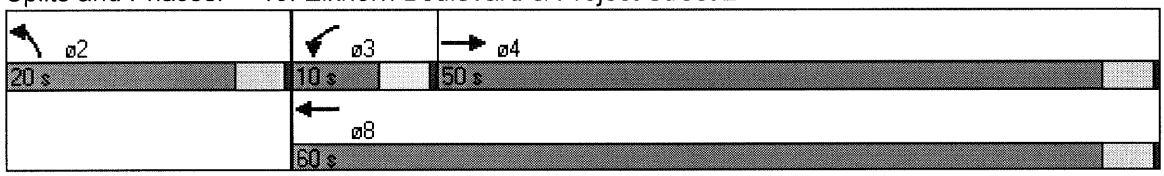
Intersection Summary			
Average Delay	27.1		
Intersection Capacity Utilization	80.3%	ICU Level of Service	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.996				0.903	
Flt Protected			0.950		0.986	
Satd. Flow (prot)	1855	0	1770	1863	1659	0
Flt Permitted			0.950		0.986	
Satd. Flow (perm)	1855	0	1770	1863	1659	0
Satd. Flow (RTOR)	3				145	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	884	25	94	654	53	138
Adj. Flow (vph)	961	27	102	711	58	150
Lane Group Flow (vph)	988	0	102	711	208	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	50.0	0.0	10.0	60.0	20.0	0.0
Act Effct Green (s)	38.4		6.3	45.6	9.1	
Actuated g/C Ratio	0.60		0.10	0.72	0.14	
v/c Ratio	0.88		0.60	0.53	0.58	
Uniform Delay, d1	10.7		29.5	3.7	7.4	
Delay	17.2		48.4	4.2	11.1	
LOS	B		D	A	B	
Approach Delay	17.2			9.8	11.1	
Approach LOS	B			A	B	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 63.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 13.5 Intersection LOS: B
Intersection Capacity Utilization 80.3% ICU Level of Service D

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	827	70	175	780	39	155
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	899	76	190	848	42	168
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			975		2165	937
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		0	48
cM capacity (veh/h)			707		38	321

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	975	190	848	211
Volume Left	0	190	0	42
Volume Right	76	0	0	168
cSH	1700	707	1700	128
Volume to Capacity	0.57	0.27	0.50	1.64
Queue Length (ft)	0	27	0	386
Control Delay (s)	0.0	12.0	0.0	382.4
Lane LOS		B		F
Approach Delay (s)	0.0	2.2		382.4
Approach LOS				F

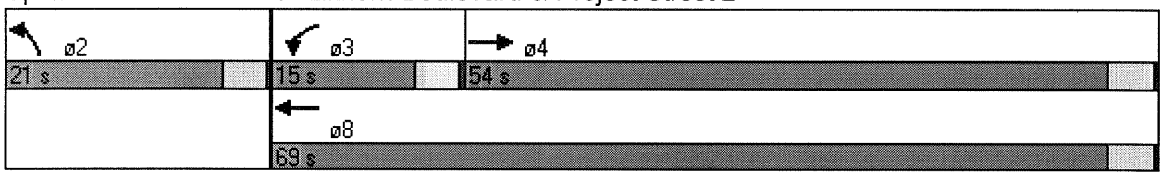
Intersection Summary			
Average Delay	37.3		
Intersection Capacity Utilization	85.2%	ICU Level of Service	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.989				0.892	
Flt Protected			0.950		0.990	
Satd. Flow (prot)	1842	0	1770	1863	1645	0
Flt Permitted			0.950		0.990	
Satd. Flow (perm)	1842	0	1770	1863	1645	0
Satd. Flow (RTOR)	8				168	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	827	70	175	780	39	155
Adj. Flow (vph)	899	76	190	848	42	168
Lane Group Flow (vph)	975	0	190	848	210	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	54.0	0.0	15.0	69.0	21.0	0.0
Act Effct Green (s)	44.5		10.7	59.3	8.6	
Actuated g/C Ratio	0.58		0.14	0.78	0.11	
v/c Ratio	0.90		0.76	0.58	0.63	
Uniform Delay, d1	13.5		31.4	3.3	6.1	
Delay	20.6		48.9	4.0	9.9	
LOS	C		D	A	A	
Approach Delay	20.6			12.2	9.9	
Approach LOS	C			B	A	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 76.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 15.7 — Intersection LOS: B
Intersection Capacity Utilization 85.2% — ICU Level of Service D

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	560	23	73	276	37	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	609	25	79	300	40	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			634		1080	621
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		82	74
cM capacity (veh/h)			949		221	487

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	634	79	300	166
Volume Left	0	79	0	40
Volume Right	25	0	0	126
cSH	1700	949	1700	377
Volume to Capacity	0.37	0.08	0.18	0.44
Queue Length (ft)	0	7	0	55
Control Delay (s)	0.0	9.1	0.0	21.8
Lane LOS		A		C
Approach Delay (s)	0.0	1.9		21.8
Approach LOS				C

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	57.9%	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)	560	23	73	276	37	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	609	25	79	300	40	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			634		1080	621
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		82	74
cM capacity (veh/h)			949		221	487

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	634	79	300	40	126
Volume Left	0	79	0	40	0
Volume Right	25	0	0	0	126
cSH	1700	949	1700	221	487
Volume to Capacity	0.37	0.08	0.18	0.18	0.26
Queue Length (ft)	0	7	0	16	26
Control Delay (s)	0.0	9.1	0.0	24.8	14.9
Lane LOS		A		C	B
Approach Delay (s)	0.0	1.9		17.3	
Approach LOS				C	

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	51.3%	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)	563	57	139	529	33	122
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	612	62	151	575	36	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			674		1520	643
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		67	72
cM capacity (veh/h)			917		109	474

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	674	151	575	168
Volume Left	0	151	0	36
Volume Right	62	0	0	133
cSH	1700	917	1700	277
Volume to Capacity	0.40	0.16	0.34	0.61
Queue Length (ft)	0	15	0	92
Control Delay (s)	0.0	9.7	0.0	36.3
Lane LOS		A		E
Approach Delay (s)	0.0	2.0		36.3
Approach LOS				E

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	64.5%	ICU Level of Service	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	563	57	139	529	33	122
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	612	62	151	575	36	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			674		1520	643
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		67	72
cM capacity (veh/h)			917		109	474

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	674	151	575	36	133
Volume Left	0	151	0	36	0
Volume Right	62	0	0	0	133
cSH	1700	917	1700	109	474
Volume to Capacity	0.40	0.16	0.34	0.33	0.28
Queue Length (ft)	0	15	0	32	28
Control Delay (s)	0.0	9.7	0.0	53.4	15.5
Lane LOS		A		F	C
Approach Delay (s)	0.0	2.0		23.6	
Approach LOS				C	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	57.7%	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)	770	40	91	616	70	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	837	43	99	670	76	152
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			880		1726	859
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		10	57
cM capacity (veh/h)			768		85	356

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	880	99	670	228
Volume Left	0	99	0	76
Volume Right	43	0	0	152
cSH	1700	768	1700	173
Volume to Capacity	0.52	0.13	0.39	1.32
Queue Length (ft)	0	11	0	334
Control Delay (s)	0.0	10.4	0.0	231.5
Lane LOS		B		F
Approach Delay (s)	0.0	1.3		231.5
Approach LOS				F

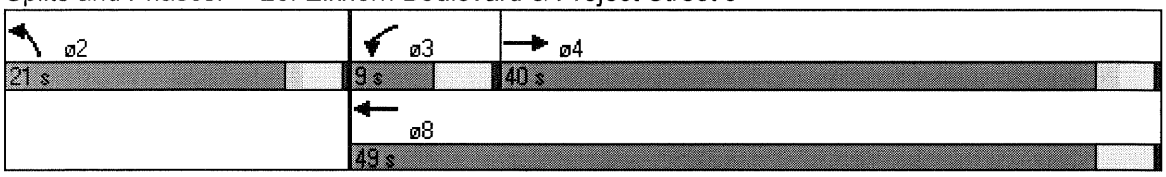
Intersection Summary			
Average Delay	28.7		
Intersection Capacity Utilization	75.7%	ICU Level of Service	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.993				0.910	
Flt Protected			0.950		0.984	
Satd. Flow (prot)	1850	0	1770	1863	1668	0
Flt Permitted			0.950		0.984	
Satd. Flow (perm)	1850	0	1770	1863	1668	0
Satd. Flow (RTOR)	5				136	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	770	40	91	616	70	140
Adj. Flow (vph)	837	43	99	670	76	152
Lane Group Flow (vph)	880	0	99	670	228	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	40.0	0.0	9.0	49.0	21.0	0.0
Act Effct Green (s)	30.6		5.2	37.1	9.5	
Actuated g/C Ratio	0.55		0.09	0.67	0.17	
v/c Ratio	0.86		0.61	0.54	0.57	
Uniform Delay, d1	10.7		25.8	4.3	8.2	
Delay	17.3		45.5	5.0	11.0	
LOS	B		D	A	B	
Approach Delay	17.3			10.2	11.0	
Approach LOS	B			B	B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 75.7% ICU Level of Service C

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	753	131	138	681	69	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	818	142	150	740	75	155
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			961		1930	890
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		0	55
cM capacity (veh/h)			716		58	342

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	961	150	740	230
Volume Left	0	150	0	75
Volume Right	142	0	0	155
cSH	1700	716	1700	131
Volume to Capacity	0.57	0.21	0.44	1.76
Queue Length (ft)	0	20	0	435
Control Delay (s)	0.0	11.4	0.0	428.2
Lane LOS		B		F
Approach Delay (s)	0.0	1.9		428.2
Approach LOS				F

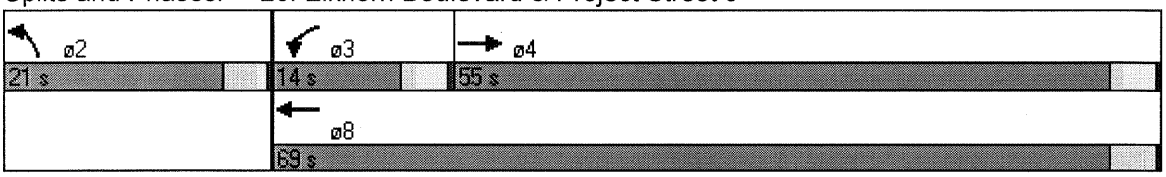
Intersection Summary			
Average Delay	48.2		
Intersection Capacity Utilization	83.7%	ICU Level of Service	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	1.00	1.00	1.00
Frt	0.980				0.909	
Flt Protected			0.950		0.984	
Satd. Flow (prot)	1825	0	1770	1863	1666	0
Flt Permitted			0.950		0.984	
Satd. Flow (perm)	1825	0	1770	1863	1666	0
Satd. Flow (RTOR)	16				102	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	753	131	138	681	69	143
Adj. Flow (vph)	818	142	150	740	75	155
Lane Group Flow (vph)	960	0	150	740	230	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Total Split (s)	55.0	0.0	14.0	69.0	21.0	0.0
Act Effct Green (s)	42.3		9.5	52.2	11.8	
Actuated g/C Ratio	0.58		0.13	0.71	0.16	
v/c Ratio	0.91		0.67	0.56	0.65	
Uniform Delay, d1	13.3		32.6	4.4	15.6	
Delay	21.4		46.4	5.0	19.8	
LOS	C		D	A	B	
Approach Delay	21.4			12.0	19.8	
Approach LOS	C			B	B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 73.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 17.2 Intersection LOS: B
Intersection Capacity Utilization 83.7% ICU Level of Service D

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	467	31	65	247	38	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	508	34	71	268	41	125
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			541		934	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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		85	77
cM capacity (veh/h)			1027		275	553

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	541	71	268	166
Volume Left	0	71	0	41
Volume Right	34	0	0	125
cSH	1700	1027	1700	442
Volume to Capacity	0.32	0.07	0.16	0.38
Queue Length (ft)	0	6	0	43
Control Delay (s)	0.0	8.8	0.0	18.0
Lane LOS		A		C
Approach Delay (s)	0.0	1.8		18.0
Approach LOS				C

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	52.7%	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)	467	31	65	247	38	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	508	34	71	268	41	125
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			541		934	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
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		85	77
cM capacity (veh/h)			1027		275	553

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	541	71	268	41	125
Volume Left	0	71	0	41	0
Volume Right	34	0	0	0	125
cSH	1700	1027	1700	275	553
Volume to Capacity	0.32	0.07	0.16	0.15	0.23
Queue Length (ft)	0	6	0	13	22
Control Delay (s)	0.0	8.8	0.0	20.4	13.4
Lane LOS		A		C	B
Approach Delay (s)	0.0	1.8		15.1	
Approach LOS				C	

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	46.0%	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)	505	62	134	427	40	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	549	67	146	464	43	125
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			616		1338	583
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		70	76
cM capacity (veh/h)			964		143	512

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	616	146	464	168
Volume Left	0	146	0	43
Volume Right	67	0	0	125
cSH	1700	964	1700	308
Volume to Capacity	0.36	0.15	0.27	0.55
Queue Length (ft)	0	13	0	77
Control Delay (s)	0.0	9.4	0.0	30.0
Lane LOS		A		D
Approach Delay (s)	0.0	2.2		30.0
Approach LOS				D

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	505	62	134	427	40	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	549	67	146	464	43	125
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			616		1338	583
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		70	76
cM capacity (veh/h)			964		143	512

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	616	146	464	43	125
Volume Left	0	146	0	43	0
Volume Right	67	0	0	0	125
cSH	1700	964	1700	143	512
Volume to Capacity	0.36	0.15	0.27	0.30	0.24
Queue Length (ft)	0	13	0	30	24
Control Delay (s)	0.0	9.4	0.0	40.7	14.3
Lane LOS		A		E	B
Approach Delay (s)	0.0	2.2		21.1	
Approach LOS				C	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3031	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	842	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1814	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1814	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.8	mi/h
Number of lanes, N	2	
Density, D	28.4	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3162	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	878	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1892	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1892	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	2	
Density, D	30.0	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2722	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	756	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1629	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1629	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	2	
Density, D	25.1	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3386	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	941	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2026	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2026	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.0	mi/h
Number of lanes, N	2	
Density, D	33.2	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4104	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1140	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1637	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1637	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	3	
Density, D	25.3	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	7083	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1967	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2825	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2825	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6766	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1879	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2699	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2699	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4559	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1266	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1819	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1819	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	3	
Density, D	28.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4851	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1347	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1935	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1935	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	3	
Density, D	31.0	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	8459	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2350	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3374	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3374	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	7722	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2145	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3080	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3080	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4926	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1368	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1965	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1965	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.0	mi/h
Number of lanes, N	3	
Density, D	31.7	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1477	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	410	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	884	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	884	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3727	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1035	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2230	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2230	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	56.2	mi/h
Number of lanes, N	2	
Density, D	39.7	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3615	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1004	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2163	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2163	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.0	mi/h
Number of lanes, N	2	
Density, D	37.3	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1637	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	455	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	979	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	979	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.1	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2196	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	610	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1314	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1314	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.2	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5430	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1508	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3249	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3249	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5167	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1435	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3092	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3092	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjNOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2682	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	745	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1605	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1605	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3051	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	847	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1826	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1826	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	2	
Density, D	28.7	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3175	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	882	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1900	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1900	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.9	mi/h
Number of lanes, N	2	
Density, D	30.2	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2734	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	759	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1636	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1636	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	2	
Density, D	25.3	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	East of Powerline Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3396	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	943	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2032	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2032	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.9	mi/h
Number of lanes, N	2	
Density, D	33.4	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/07/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4033	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1120	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1609	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1609	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	3	
Density, D	24.8	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	7006	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1946	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2795	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2795	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	6664	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1851	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2658	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2658	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of Del Paso Road
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4500	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1250	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1795	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1795	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.9	mi/h
Number of lanes, N	3	
Density, D	28.1	pc/mi/ln

Level of service, LOS D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+Pro1WOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4839	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1344	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1930	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1930	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.5	mi/h
Number of lanes, N	3	
Density, D	30.9	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Northbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	8595	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2388	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3428	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3428	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	7679	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2133	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3063	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3063	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	3	
Density, D		pc/mi/ln

Level of service, LOS F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	Interstate 5 Southbound
From/To:	North of I-80/S of Arena Blvd
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	4909	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1364	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1958	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1958	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.1	mi/h
Number of lanes, N	3	
Density, D	31.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1488	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	413	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	890	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	890	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.7	pc/mi/ln

Level of service, LOS B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3753	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1042	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2246	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2246	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.7	mi/h
Number of lanes, N	2	
Density, D	40.3	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	3579	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	994	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	2141	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2141	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.6	mi/h
Number of lanes, N	2	
Density, D	36.6	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elverta Road/Elkhorn Boulevard
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	1667	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	463	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	997	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	997	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.3	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2137	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	594	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1279	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1279	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Northbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5363	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1490	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3209	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3209	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	A.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	5085	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1412	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	3043	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	3043	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1d

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Andrew K.
Agency or Company:	TJKM
Date Performed:	9/26/2005
Analysis Time Period:	P.M. Peak
Freeway/Direction:	SR 99 Southbound
From/To:	Elkhorn Boulevard / I-5 IC
Jurisdiction:	Sacramento
Analysis Year:	2005-Existing+Approved+ProjWOP

Description: 41-091 Sacramento - Greenbriar Development Freeway Analysis

Flow Inputs and Adjustments

Volume, V	2636	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	732	v
Trucks and buses	15	%
Recreational vehicles	1	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.929	
Driver population factor, fp	1.00	
Flow rate, vp	1577	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1577	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	24.3	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX F – LEVEL OF SERVICE WORKSHEETS: CUMULATIVE (2025) PLUS PROJECT CONDITIONS

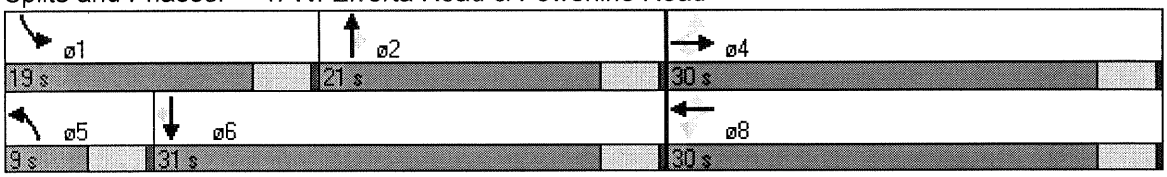
- Intersection Analysis
- Freeway Mainline Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	1863	1583	1770	1863	1583	3433	3539	1583
Flt Permitted	0.683			0.536			0.950			0.950		
Satd. Flow (perm)	1272	3539	1583	1937	1863	1583	1770	1863	1583	3433	3539	1583
Satd. Flow (RTOR)			433			36			54			43
Headway 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
Volume (vph)	30	305	687	27	106	33	40	120	50	588	362	40
Adj. Flow (vph)	33	332	747	29	115	36	43	130	54	639	393	43
Lane Group Flow (vph)	33	332	747	29	115	36	43	130	54	639	393	43
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
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	9.0	21.0	21.0	19.0	31.0	31.0
Act Effct Green (s)	20.0	20.0	20.0	20.0	20.0	20.0	5.1	9.3	9.3	13.8	22.7	22.7
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36	0.36	0.09	0.17	0.17	0.25	0.41	0.41
v/c Ratio	0.07	0.26	0.88	0.04	0.17	0.06	0.28	0.42	0.17	0.75	0.27	0.06
Uniform Delay, d1	12.4	13.4	7.0	12.3	12.9	0.0	26.7	19.7	0.0	20.3	11.7	0.0
Delay	12.3	12.8	11.5	12.1	12.7	5.1	28.8	23.5	7.7	24.9	14.1	5.5
LOS	B	B	B	B	B	A	C	C	A	C	B	A
Approach Delay		11.9			11.1			20.8			20.1	
Approach LOS		B			B			C			C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 70.4% ICU Level of Service C

Splits and Phases: 1: W. Elverta Road & Powerline Road

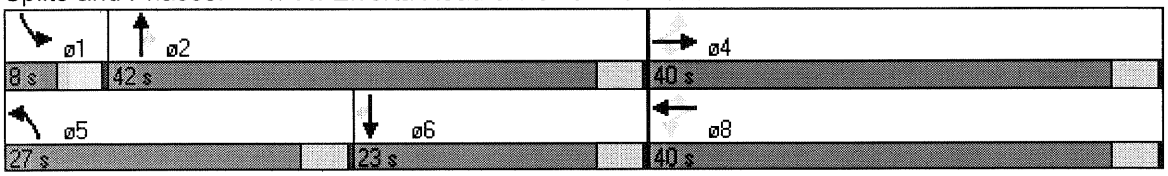


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	1863	1583	1770	1863	1583	3433	3539	1583
Flt Permitted	0.111			0.646			0.950			0.950		
Satd. Flow (perm)	207	3539	1583	2334	1863	1583	1770	1863	1583	3433	3539	1583
Satd. Flow (RTOR)			5			211			22			33
Headway 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
Volume (vph)	3	154	5	20	663	218	396	680	20	28	56	30
Adj. Flow (vph)	3	167	5	22	721	237	430	739	22	30	61	33
Lane Group Flow (vph)	3	167	5	22	721	237	430	739	22	30	61	33
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
Total Split (s)	40.0	40.0	40.0	40.0	40.0	40.0	27.0	42.0	42.0	8.0	23.0	23.0
Act Effct Green (s)	34.0	34.0	34.0	34.0	34.0	34.0	22.0	35.6	35.6	4.0	14.0	14.0
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.41	0.41	0.27	0.43	0.43	0.05	0.17	0.17
v/c Ratio	0.03	0.11	0.01	0.02	0.94	0.30	0.91	0.91	0.03	0.18	0.10	0.11
Uniform Delay, d1	15.0	15.5	0.0	14.9	24.1	1.7	30.1	22.9	0.0	40.1	28.0	0.0
Delay	17.3	16.3	10.2	16.4	40.5	3.9	51.1	34.8	6.6	41.7	29.1	10.6
LOS	B	B	B	B	D	A	D	C	A	D	C	B
Approach Delay		16.1			31.1			40.2			27.2	
Approach LOS		B			C			D			C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 82.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 34.2 Intersection LOS: C
Intersection Capacity Utilization 83.5% ICU Level of Service D

Splits and Phases: 1: W. Elverta Road & Powerline Road

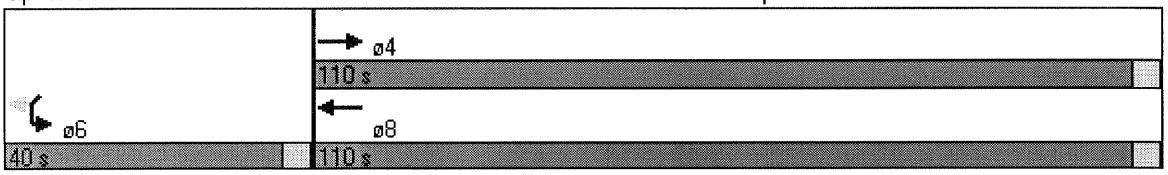


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	111	4301	0	28	758
Adj. Flow (vph)	0	121	4675	0	30	824
Lane Group Flow (vph)	0	121	4675	0	30	824
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	110.0	110.0	0.0	40.0	40.0
Act Effct Green (s)		106.1	106.1		36.0	36.0
Actuated g/C Ratio		0.71	0.71		0.24	0.24
v/c Ratio		0.03	1.30		0.04	1.23
Uniform Delay, d1		6.6	22.0		43.7	57.0
Delay		6.6	144.7		43.9	145.8
LOS		A	F		D	F
Approach Delay		6.6	144.7		142.2	
Approach LOS		A	F		F	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 141.3 Intersection LOS: F
Intersection Capacity Utilization 125.8% ICU Level of Service H

Splits and Phases: 2: W. Elverta Road & SR 70/99 SB off ramp

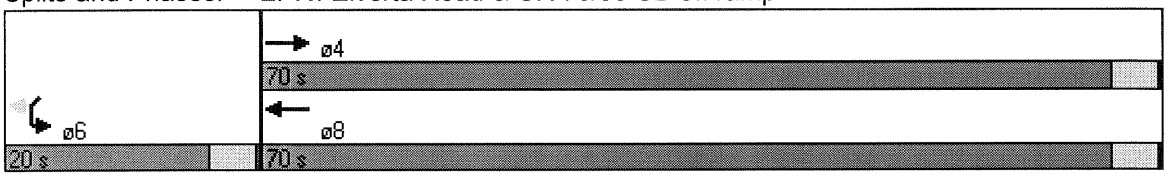


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						212
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	3480	225	0	61	195
Adj. Flow (vph)	0	3783	245	0	66	212
Lane Group Flow (vph)	0	3783	245	0	66	212
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	70.0	70.0	0.0	20.0	20.0
Act Effct Green (s)		66.0	66.0		7.1	7.1
Actuated g/C Ratio		0.81	0.81		0.09	0.09
v/c Ratio		0.91	0.06		0.22	0.49
Uniform Delay, d1		5.5	1.5		34.4	0.0
Delay		8.2	1.6		34.4	5.7
LOS		A	A		C	A
Approach Delay		8.2	1.6		12.5	
Approach LOS		A	A		B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 81.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 83.1% ICU Level of Service D

Splits and Phases: 2: W. Elverta Road & SR 70/99 SB off ramp

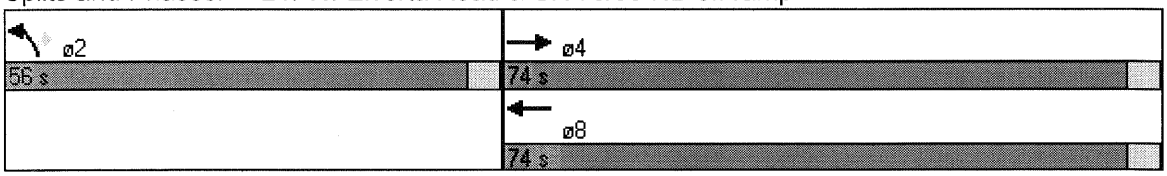


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	74	0	0	3086	1534	18
Adj. Flow (vph)	80	0	0	3354	1667	20
Lane Group Flow (vph)	80	0	0	3354	1667	20
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	74.0	0.0	0.0	74.0	56.0	56.0
Act Effct Green (s)	69.9			69.9	52.0	52.0
Actuated g/C Ratio	0.54			0.54	0.40	0.40
v/c Ratio	0.03			1.22	1.21	0.02
Uniform Delay, d1	14.0			30.0	39.0	9.4
Delay	14.1			121.8	123.2	14.2
LOS	B			F	F	B
Approach Delay	14.1			121.8	121.9	
Approach LOS	B			F	F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 120.1 — Intersection LOS: F
Intersection Capacity Utilization 119.0% — ICU Level of Service G

Splits and Phases: 21: W. Elverta Road & SR 70/99 NB off ramp

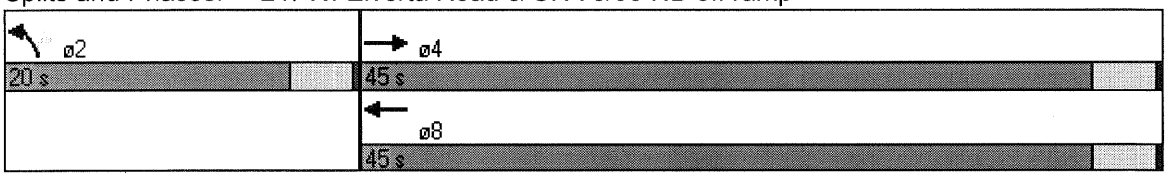


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						2
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2756	0	0	153	104	334
Adj. Flow (vph)	2996	0	0	166	113	363
Lane Group Flow (vph)	2996	0	0	166	113	363
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	45.0	0.0	0.0	45.0	20.0	20.0
Act Effct Green (s)	41.0			41.0	12.7	12.7
Actuated g/C Ratio	0.66			0.66	0.21	0.21
v/c Ratio	0.89			0.05	0.16	0.63
Uniform Delay, d1	8.5			3.6	20.1	22.2
Delay	12.2			4.1	19.8	22.3
LOS	B			A	B	C
Approach Delay	12.2			4.1	21.7	
Approach LOS	B			A	C	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 61.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 77.2% ICU Level of Service C

Splits and Phases: 21: W. Elverta Road & SR 70/99 NB off ramp

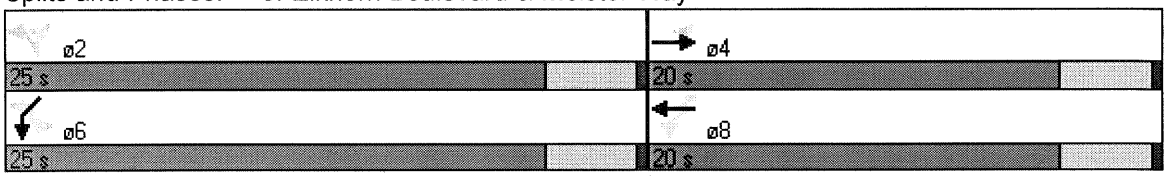


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.94	1.00	1.00	1.00	1.00	1.00	0.97	0.88	1.00	1.00	1.00	0.76
Frt		0.905				0.850		0.850				0.850
Flt Protected	0.950				0.997		0.950				0.950	
Satd. Flow (prot)	4990	1686	0	0	1857	1583	3433	2787	0	0	1770	3610
Flt Permitted	0.665				0.980		0.748				0.918	
Satd. Flow (perm)	3493	1686	0	0	1825	1583	2703	2787	0	0	1710	3610
Satd. Flow (RTOR)		152				89		127				
Headway 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
Volume (vph)	836	82	140	8	125	82	228	676	238	2	12	252
Adj. Flow (vph)	909	89	152	9	136	89	248	735	259	2	13	274
Lane Group Flow (vph)	909	241	0	0	145	89	248	994	0	0	15	274
Turn Type		custom		Perm		Perm	custom	custom		custom	Prot	
Protected Phases		4			8						6	
Permitted Phases	4			8		8	2	2		6		6
Total Split (s)	20.0	20.0	0.0	20.0	20.0	20.0	25.0	25.0	0.0	25.0	25.0	25.0
Act Effct Green (s)	14.5	14.5			14.5	14.5	18.0	18.0			18.0	18.0
Actuated g/C Ratio	0.36	0.36			0.36	0.36	0.44	0.44			0.44	0.44
v/c Ratio	0.73	0.35			0.22	0.14	0.21	0.76			0.02	0.17
Uniform Delay, d1	11.3	3.3			9.1	0.0	6.9	8.1			6.3	6.8
Delay	12.6	4.8			10.4	3.3	7.2	8.7			6.6	7.0
LOS	B	A			B	A	A	A			A	A
Approach Delay		10.9			7.7						7.0	
Approach LOS		B			A						A	

Intersection Summary

Cycle Length: 45
Actuated Cycle Length: 40.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 9.2 Intersection LOS: A
Intersection Capacity Utilization 76.3% ICU Level of Service C

Splits and Phases: 3: Elkhorn Boulevard & Meister Way

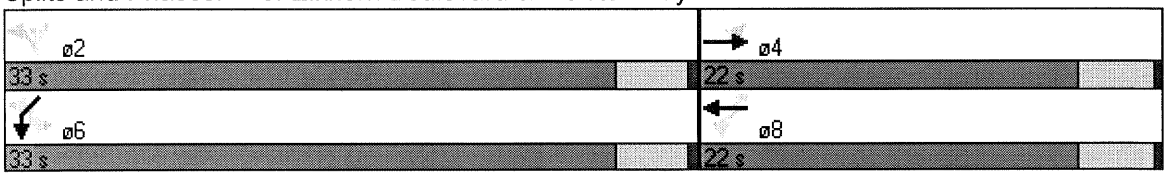


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SWL2	SWL	SWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.94	1.00	1.00	1.00	1.00	1.00	0.97	0.88	1.00	1.00	1.00	0.76
Frt		0.876				0.850		0.850				0.850
Flt Protected	0.950				0.967		0.950				0.950	
Satd. Flow (prot)	4990	1632	0	0	1801	1583	3433	2787	0	0	1770	3610
Flt Permitted	0.504				0.716		0.224				0.998	
Satd. Flow (perm)	2647	1632	0	0	1334	1583	809	2787	0	0	1859	3610
Satd. Flow (RTOR)		105				22		12				
Headway 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
Volume (vph)	433	20	97	174	78	20	65	43	11	9	638	873
Adj. Flow (vph)	471	22	105	189	85	22	71	47	12	10	693	949
Lane Group Flow (vph)	471	127	0	0	274	22	71	59	0	0	703	949
Turn Type		custom		Perm		Perm	custom	custom		custom	Prot	
Protected Phases		4			8						6	
Permitted Phases	4			8		8	2	2		6		6
Total Split (s)	22.0	22.0	0.0	22.0	22.0	22.0	33.0	33.0	0.0	33.0	33.0	33.0
Act Effct Green (s)	13.7	13.7			13.7	13.7	23.5	23.5			23.5	23.5
Actuated g/C Ratio	0.30	0.30			0.30	0.30	0.51	0.51			0.51	0.51
v/c Ratio	0.59	0.23			0.68	0.04	0.17	0.04			0.74	0.51
Uniform Delay, d1	13.3	1.9			13.8	0.0	5.7	4.2			8.4	7.1
Delay	14.8	5.0			16.7	6.5	6.9	5.2			9.7	7.7
LOS	B	A			B	A	A	A			A	A
Approach Delay		12.7			16.0						8.5	
Approach LOS		B			B						A	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 45.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 10.2 Intersection LOS: B
Intersection Capacity Utilization 79.5% ICU Level of Service C

Splits and Phases: 3: Elkhorn Boulevard & Meister Way

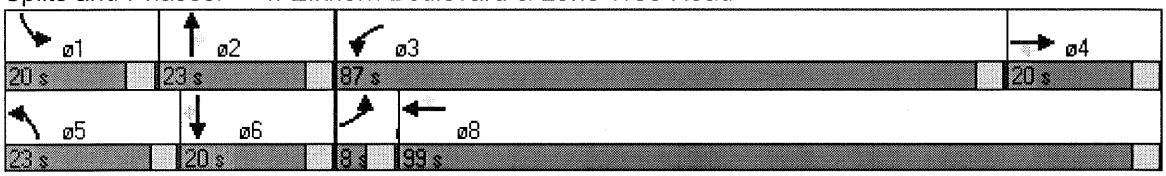


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			18			545			112			10
Headway 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
Volume (vph)	71	127	17	1446	1906	1290	441	189	103	287	68	9
Adj. Flow (vph)	77	138	18	1572	2072	1402	479	205	112	312	74	10
Lane Group Flow (vph)	77	138	18	1572	2072	1402	479	205	112	312	74	10
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
Total Split (s)	8.0	20.0	20.0	87.0	99.0	99.0	23.0	23.0	23.0	20.0	20.0	20.0
Act Effct Green (s)	4.0	23.9	23.9	75.1	95.0	95.0	19.0	13.9	13.9	15.6	10.5	10.5
Actuated g/C Ratio	0.03	0.17	0.17	0.52	0.66	0.66	0.13	0.10	0.10	0.11	0.07	0.07
v/c Ratio	0.81	0.16	0.06	0.88	0.62	1.14	1.06	0.60	0.44	0.84	0.29	0.08
Uniform Delay, d1	69.9	51.7	0.0	30.7	14.3	13.7	62.7	62.6	0.0	63.2	63.4	0.0
Delay	102.8	54.8	22.5	30.6	14.7	88.8	111.0	62.8	10.3	70.8	63.1	28.7
LOS	F	D	C	C	B	F	F	E	B	E	E	C
Approach Delay		68.2			40.2			84.4			68.3	
Approach LOS		E			D			F			E	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 144.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 48.4 — Intersection LOS: D
Intersection Capacity Utilization 105.8% — ICU Level of Service F

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

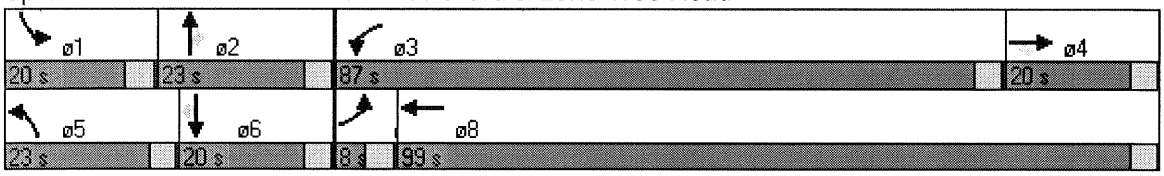


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			18			310			112			10
Headway 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
Volume (vph)	71	127	17	1446	1906	1290	441	189	103	287	68	9
Adj. Flow (vph)	77	138	18	1572	2072	1402	479	205	112	312	74	10
Lane Group Flow (vph)	77	138	18	1572	2072	1402	479	205	112	312	74	10
Turn Type	Prot		Perm	Prot		Free	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			Free			2			6
Total Split (s)	8.0	20.0	20.0	87.0	99.0	0.0	23.0	23.0	23.0	20.0	20.0	20.0
Act Effct Green (s)	4.2	8.5	8.5	58.6	62.9	112.3	19.7	14.3	14.3	14.3	9.0	9.0
Actuated g/C Ratio	0.04	0.08	0.08	0.52	0.56	1.00	0.18	0.13	0.13	0.13	0.08	0.08
v/c Ratio	0.61	0.36	0.13	0.88	0.73	0.89	0.80	0.45	0.37	0.71	0.26	0.07
Uniform Delay, d1	53.0	49.0	0.0	23.4	18.0	0.0	44.0	44.9	0.0	46.7	48.2	0.0
Delay	74.7	53.5	23.6	23.5	17.7	1.6	62.4	49.8	10.2	53.8	53.4	28.0
LOS	E	D	C	C	B	A	E	D	B	D	D	C
Approach Delay		58.2			15.0			51.8			53.1	
Approach LOS		E			B			D			D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 112.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 78.5% ICU Level of Service C

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

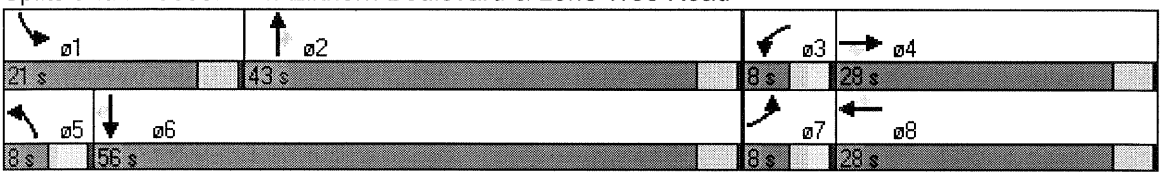


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			63			518			106			55
Headway 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
Volume (vph)	12	2127	148	189	302	477	32	160	1366	1466	218	51
Adj. Flow (vph)	13	2312	161	205	328	518	35	174	1485	1593	237	55
Lane Group Flow (vph)	13	2312	161	205	328	518	35	174	1485	1593	237	55
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
Total Split (s)	8.0	28.0	28.0	8.0	28.0	28.0	8.0	43.0	43.0	21.0	56.0	56.0
Act Effct Green (s)	4.0	24.0	24.0	4.0	30.4	30.4	4.0	39.0	39.0	17.0	55.2	55.2
Actuated g/C Ratio	0.04	0.24	0.24	0.04	0.30	0.30	0.04	0.39	0.39	0.17	0.55	0.55
v/c Ratio	0.10	1.90	0.38	1.50	0.21	0.62	0.26	0.13	2.18	2.73	0.12	0.06
Uniform Delay, d1	51.8	38.8	18.7	50.4	28.2	0.0	50.5	20.7	27.1	43.9	12.6	0.0
Delay	48.4	257.5	19.4	198.2	26.6	3.0	47.2	19.7	285.6	331.1	11.5	3.4
LOS	D	F	B	F	C	A	D	B	F	F	B	A
Approach Delay		241.0			48.5			253.4			281.4	
Approach LOS		F			D			F			F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.73
Intersection Signal Delay: 226.2 Intersection LOS: F
Intersection Capacity Utilization 192.1% ICU Level of Service H

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

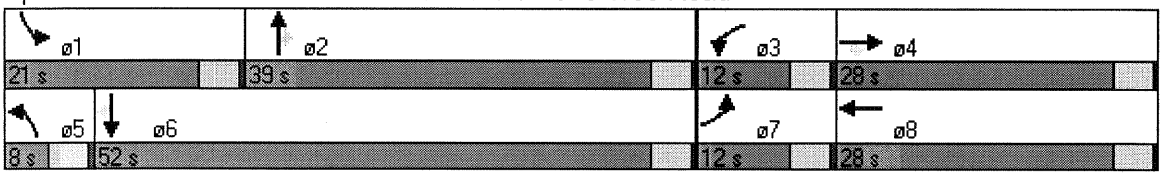


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			63			518			194			55
Headway 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
Volume (vph)	12	2127	148	189	302	477	32	160	1366	1466	218	51
Adj. Flow (vph)	13	2312	161	205	328	518	35	174	1485	1593	237	55
Lane Group Flow (vph)	13	2312	161	205	328	518	35	174	1485	1593	237	55
Turn Type	Prot		Perm	Prot		Free	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			Free			2			6
Total Split (s)	12.0	28.0	28.0	12.0	28.0	0.0	8.0	39.0	39.0	21.0	52.0	52.0
Act Effct Green (s)	5.9	24.0	24.0	8.0	33.9	100.0	4.0	35.0	35.0	17.0	51.2	51.2
Actuated g/C Ratio	0.05	0.24	0.24	0.08	0.34	1.00	0.04	0.35	0.35	0.17	0.51	0.51
v/c Ratio	0.07	1.90	0.38	0.75	0.19	0.33	0.26	0.14	2.18	2.73	0.13	0.07
Uniform Delay, d1	51.2	38.8	18.7	47.5	25.6	0.0	50.5	23.3	24.3	43.9	14.7	0.0
Delay	46.8	257.5	19.4	51.1	24.3	0.0	47.2	22.4	285.8	331.1	13.6	4.0
LOS	D	F	B	D	C	A	D	C	F	F	B	A
Approach Delay		241.0			17.6			253.8			281.6	
Approach LOS		F			B			F			F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.73
Intersection Signal Delay: 221.8 Intersection LOS: F
Intersection Capacity Utilization 192.1% ICU Level of Service H

Splits and Phases: 4: Elkhorn Boulevard & Lone Tree Road

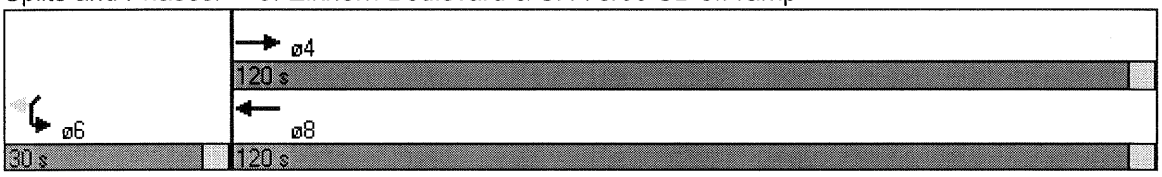


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↑	↱↑
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						1
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	200	4074	0	88	490
Adj. Flow (vph)	0	217	4428	0	96	533
Lane Group Flow (vph)	0	217	4428	0	96	533
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	120.0	120.0	0.0	30.0	30.0
Act Effct Green (s)		116.0	116.0		26.0	26.0
Actuated g/C Ratio		0.77	0.77		0.17	0.17
v/c Ratio		0.06	1.13		0.16	1.10
Uniform Delay, d1		4.0	17.0		52.7	61.9
Delay		4.0	77.8		53.0	114.2
LOS		A	E		D	F
Approach Delay		4.0	77.8		104.8	
Approach LOS		A	E		F	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 78.0 Intersection LOS: E
Intersection Capacity Utilization 110.9% ICU Level of Service G

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

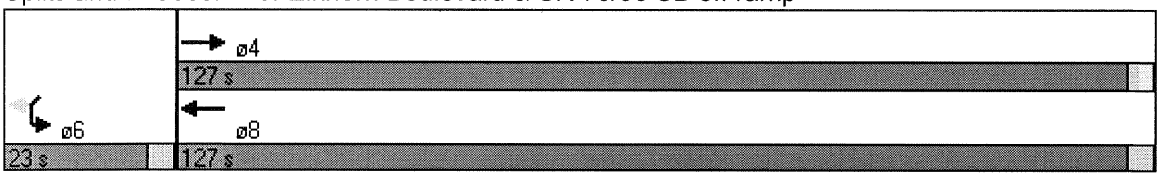


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.86
Frt					0.903	0.850
Flt Protected					0.983	
Satd. Flow (prot)	0	5085	5085	0	3208	2723
Flt Permitted					0.983	
Satd. Flow (perm)	0	5085	5085	0	3208	2723
Satd. Flow (RTOR)						1
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	200	4074	0	88	490
Adj. Flow (vph)	0	217	4428	0	96	533
Lane Group Flow (vph)	0	217	4428	0	274	355
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	127.0	127.0	0.0	23.0	23.0
Act Effct Green (s)		123.0	123.0		19.1	19.1
Actuated g/C Ratio		0.82	0.82		0.13	0.13
v/c Ratio		0.05	1.06		0.89dr	1.03
Uniform Delay, d1		2.5	13.5		62.5	65.3
Delay		2.5	47.0		62.9	104.5
LOS		A	D		E	F
Approach Delay		2.5	47.0		86.4	
Approach LOS		A	D		F	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 49.9 Intersection LOS: D
Intersection Capacity Utilization 107.1% ICU Level of Service F
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

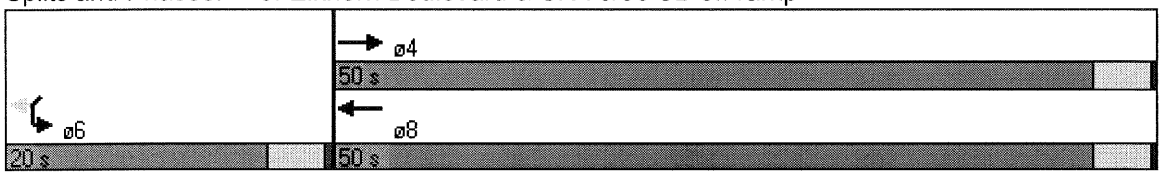


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						95
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	2876	988	0	361	87
Adj. Flow (vph)	0	3126	1074	0	392	95
Lane Group Flow (vph)	0	3126	1074	0	392	95
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	50.0	50.0	0.0	20.0	20.0
Act Effct Green (s)		46.0	46.0		12.5	12.5
Actuated g/C Ratio		0.69	0.69		0.19	0.19
v/c Ratio		0.89	0.31		0.61	0.16
Uniform Delay, d1		8.2	4.0		24.8	0.0
Delay		11.6	4.3		24.8	5.8
LOS		B	A		C	A
Approach Delay		11.6	4.3		21.1	
Approach LOS		B	A		C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 66.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 10.9 — Intersection LOS: B
Intersection Capacity Utilization 78.3% — ICU Level of Service C

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

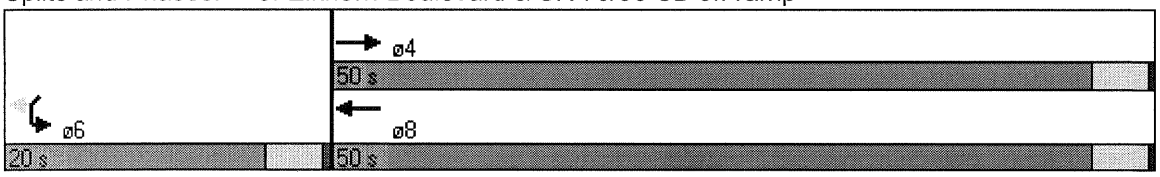


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑		↰↑↑	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.86
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2723
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2723
Satd. Flow (RTOR)						95
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	2876	988	0	361	87
Adj. Flow (vph)	0	3126	1074	0	392	95
Lane Group Flow (vph)	0	3126	1074	0	392	95
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	50.0	50.0	0.0	20.0	20.0
Act Effct Green (s)		46.0	46.0		12.5	12.5
Actuated g/C Ratio		0.69	0.69		0.19	0.19
v/c Ratio		0.89	0.31		0.61	0.16
Uniform Delay, d1		8.2	4.0		24.8	0.0
Delay		11.6	4.3		24.8	5.8
LOS		B	A		C	A
Approach Delay		11.6	4.3		21.1	
Approach LOS		B	A		C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 66.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 10.9 — Intersection LOS: B
Intersection Capacity Utilization 78.9% — ICU Level of Service C

Splits and Phases: 5: Elkhorn Boulevard & SR 70/99 SB off ramp

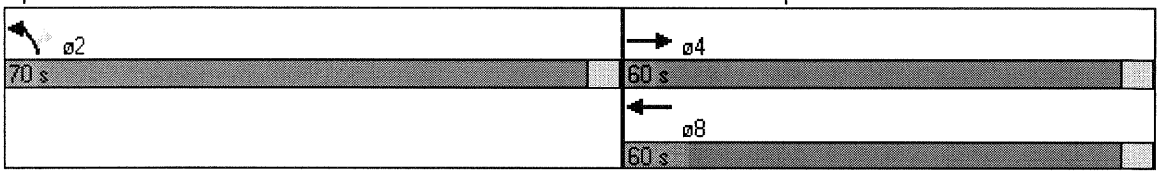


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						51
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	236	0	0	2536	1983	84
Adj. Flow (vph)	257	0	0	2757	2155	91
Lane Group Flow (vph)	257	0	0	2757	2155	91
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	60.0	0.0	0.0	60.0	70.0	70.0
Act Effct Green (s)	56.0			56.0	66.0	66.0
Actuated g/C Ratio	0.43			0.43	0.51	0.51
v/c Ratio	0.12			1.26	1.24	0.06
Uniform Delay, d1	22.2			37.0	32.0	7.0
Delay	22.3			137.1	126.3	8.0
LOS	C			F	F	A
Approach Delay	22.3			137.1	121.5	
Approach LOS	C			F	F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 124.9 — Intersection LOS: F
Intersection Capacity Utilization 121.4% — ICU Level of Service H

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

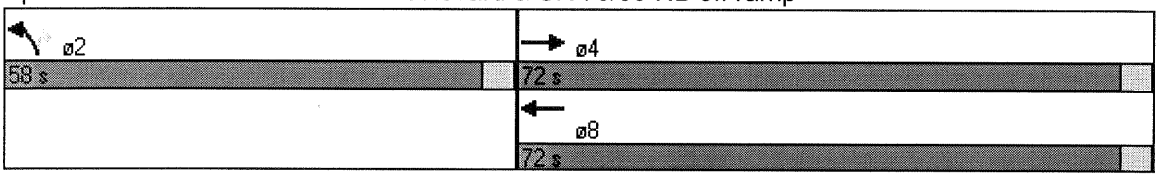


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↑↑↑	↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.94	0.86
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	4990	1362
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	4990	1362
Satd. Flow (RTOR)						62
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	236	0	0	2536	1983	84
Adj. Flow (vph)	257	0	0	2757	2155	91
Lane Group Flow (vph)	257	0	0	2757	2155	91
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	72.0	0.0	0.0	72.0	58.0	58.0
Act Effct Green (s)	68.0			68.0	54.0	54.0
Actuated g/C Ratio	0.52			0.52	0.42	0.42
v/c Ratio	0.10			1.04	1.04	0.15
Uniform Delay, d1	15.6			31.0	38.0	7.2
Delay	15.6			54.2	63.0	9.3
LOS	B			D	E	A
Approach Delay	15.6			54.2	60.9	
Approach LOS	B			D	E	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 55.2 Intersection LOS: E
Intersection Capacity Utilization 101.6% ICU Level of Service F

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

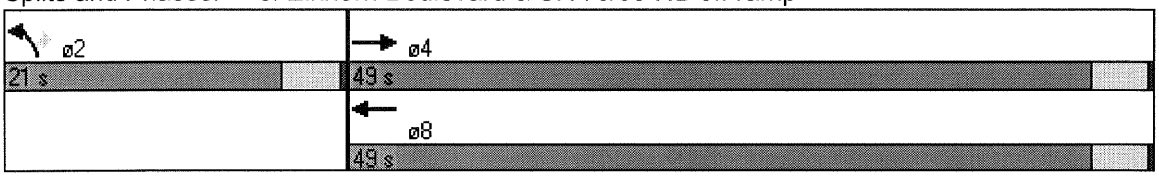


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	5085	0	0	5085	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	5085	0	0	5085	3433	2787
Satd. Flow (RTOR)						2
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2810	0	0	449	625	399
Adj. Flow (vph)	3054	0	0	488	679	434
Lane Group Flow (vph)	3054	0	0	488	679	434
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	49.0	0.0	0.0	49.0	21.0	21.0
Act Effct Green (s)	45.0			45.0	16.6	16.6
Actuated g/C Ratio	0.65			0.65	0.24	0.24
v/c Ratio	0.93			0.15	0.83	0.65
Uniform Delay, d1	10.9			4.8	25.1	23.8
Delay	14.3			4.9	28.4	24.2
LOS	B			A	C	C
Approach Delay	14.3			4.9	26.8	
Approach LOS	B			A	C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 69.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 16.3 — Intersection LOS: B
Intersection Capacity Utilization 85.1% — ICU Level of Service D

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

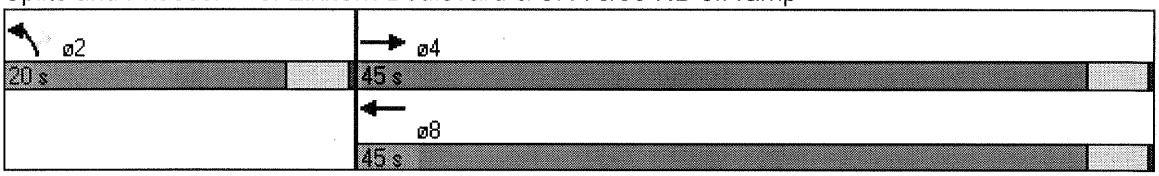


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰↑	↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.94	0.86
Frt					0.967	0.850
Flt Protected					0.963	
Satd. Flow (prot)	5085	0	0	5085	4892	1362
Flt Permitted					0.963	
Satd. Flow (perm)	5085	0	0	5085	4892	1362
Satd. Flow (RTOR)					1	1
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2810	0	0	449	625	399
Adj. Flow (vph)	3054	0	0	488	679	434
Lane Group Flow (vph)	3054	0	0	488	874	239
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Total Split (s)	45.0	0.0	0.0	45.0	20.0	20.0
Act Effct Green (s)	41.0			41.0	15.5	15.5
Actuated g/C Ratio	0.64			0.64	0.24	0.24
v/c Ratio	0.94			0.15	0.74	0.73
Uniform Delay, d1	10.7			4.7	22.6	22.4
Delay	16.2			4.9	22.8	28.4
LOS	B			A	C	C
Approach Delay	16.2			4.9	24.0	
Approach LOS	B			A	C	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 64.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 16.9 — Intersection LOS: B
Intersection Capacity Utilization 83.6% — ICU Level of Service D

Splits and Phases: 6: Elkhorn Boulevard & SR 70/99 NB off ramp

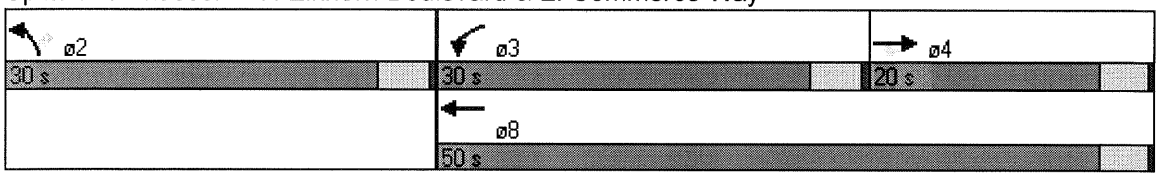


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	5085	1583	1770	5085	3433	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	5085	1583	1770	5085	3433	1583
Satd. Flow (RTOR)		141				210
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	190	130	474	2255	922	193
Adj. Flow (vph)	207	141	515	2451	1002	210
Lane Group Flow (vph)	207	141	515	2451	1002	210
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	30.0	50.0	30.0	30.0
Act Effct Green (s)	15.8	15.8	24.4	44.2	24.8	24.8
Actuated g/C Ratio	0.20	0.20	0.32	0.57	0.32	0.32
v/c Ratio	0.20	0.32	0.92	0.84	0.91	0.32
Uniform Delay, d1	25.3	0.0	25.3	13.5	25.0	0.0
Delay	26.5	5.6	37.8	14.0	30.8	3.3
LOS	C	A	D	B	C	A
Approach Delay	18.0			18.1	26.1	
Approach LOS	B			B	C	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 77.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 20.2 Intersection LOS: C
Intersection Capacity Utilization 82.6% ICU Level of Service D

Splits and Phases: 7: Elkhorn Boulevard & E. Commerce Way

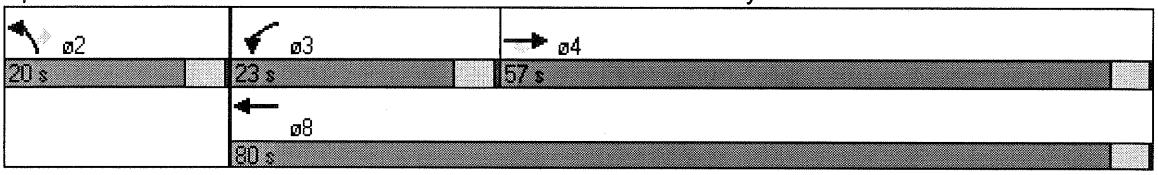


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱	↰	↑↑↑	↰↰	↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.97	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	5085	1583	1770	5085	3433	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	5085	1583	1770	5085	3433	1583
Satd. Flow (RTOR)		550				290
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2117	1106	322	397	138	415
Adj. Flow (vph)	2252	1177	350	432	150	451
Lane Group Flow (vph)	2252	1177	350	432	150	451
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	57.0	57.0	23.0	80.0	20.0	20.0
Act Effct Green (s)	53.0	53.0	19.0	76.1	14.5	14.5
Actuated g/C Ratio	0.54	0.54	0.19	0.77	0.15	0.15
v/c Ratio	0.82	1.07	1.03	0.11	0.30	0.94
Uniform Delay, d1	18.8	11.4	39.8	2.8	37.5	14.6
Delay	19.5	56.4	87.8	3.0	37.4	28.6
LOS	B	E	F	A	D	C
Approach Delay	32.2			40.9	30.8	
Approach LOS	C			D	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 98.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 33.4 Intersection LOS: C
Intersection Capacity Utilization 98.9% ICU Level of Service E

Splits and Phases: 7: Elkhorn Boulevard & E. Commerce Way

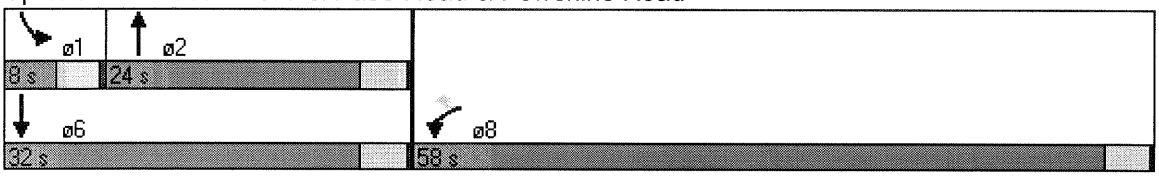


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	0.95	0.97	1.00
Frt		0.850	0.996			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3525	0	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3525	0	3433	1863
Satd. Flow (RTOR)		192	2			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	616	944	673	17	80	17
Adj. Flow (vph)	670	1004	732	18	87	18
Lane Group Flow (vph)	670	1004	750	0	87	18
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Total Split (s)	58.0	58.0	24.0	0.0	8.0	32.0
Act Effct Green (s)	51.7	51.7	19.5		4.0	25.6
Actuated g/C Ratio	0.61	0.61	0.23		0.05	0.30
v/c Ratio	0.63	0.97	0.93		0.55	0.03
Uniform Delay, d1	11.1	13.5	32.6		41.2	20.8
Delay	11.7	31.0	47.4		45.3	21.8
LOS	B	C	D		D	C
Approach Delay	23.3		47.4			41.3
Approach LOS	C		D			D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 31.2 Intersection LOS: C
Intersection Capacity Utilization 89.7% ICU Level of Service D

Splits and Phases: 8: Del Paso Road & Powerline Road

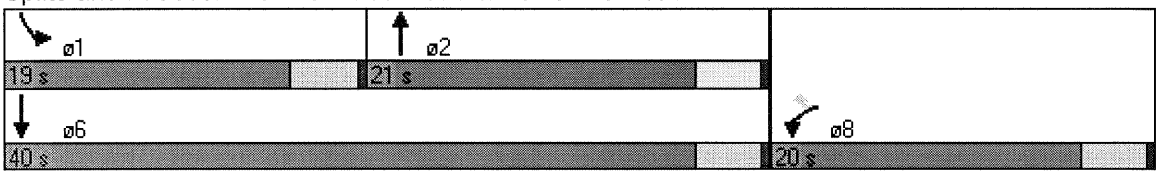


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	0.95	0.97	1.00
Frt		0.850	0.866			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3065	0	3433	1863
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	3065	0	3433	1863
Satd. Flow (RTOR)		226	594			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	13	208	72	595	488	760
Adj. Flow (vph)	14	226	78	647	530	826
Lane Group Flow (vph)	14	226	725	0	530	826
Turn Type		Perm			Prot	
Protected Phases	8		2		1	6
Permitted Phases		8				
Total Split (s)	20.0	20.0	21.0	0.0	19.0	40.0
Act Effct Green (s)	7.1	7.1	9.4		11.3	26.7
Actuated g/C Ratio	0.18	0.18	0.25		0.30	0.70
v/c Ratio	0.04	0.48	0.60		0.52	0.63
Uniform Delay, d1	14.4	0.0	2.0		11.3	4.1
Delay	16.7	3.8	3.3		13.0	5.4
LOS	B	A	A		B	A
Approach Delay	4.6		3.3			8.4
Approach LOS	A		A			A

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 38
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 6.4 Intersection LOS: A
Intersection Capacity Utilization 53.5% ICU Level of Service A

Splits and Phases: 8: Del Paso Road & Powerline Road

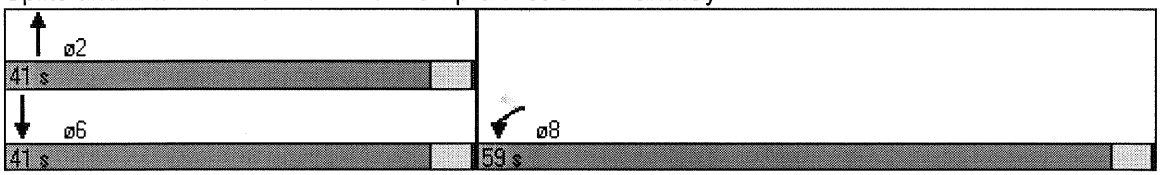


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.91	1.00	1.00	0.91
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	3433	2787	5085	0	0	5085
Flt Permitted	0.950					
Satd. Flow (perm)	3433	2787	5085	0	0	5085
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	3830	2902	0	0	590
Adj. Flow (vph)	22	4163	3154	0	0	641
Lane Group Flow (vph)	22	4163	3154	0	0	641
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	59.0	59.0	41.0	0.0	0.0	41.0
Act Effct Green (s)	55.0	55.0	37.0			37.0
Actuated g/C Ratio	0.55	0.55	0.37			0.37
v/c Ratio	0.01	2.72	1.68			0.34
Uniform Delay, d1	10.2	22.5	31.5			22.7
Delay	10.2	316.7	223.9			22.9
LOS	B	F	F			C
Approach Delay	315.1		223.9			22.9
Approach LOS	F		F			C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.72
Intersection Signal Delay: 255.6 Intersection LOS: F
Intersection Capacity Utilization 213.2% ICU Level of Service H

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

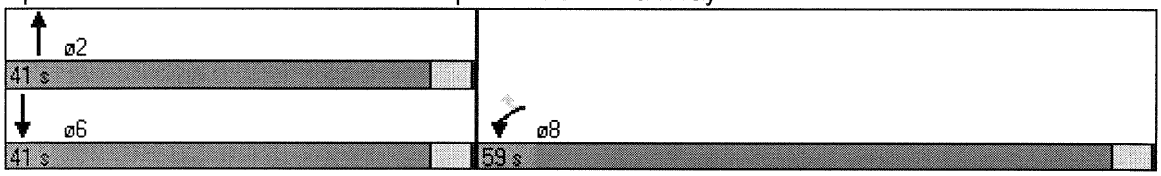


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.86	0.91	1.00	1.00	0.91
Frt	0.852	0.850				
Flt Protected	0.999					
Satd. Flow (prot)	3076	2723	5085	0	0	5085
Flt Permitted	0.999					
Satd. Flow (perm)	3076	2723	5085	0	0	5085
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	3830	2902	0	0	590
Adj. Flow (vph)	22	4163	3154	0	0	641
Lane Group Flow (vph)	1410	2775	3154	0	0	641
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	59.0	59.0	41.0	0.0	0.0	41.0
Act Effct Green (s)	55.0	55.0	37.0			37.0
Actuated g/C Ratio	0.55	0.55	0.37			0.37
v/c Ratio	1.59dr	1.85	1.68			0.34
Uniform Delay, d1	18.7	22.5	31.5			22.7
Delay	19.4	247.8	223.9			22.9
LOS	B	F	F			C
Approach Delay	170.8		223.9			22.9
Approach LOS	F		F			C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.85
Intersection Signal Delay: 179.9 Intersection LOS: F
Intersection Capacity Utilization 184.1% ICU Level of Service H
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

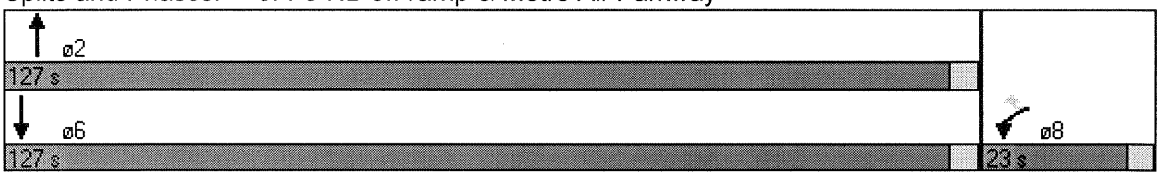


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.88	0.91	1.00	1.00	0.91
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	3433	2787	5085	0	0	5085
Flt Permitted	0.950					
Satd. Flow (perm)	3433	2787	5085	0	0	5085
Satd. Flow (RTOR)		672				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	887	613	0	0	4832
Adj. Flow (vph)	22	964	666	0	0	5252
Lane Group Flow (vph)	22	964	666	0	0	5252
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	23.0	23.0	127.0	0.0	0.0	127.0
Act Effct Green (s)	19.1	19.1	123.0			123.0
Actuated g/C Ratio	0.13	0.13	0.82			0.82
v/c Ratio	0.05	1.03	0.16			1.26
Uniform Delay, d1	57.5	18.7	2.8			13.5
Delay	57.8	47.4	2.8			125.9
LOS	E	D	A			F
Approach Delay	47.6		2.8			125.9
Approach LOS	D		A			F

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 102.9 Intersection LOS: F
Intersection Capacity Utilization 111.5% ICU Level of Service G

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

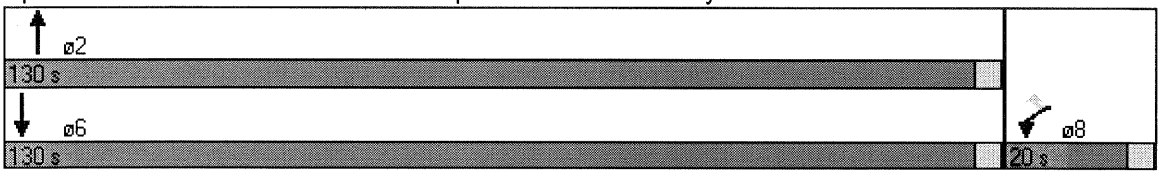


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.86	0.91	1.00	1.00	0.91
Frt	0.860	0.850				
Flt Protected	0.997					
Satd. Flow (prot)	3098	2723	5085	0	0	5085
Flt Permitted	0.997					
Satd. Flow (perm)	3098	2723	5085	0	0	5085
Satd. Flow (RTOR)	321	643				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	20	887	613	0	0	4832
Adj. Flow (vph)	22	964	666	0	0	5252
Lane Group Flow (vph)	343	643	666	0	0	5252
Turn Type		Perm				
Protected Phases	8		2			6
Permitted Phases		8				
Total Split (s)	20.0	20.0	130.0	0.0	0.0	130.0
Act Effct Green (s)	10.2	10.2	126.1			126.1
Actuated g/C Ratio	0.07	0.07	0.87			0.87
v/c Ratio	0.66	0.81	0.15			1.18
Uniform Delay, d1	4.0	0.0	1.3			9.1
Delay	8.5	4.5	1.5			100.5
LOS	A	A	A			F
Approach Delay	5.9		1.5			100.5
Approach LOS	A		A			F

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 144.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.18
Intersection Signal Delay: 77.4 Intersection LOS: E
Intersection Capacity Utilization 114.9% ICU Level of Service G

Splits and Phases: 9: I-5 NB off ramp & Metro Air Parkway

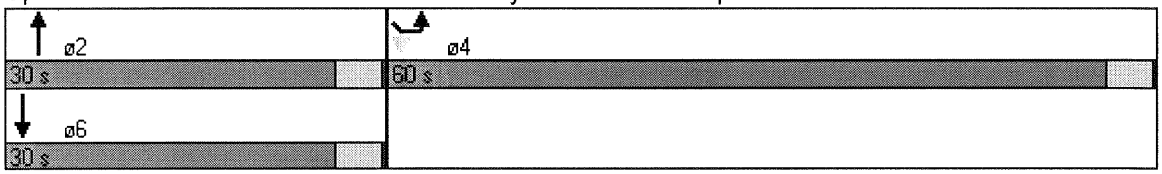


Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						199
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	1318	71	0	1940	183
Adj. Flow (vph)	0	1433	77	0	2109	199
Lane Group Flow (vph)	0	1433	77	0	2109	199
Turn Type						Perm
Protected Phases		2	6		4	
Permitted Phases						4
Total Split (s)	0.0	30.0	30.0	0.0	60.0	60.0
Act Effct Green (s)		26.0	26.0		56.0	56.0
Actuated g/C Ratio		0.29	0.29		0.62	0.62
v/c Ratio		0.98	0.05		0.99	0.11
Uniform Delay, d1		31.7	23.1		16.6	0.0
Delay		45.9	23.2		30.3	1.1
LOS		D	C		C	A
Approach Delay		45.9	23.2		27.8	
Approach LOS		D	C		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 34.5 Intersection LOS: C
Intersection Capacity Utilization 94.5% ICU Level of Service E

Splits and Phases: 10: Metro Air Parkway & I-5 SB off ramp

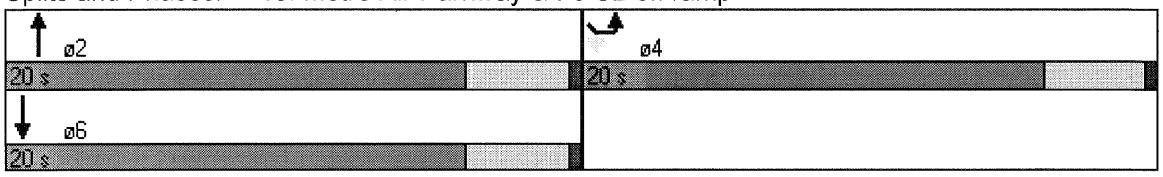


Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	5085	5085	0	3433	2787
Flt Permitted					0.950	
Satd. Flow (perm)	0	5085	5085	0	3433	2787
Satd. Flow (RTOR)						28
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	0	430	1142	0	439	373
Adj. Flow (vph)	0	467	1241	0	477	405
Lane Group Flow (vph)	0	467	1241	0	477	405
Turn Type						Perm
Protected Phases		2	6		4	
Permitted Phases						4
Total Split (s)	0.0	20.0	20.0	0.0	20.0	20.0
Act Effct Green (s)		14.3	14.3		11.3	11.3
Actuated g/C Ratio		0.42	0.42		0.33	0.33
v/c Ratio		0.22	0.58		0.42	0.43
Uniform Delay, d1		6.1	7.3		8.6	8.0
Delay		6.8	8.1		8.9	8.3
LOS		A	A		A	A
Approach Delay		6.8	8.1		8.6	
Approach LOS		A	A		A	

Intersection Summary

Cycle Length: 40
Actuated Cycle Length: 33.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.0 Intersection LOS: A
Intersection Capacity Utilization 44.8% ICU Level of Service A

Splits and Phases: 10: Metro Air Parkway & I-5 SB off ramp

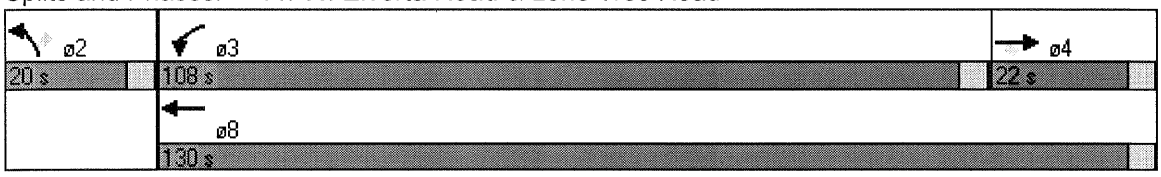


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		154				34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	120	142	2174	2886	20	31
Adj. Flow (vph)	130	154	2363	3137	22	34
Lane Group Flow (vph)	130	154	2363	3137	22	34
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	22.0	22.0	108.0	130.0	20.0	20.0
Act Effct Green (s)	18.0	18.0	104.0	126.0	6.3	6.3
Actuated g/C Ratio	0.13	0.13	0.74	0.90	0.04	0.04
v/c Ratio	0.29	0.46	0.93	0.99	0.14	0.21
Uniform Delay, d1	55.4	0.0	15.1	6.5	64.3	0.0
Delay	55.8	8.3	18.6	17.3	64.4	19.7
LOS	E	A	B	B	E	B
Approach Delay	30.1			17.9	37.2	
Approach LOS	C			B	D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 140.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 18.6 Intersection LOS: B
Intersection Capacity Utilization 96.7% ICU Level of Service E

Splits and Phases: 11: W. Elverta Road & Lone Tree Road

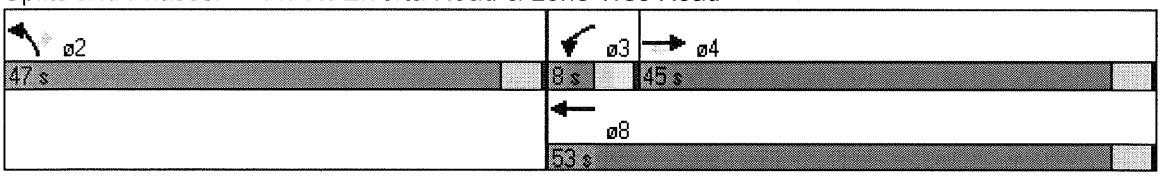


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰↰	↑↑	↰↰	↱↱
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		8				171
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	2510	25	95	326	21	2284
Adj. Flow (vph)	2728	27	103	354	23	2483
Lane Group Flow (vph)	2728	27	103	354	23	2483
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	45.0	45.0	8.0	53.0	47.0	47.0
Act Effct Green (s)	41.0	41.0	4.0	49.0	43.0	43.0
Actuated g/C Ratio	0.41	0.41	0.04	0.49	0.43	0.43
v/c Ratio	1.88	0.04	0.75	0.20	0.02	1.92
Uniform Delay, d1	29.5	12.4	47.5	14.4	16.3	24.7
Delay	253.5	14.0	63.5	14.6	16.4	256.7
LOS	F	B	E	B	B	F
Approach Delay	251.1			25.6	254.5	
Approach LOS	F			C	F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.92
Intersection Signal Delay: 234.6 Intersection LOS: F
Intersection Capacity Utilization 168.9% ICU Level of Service H

Splits and Phases: 11: W. Elverta Road & Lone Tree Road

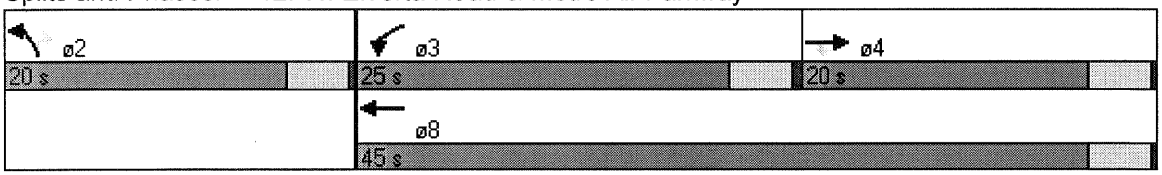


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		481				37
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	329	536	925	1094	20	34
Adj. Flow (vph)	358	583	1005	1189	22	37
Lane Group Flow (vph)	358	583	1005	1189	22	37
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	20.0	20.0	25.0	45.0	20.0	20.0
Act Effct Green (s)	12.0	12.0	19.2	35.3	6.0	6.0
Actuated g/C Ratio	0.24	0.24	0.39	0.71	0.12	0.12
v/c Ratio	0.42	0.78	0.75	0.47	0.05	0.10
Uniform Delay, d1	15.7	2.7	12.9	3.0	19.1	0.0
Delay	16.0	5.1	14.4	3.0	21.8	9.4
LOS	B	A	B	A	C	A
Approach Delay	9.3			8.2	14.0	
Approach LOS	A			A	B	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 49.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 8.6 Intersection LOS: A
Intersection Capacity Utilization 71.4% ICU Level of Service C

Splits and Phases: 12: W. Elverta Road & Metro Air Parkway

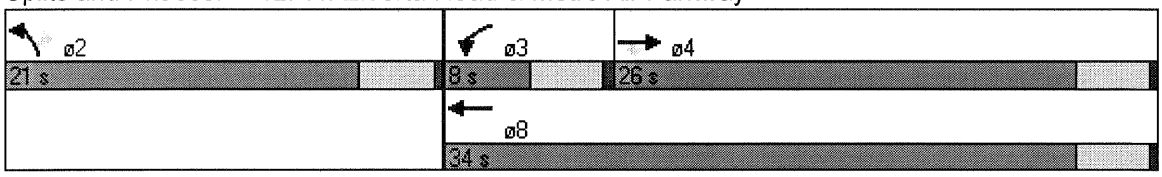


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	0.88
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	3433	3539	3433	2787
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3539	1583	3433	3539	3433	2787
Satd. Flow (RTOR)		15				327
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	1063	14	114	263	653	649
Adj. Flow (vph)	1155	15	124	286	710	705
Lane Group Flow (vph)	1155	15	124	286	710	705
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Total Split (s)	26.0	26.0	8.0	34.0	21.0	21.0
Act Effct Green (s)	20.1	20.1	4.1	25.9	15.5	15.5
Actuated g/C Ratio	0.40	0.40	0.08	0.52	0.31	0.31
v/c Ratio	0.81	0.02	0.45	0.16	0.67	0.65
Uniform Delay, d1	13.6	0.0	23.2	5.9	15.3	7.7
Delay	15.8	5.6	24.9	6.2	16.2	8.6
LOS	B	A	C	A	B	A
Approach Delay	15.7			11.9	12.4	
Approach LOS	B			B	B	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 49.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 13.6 — Intersection LOS: B
Intersection Capacity Utilization 65.7% — ICU Level of Service B

Splits and Phases: 12: W. Elverta Road & Metro Air Parkway

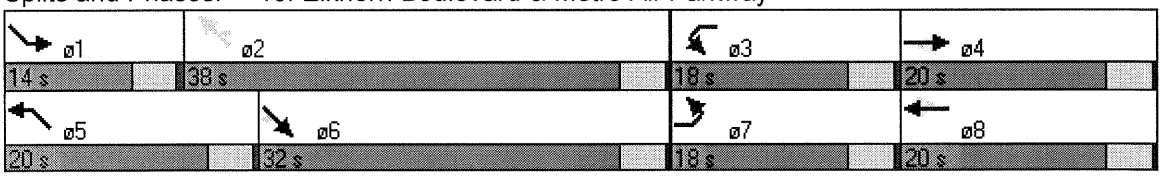


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			20			199			63			386
Headway 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
Volume (vph)	550	685	20	555	280	199	386	931	63	45	1784	852
Adj. Flow (vph)	550	685	20	555	280	199	386	931	63	45	1784	852
Lane Group Flow (vph)	550	685	20	555	280	199	386	931	63	45	1784	852
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		custom
Protected Phases	7	4		3	8		1	6		5		
Permitted Phases			4			8			6		2	2
Total Split (s)	18.0	20.0	20.0	18.0	20.0	20.0	14.0	32.0	32.0	20.0	38.0	38.0
Act Effct Green (s)	14.0	15.4	15.4	14.0	15.4	15.4	10.0	41.4	41.4	6.6	34.0	34.0
Actuated g/C Ratio	0.16	0.17	0.17	0.16	0.17	0.17	0.11	0.46	0.46	0.07	0.38	0.38
v/c Ratio	1.02	0.78	0.07	1.03	0.32	0.46	1.01	0.39	0.08	0.19	0.92	1.01
Uniform Delay, d1	38.5	36.3	0.0	38.5	33.3	0.0	40.5	16.5	0.0	41.9	25.9	15.1
Delay	77.6	35.6	13.6	80.0	32.5	5.3	81.0	16.9	4.7	39.5	31.2	46.3
LOS	E	D	B	F	C	A	F	B	A	D	C	D
Approach Delay		53.6			52.8			34.3			36.1	
Approach LOS		D			D			C			D	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 89.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 41.9 Intersection LOS: D
Intersection Capacity Utilization 87.9% ICU Level of Service D

Splits and Phases: 13: Elkhorn Boulevard & Metro Air Parkway

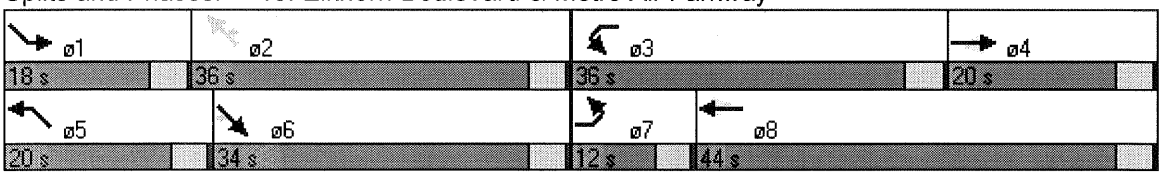


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			95			308			370			217
Headway 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
Volume (vph)	142	365	95	1033	557	417	430	1412	608	25	1266	312
Adj. Flow (vph)	142	365	95	1033	557	417	430	1412	608	25	1266	312
Lane Group Flow (vph)	142	365	95	1033	557	417	430	1412	608	25	1266	312
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		custom
Protected Phases	7	4		3	8		1	6		5		
Permitted Phases			4			8			6		2	2
Total Split (s)	12.0	20.0	20.0	36.0	44.0	44.0	18.0	34.0	34.0	20.0	36.0	36.0
Act Effct Green (s)	7.8	12.8	12.8	32.1	37.1	37.1	14.0	42.7	42.7	6.2	30.9	30.9
Actuated g/C Ratio	0.07	0.12	0.12	0.30	0.35	0.35	0.13	0.40	0.40	0.06	0.29	0.29
v/c Ratio	0.56	0.59	0.35	0.99	0.31	0.55	0.95	0.69	0.71	0.13	0.85	0.51
Uniform Delay, d1	48.2	44.8	0.0	37.8	25.9	6.6	46.4	27.0	9.5	50.2	34.7	8.5
Delay	48.5	44.2	9.0	62.5	25.3	7.5	72.2	27.5	11.1	48.7	36.7	10.1
LOS	D	D	A	E	C	A	E	C	B	D	D	B
Approach Delay		39.7			40.7			31.3			31.7	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 105.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 35.0 Intersection LOS: C
Intersection Capacity Utilization 86.6% ICU Level of Service D

Splits and Phases: 13: Elkhorn Boulevard & Metro Air Parkway

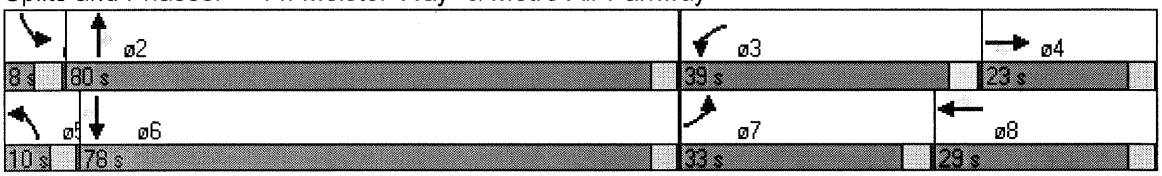


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			89			107			408			321
Headway 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
Volume (vph)	206	35	312	440	121	128	20	2345	1030	30	1098	389
Adj. Flow (vph)	224	38	339	478	132	139	22	2549	1120	33	1193	423
Lane Group Flow (vph)	224	38	339	478	132	139	22	2549	1120	33	1193	423
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
Total Split (s)	33.0	23.0	23.0	39.0	29.0	29.0	10.0	80.0	80.0	8.0	78.0	78.0
Act Effct Green (s)	22.8	19.1	19.1	35.0	31.2	31.2	5.9	76.1	76.1	4.1	76.4	76.4
Actuated g/C Ratio	0.15	0.13	0.13	0.24	0.21	0.21	0.04	0.51	0.51	0.03	0.51	0.51
v/c Ratio	0.82	0.16	1.21	1.14	0.34	0.33	0.32	0.98	1.11	0.70	0.46	0.44
Uniform Delay, d1	61.7	58.4	44.5	57.5	50.6	11.1	72.3	35.8	21.8	73.2	23.6	4.7
Delay	60.5	59.0	144.5	130.0	52.7	15.6	71.0	45.8	83.2	108.4	23.4	5.6
LOS	E	E	F	F	D	B	E	D	F	F	C	A
Approach Delay		107.8			95.1			57.3			20.5	
Approach LOS		F			F			E			C	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 57.0 Intersection LOS: E
Intersection Capacity Utilization 89.1% ICU Level of Service D

Splits and Phases: 14: Meister Way & Metro Air Parkway

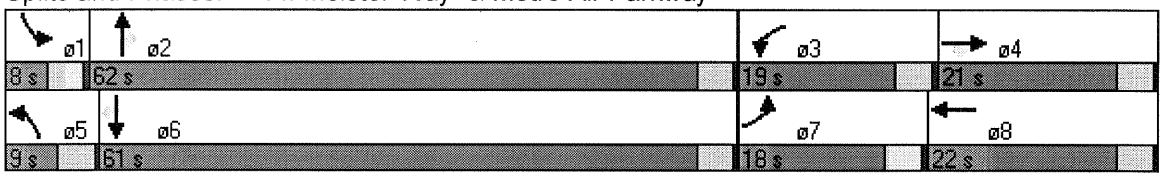


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850		0.923				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3433	1719	0	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	3433	1719	0	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			98		41				581			423
Headway 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
Volume (vph)	206	35	312	440	121	128	20	2345	1030	30	1098	389
Adj. Flow (vph)	224	38	339	478	132	139	22	2549	1120	33	1193	423
Lane Group Flow (vph)	224	38	339	478	271	0	22	2549	1120	33	1193	423
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Total Split (s)	18.0	21.0	21.0	19.0	22.0	0.0	9.0	62.0	62.0	8.0	61.0	61.0
Act Effct Green (s)	14.0	17.1	17.1	15.0	18.0		5.0	58.1	58.1	4.0	59.3	59.3
Actuated g/C Ratio	0.13	0.16	0.16	0.14	0.17		0.04	0.54	0.54	0.04	0.56	0.56
v/c Ratio	0.97	0.13	1.01	0.99	0.84		0.28	0.92	0.99	0.52	0.42	0.40
Uniform Delay, d1	47.4	39.7	32.3	47.1	37.4		53.3	23.2	12.1	53.2	14.9	0.0
Delay	90.4	40.3	77.3	81.2	49.8		52.1	27.3	35.2	62.1	14.4	1.4
LOS	F	D	E	F	D		D	C	D	E	B	A
Approach Delay		79.9			69.9			29.8			12.0	
Approach LOS		E			E			C			B	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 106.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 34.4 Intersection LOS: C
Intersection Capacity Utilization 87.1% ICU Level of Service D

Splits and Phases: 14: Meister Way & Metro Air Parkway

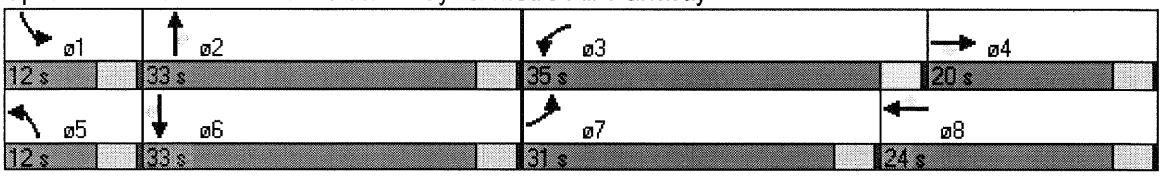


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			22			15			451			141
Headway 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
Volume (vph)	363	132	20	1080	27	14	238	1210	564	122	2112	308
Adj. Flow (vph)	395	143	22	1174	29	15	259	1315	613	133	2296	335
Lane Group Flow (vph)	395	143	22	1174	29	15	259	1315	613	133	2296	335
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
Total Split (s)	31.0	20.0	20.0	35.0	24.0	24.0	12.0	33.0	33.0	12.0	33.0	33.0
Act Effct Green (s)	34.1	12.2	12.2	31.0	13.5	13.5	8.0	29.0	29.0	8.0	29.0	29.0
Actuated g/C Ratio	0.35	0.13	0.13	0.32	0.13	0.13	0.08	0.30	0.30	0.08	0.30	0.30
v/c Ratio	0.63	0.60	0.10	2.06	0.12	0.07	1.76	0.86	0.77	0.90	1.50	0.58
Uniform Delay, d1	26.8	39.0	0.0	33.4	39.3	0.0	45.0	32.7	7.5	44.6	34.4	16.2
Delay	35.5	39.8	14.8	297.9	34.3	15.2	264.6	35.2	9.9	90.2	206.5	16.9
LOS	D	D	B	F	C	B	F	D	A	F	F	B
Approach Delay		35.8			288.1			55.2			178.0	
Approach LOS		D			F			E			F	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 96.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.06
Intersection Signal Delay: 146.2 Intersection LOS: F
Intersection Capacity Utilization 144.6% ICU Level of Service H

Splits and Phases: 14: Meister Way & Metro Air Parkway

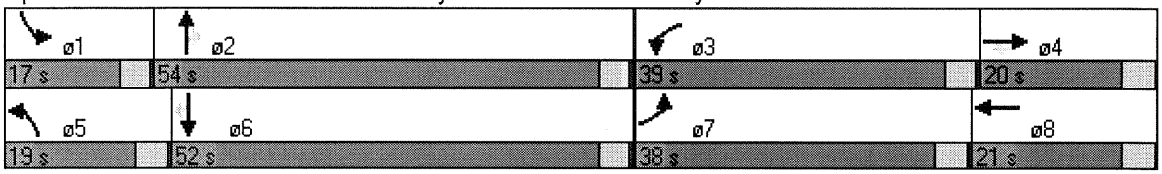


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frt			0.850		0.949				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3433	1768	0	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	3433	1768	0	1770	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			22		15				401			122
Headway 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
Volume (vph)	363	132	20	1080	27	14	238	1210	564	122	2112	308
Adj. Flow (vph)	395	143	22	1174	29	15	259	1315	613	133	2296	335
Lane Group Flow (vph)	395	143	22	1174	44	0	259	1315	613	133	2296	335
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Total Split (s)	38.0	20.0	20.0	39.0	21.0	0.0	19.0	54.0	54.0	17.0	52.0	52.0
Act Effct Green (s)	36.3	13.8	13.8	35.0	14.6		15.0	50.7	50.7	12.3	48.0	48.0
Actuated g/C Ratio	0.28	0.11	0.11	0.27	0.11		0.12	0.40	0.40	0.10	0.38	0.38
v/c Ratio	0.79	0.71	0.12	1.25	0.21		1.25	0.65	0.70	0.78	1.20	0.50
Uniform Delay, d1	42.7	54.7	0.0	46.9	34.6		56.8	31.9	10.0	56.9	40.4	18.8
Delay	50.9	55.4	19.0	150.8	36.8		167.7	32.0	11.0	66.5	129.2	19.5
LOS	D	E	B	F	D		F	C	B	E	F	B
Approach Delay		50.8			146.7			42.2			112.9	
Approach LOS		D			F			D			F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 127.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 90.8 Intersection LOS: F
Intersection Capacity Utilization 113.1% ICU Level of Service G

Splits and Phases: 14: Meister Way & Metro Air Parkway

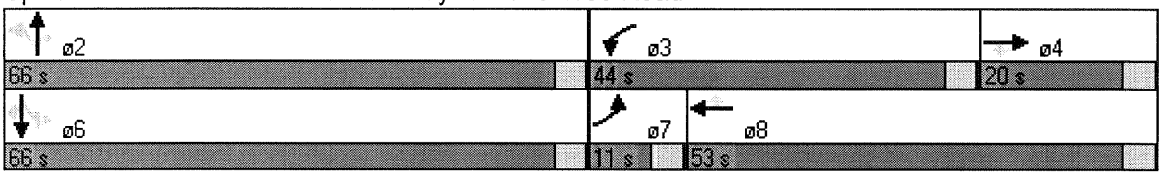


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.065			0.705		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	121	1863	1583	1313	1863	1583
Satd. Flow (RTOR)			27			483			90			254
Headway 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
Volume (vph)	60	140	25	552	571	564	98	74	83	180	830	544
Adj. Flow (vph)	65	152	27	600	621	613	107	80	90	196	902	591
Lane Group Flow (vph)	65	152	27	600	621	613	107	80	90	196	902	591
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	11.0	20.0	20.0	44.0	53.0	53.0	66.0	66.0	66.0	66.0	66.0	66.0
Act Effct Green (s)	6.9	14.2	14.2	40.1	49.5	49.5	62.0	62.0	62.0	62.0	62.0	62.0
Actuated g/C Ratio	0.05	0.11	0.11	0.31	0.39	0.39	0.48	0.48	0.48	0.48	0.48	0.48
v/c Ratio	0.69	0.74	0.14	1.09	0.86	0.68	1.81	0.09	0.11	0.31	1.00	0.66
Uniform Delay, d1	61.3	54.8	0.0	44.5	36.8	5.9	33.5	18.2	0.0	20.5	33.6	13.3
Delay	75.3	56.8	17.6	97.6	43.4	7.1	274.2	18.6	3.7	20.9	57.9	14.0
LOS	E	E	B	F	D	A	F	B	A	C	E	B
Approach Delay		57.4			49.0			112.5			38.2	
Approach LOS		E			D			F			D	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 128.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.81
Intersection Signal Delay: 49.4 Intersection LOS: D
Intersection Capacity Utilization 108.0% ICU Level of Service F

Splits and Phases: 15: Meister Way & Lone Tree Road

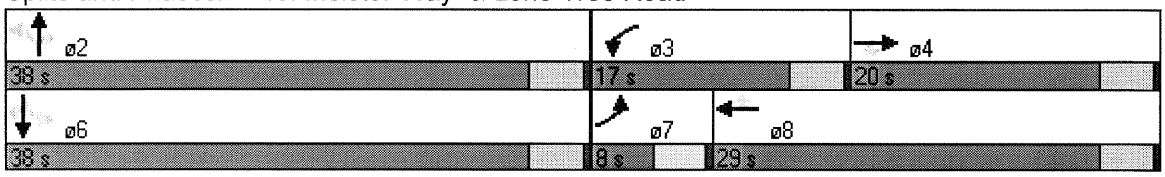


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.97	1.00	1.00
Frt			0.850			0.850		0.952	0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3227	1441	3433	1863	1583
Flt Permitted	0.950			0.950			0.118			0.680		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	220	3227	1441	2457	1863	1583
Satd. Flow (RTOR)			25			564		35	48			270
Headway 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
Volume (vph)	60	140	25	552	571	564	98	74	83	180	830	544
Adj. Flow (vph)	60	140	25	552	571	564	98	74	83	180	830	544
Lane Group Flow (vph)	60	140	25	552	571	564	98	109	48	180	830	544
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	8.0	20.0	20.0	17.0	29.0	29.0	38.0	38.0	38.0	38.0	38.0	38.0
Act Effct Green (s)	4.0	12.5	12.5	14.7	24.1	24.1	34.0	34.0	34.0	34.0	34.0	34.0
Actuated g/C Ratio	0.05	0.17	0.17	0.21	0.34	0.34	0.48	0.48	0.48	0.48	0.48	0.48
v/c Ratio	0.32	0.44	0.09	0.77	0.90	0.62	0.92	0.07	0.07	0.15	0.93	0.60
Uniform Delay, d1	34.6	27.5	0.0	27.4	23.2	0.0	18.4	7.1	0.0	11.0	18.4	6.5
Delay	34.6	26.3	10.3	42.7	35.1	2.1	89.7	8.3	4.0	11.6	37.5	7.4
LOS	C	C	B	D	D	A	F	A	A	B	D	A
Approach Delay		26.7			26.6			38.7			24.0	
Approach LOS		C			C			D			C	

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 70.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 26.3 Intersection LOS: C
Intersection Capacity Utilization 95.8% ICU Level of Service E

Splits and Phases: 15: Meister Way & Lone Tree Road

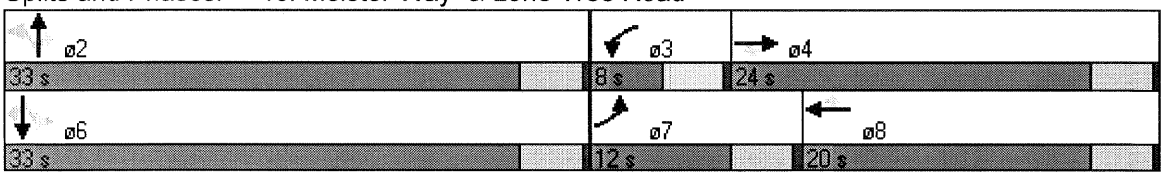


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.741			0.138		
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1380	1863	1583	257	1863	1583
Satd. Flow (RTOR)			14			74			260			176
Headway 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
Volume (vph)	533	640	17	156	267	202	20	790	520	314	23	162
Adj. Flow (vph)	579	696	18	170	290	220	22	859	565	341	25	176
Lane Group Flow (vph)	579	696	18	170	290	220	22	859	565	341	25	176
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	12.0	24.0	24.0	8.0	20.0	20.0	33.0	33.0	33.0	33.0	33.0	33.0
Act Effct Green (s)	8.0	20.0	20.0	4.0	16.0	16.0	29.0	29.0	29.0	29.0	29.0	29.0
Actuated g/C Ratio	0.12	0.31	0.31	0.06	0.25	0.25	0.45	0.45	0.45	0.45	0.45	0.45
v/c Ratio	2.66	1.21	0.04	1.56	0.63	0.49	0.04	1.03	0.66	2.97	0.03	0.22
Uniform Delay, d1	28.5	22.5	3.4	30.5	21.9	13.6	10.1	18.0	7.0	18.0	10.1	0.0
Delay	312.8	108.5	9.8	197.3	22.6	14.3	10.3	51.8	7.7	327.0	10.3	2.2
LOS	F	F	A	F	C	B	B	D	A	F	B	A
Approach Delay		198.6			63.6			34.0			206.9	
Approach LOS		F			E			C			F	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.97
Intersection Signal Delay: 116.5 Intersection LOS: F
Intersection Capacity Utilization 124.8% ICU Level of Service H

Splits and Phases: 15: Meister Way & Lone Tree Road

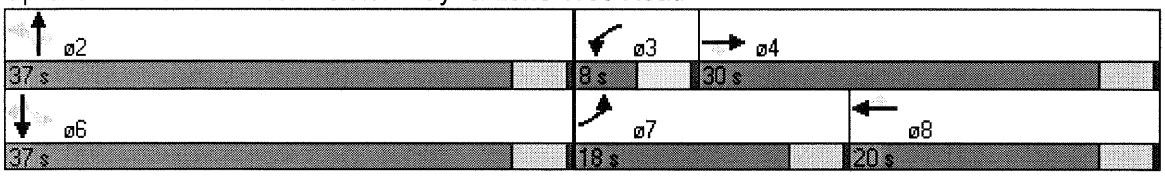


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.97	1.00	1.00
Frt			0.850			0.850		0.987	0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3346	1441	3433	1863	1583
Flt Permitted	0.950			0.950			0.742			0.210		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	1382	3346	1441	759	1863	1583
Satd. Flow (RTOR)			14			83		16	248			162
Headway 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
Volume (vph)	533	640	17	156	267	202	20	790	520	314	23	162
Adj. Flow (vph)	533	640	17	156	267	202	20	790	520	314	23	162
Lane Group Flow (vph)	533	640	17	156	267	202	20	865	445	314	23	162
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	18.0	30.0	30.0	8.0	20.0	20.0	37.0	37.0	37.0	37.0	37.0	37.0
Act Effct Green (s)	13.6	26.1	26.1	4.0	16.4	16.4	31.6	31.6	31.6	31.6	31.6	31.6
Actuated g/C Ratio	0.18	0.35	0.35	0.05	0.22	0.22	0.43	0.43	0.43	0.43	0.43	0.43
v/c Ratio	0.84	0.97	0.03	0.83	0.64	0.48	0.03	0.60	0.59	0.96	0.03	0.21
Uniform Delay, d1	28.9	23.4	2.7	34.5	25.9	14.2	12.2	15.8	6.4	20.4	12.1	0.0
Delay	34.3	51.2	9.5	60.3	28.6	15.8	12.2	16.0	6.9	49.6	12.1	2.5
LOS	C	D	A	E	C	B	B	B	A	D	B	A
Approach Delay		43.0			32.4			12.9			32.6	
Approach LOS		D			C			B			C	

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 73.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 28.8 Intersection LOS: C
Intersection Capacity Utilization 87.8% ICU Level of Service D

Splits and Phases: 15: Meister Way & Lone Tree Road

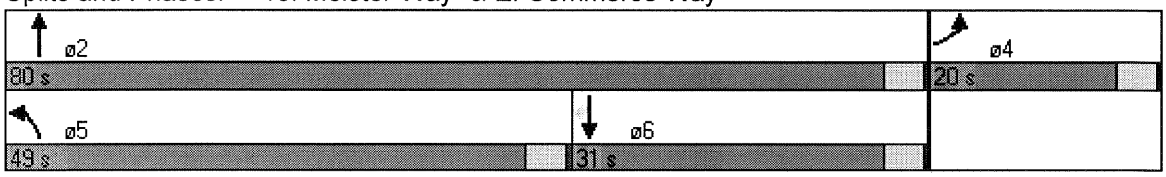


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	0.893					0.850
Flt Protected	0.990		0.950			
Satd. Flow (prot)	1647	0	1770	3539	3539	1583
Flt Permitted	0.990		0.950			
Satd. Flow (perm)	1647	0	1770	3539	3539	1583
Satd. Flow (RTOR)	164					203
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	80	305	810	815	958	415
Adj. Flow (vph)	87	332	880	886	1041	451
Lane Group Flow (vph)	419	0	880	886	1041	451
Turn Type			Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Total Split (s)	20.0	0.0	49.0	80.0	31.0	31.0
Act Effct Green (s)	16.0		45.0	76.0	27.0	27.0
Actuated g/C Ratio	0.16		0.45	0.76	0.27	0.27
v/c Ratio	1.04		1.10	0.33	1.09	0.78
Uniform Delay, d1	24.8		27.5	3.8	36.5	17.8
Delay	70.2		79.5	3.9	81.0	21.1
LOS	E		E	A	F	C
Approach Delay	70.2			41.5	62.9	
Approach LOS	E			D	E	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 53.5 Intersection LOS: D
Intersection Capacity Utilization 112.8% ICU Level of Service G

Splits and Phases: 16: Meister Way & E. Commerce Way

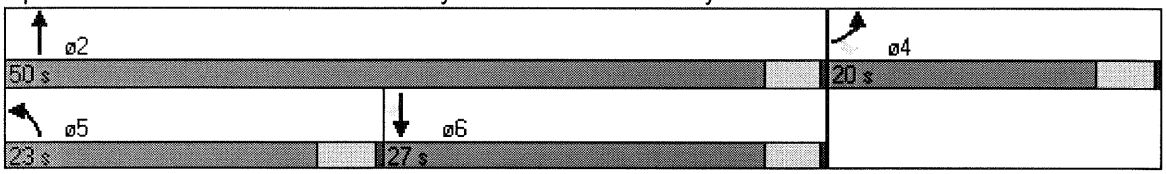


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	3433	1863	3539	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	3433	1863	3539	1583
Satd. Flow (RTOR)		332				315
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	80	305	810	815	958	415
Adj. Flow (vph)	87	332	880	886	1041	451
Lane Group Flow (vph)	87	332	880	886	1041	451
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Total Split (s)	20.0	20.0	23.0	50.0	27.0	27.0
Act Effct Green (s)	9.0	9.0	18.4	44.4	22.0	22.0
Actuated g/C Ratio	0.15	0.15	0.30	0.72	0.36	0.36
v/c Ratio	0.34	0.64	0.86	0.66	0.82	0.59
Uniform Delay, d1	23.5	0.0	20.2	4.5	17.9	4.3
Delay	24.1	3.6	28.2	5.7	22.7	5.8
LOS	C	A	C	A	C	A
Approach Delay	7.8			16.9	17.6	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 61.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 16.1 Intersection LOS: B
Intersection Capacity Utilization 68.7% ICU Level of Service B

Splits and Phases: 16: Meister Way & E. Commerce Way

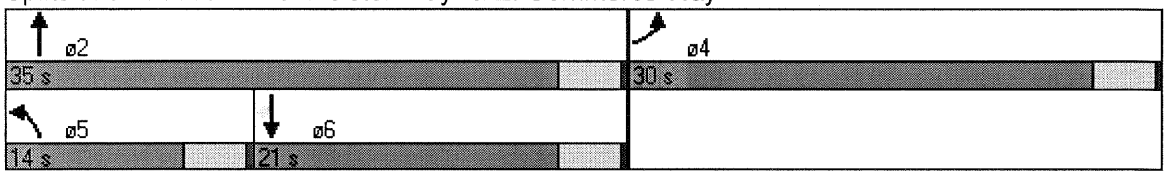


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	0.909					0.850
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1666	0	1770	3539	3539	1583
Flt Permitted	0.984		0.950			
Satd. Flow (perm)	1666	0	1770	3539	3539	1583
Satd. Flow (RTOR)	189					150
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	372	760	435	830	903	190
Adj. Flow (vph)	404	826	473	902	982	207
Lane Group Flow (vph)	1230	0	473	902	982	207
Turn Type			Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases						6
Total Split (s)	30.0	0.0	14.0	35.0	21.0	21.0
Act Effct Green (s)	26.0		10.0	31.0	17.0	17.0
Actuated g/C Ratio	0.40		0.15	0.48	0.26	0.26
v/c Ratio	1.58		1.74	0.53	1.06	0.39
Uniform Delay, d1	14.8		27.5	11.9	24.0	5.1
Delay	192.1		221.8	12.2	62.3	7.0
LOS	F		F	B	E	A
Approach Delay	192.1			84.3	52.7	
Approach LOS	F			F	D	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.74
Intersection Signal Delay: 109.3 Intersection LOS: F
Intersection Capacity Utilization 136.5% ICU Level of Service H

Splits and Phases: 16: Meister Way & E. Commerce Way

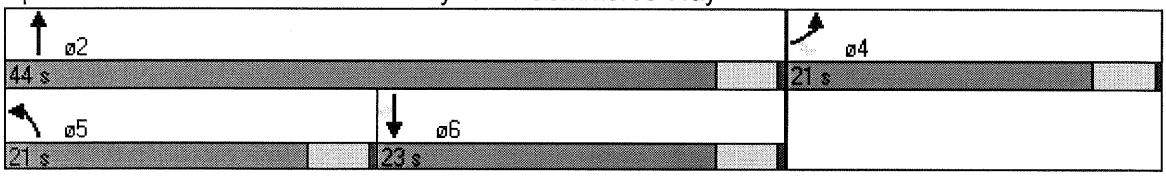


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	3433	1863	3539	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	3433	1863	3539	1583
Satd. Flow (RTOR)		521				157
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	372	760	435	830	903	190
Adj. Flow (vph)	404	826	473	902	982	207
Lane Group Flow (vph)	404	826	473	902	982	207
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Total Split (s)	21.0	21.0	21.0	44.0	23.0	23.0
Act Effct Green (s)	17.1	17.1	13.3	36.7	19.4	19.4
Actuated g/C Ratio	0.28	0.28	0.22	0.59	0.31	0.31
v/c Ratio	0.83	1.01	0.64	0.81	0.89	0.34
Uniform Delay, d1	21.0	8.0	22.0	9.8	20.1	3.6
Delay	34.3	40.1	22.0	11.6	29.3	5.9
LOS	C	D	C	B	C	A
Approach Delay	38.2			15.2	25.2	
Approach LOS	D			B	C	

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 61.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 25.8 Intersection LOS: C
Intersection Capacity Utilization 84.9% ICU Level of Service D

Splits and Phases: 16: Meister Way & E. Commerce Way



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	486	119	290	832	233	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	528	129	315	904	253	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	1220				1953	767
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	8				0	92
cM capacity (veh/h)	572				5	402

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	658	1220	253	30
Volume Left	528	0	253	0
Volume Right	0	904	0	30
cSH	572	1700	5	402
Volume to Capacity	0.92	0.72	47.32	0.08
Queue Length (ft)	290	0	Err	6
Control Delay (s)	48.1	0.0	Err	14.7
Lane LOS	E		F	B
Approach Delay (s)	48.1	0.0	8927.9	
Approach LOS			F	

Intersection Summary			
Average Delay	1186.8		
Intersection Capacity Utilization	132.3%	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)	294	250	148	415	1484	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	320	272	161	451	1613	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	612				1297	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	67				0	95
cM capacity (veh/h)	967				120	661

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	591	612	1613	34
Volume Left	320	0	1613	0
Volume Right	0	451	0	34
cSH	967	1700	120	661
Volume to Capacity	0.33	0.36	13.49	0.05
Queue Length (ft)	36	0	Err	4
Control Delay (s)	7.6	0.0	Err	10.7
Lane LOS	A		F	B
Approach Delay (s)	7.6	0.0	9794.6	
Approach LOS			F	

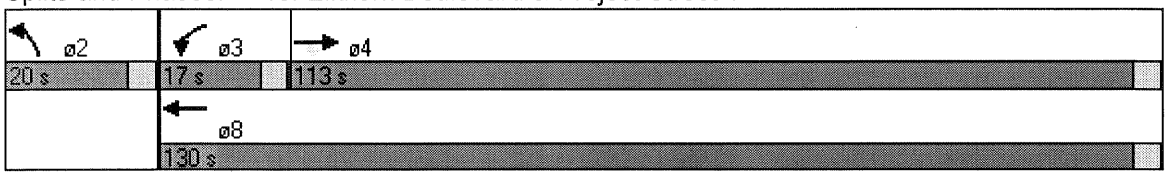
Intersection Summary			
Average Delay	5660.9		
Intersection Capacity Utilization	167.6%	ICU Level of Service	H

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱	↰	↑↑↑	Y	
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	0.91	1.00	1.00
Frt		0.850			0.948	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	5085	1583	1770	5085	1713	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	5085	1583	1770	5085	1713	0
Satd. Flow (RTOR)		18			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	557	18	77	4512	98	62
Adj. Flow (vph)	557	18	77	4512	98	62
Lane Group Flow (vph)	557	18	77	4512	160	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	113.0	113.0	17.0	130.0	20.0	0.0
Act Effct Green (s)	111.1	111.1	10.9	126.0	15.1	
Actuated g/C Ratio	0.75	0.75	0.07	0.85	0.10	
v/c Ratio	0.15	0.02	0.60	1.05	0.85	
Uniform Delay, d1	5.4	0.0	66.9	11.5	58.8	
Delay	5.7	2.2	67.0	43.2	71.1	
LOS	A	A	E	D	E	
Approach Delay	5.6			43.6	71.1	
Approach LOS	A			D	E	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 149.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 40.3 Intersection LOS: D
Intersection Capacity Utilization 103.1% ICU Level of Service F

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1

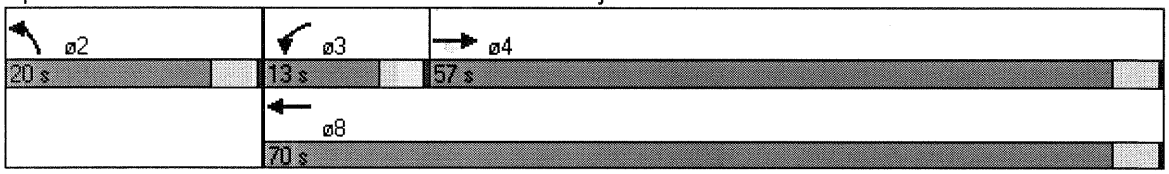


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⋔	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.948	
Flt Protected			0.950		0.970	
Satd. Flow (prot)	6408	1583	1770	6408	1713	0
Flt Permitted			0.950		0.970	
Satd. Flow (perm)	6408	1583	1770	6408	1713	0
Satd. Flow (RTOR)		18			31	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	557	18	77	4512	98	62
Adj. Flow (vph)	557	18	77	4512	98	62
Lane Group Flow (vph)	557	18	77	4512	160	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	57.0	57.0	13.0	70.0	20.0	0.0
Act Effct Green (s)	56.2	56.2	8.0	66.1	11.5	
Actuated g/C Ratio	0.66	0.66	0.09	0.77	0.13	
v/c Ratio	0.13	0.02	0.47	0.91	0.62	
Uniform Delay, d1	5.8	0.0	38.3	7.4	28.4	
Delay	6.6	3.4	37.9	11.1	28.0	
LOS	A	A	D	B	C	
Approach Delay	6.5			11.5	28.0	
Approach LOS	A			B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 11.5 Intersection LOS: B
Intersection Capacity Utilization 81.3% ICU Level of Service D

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1

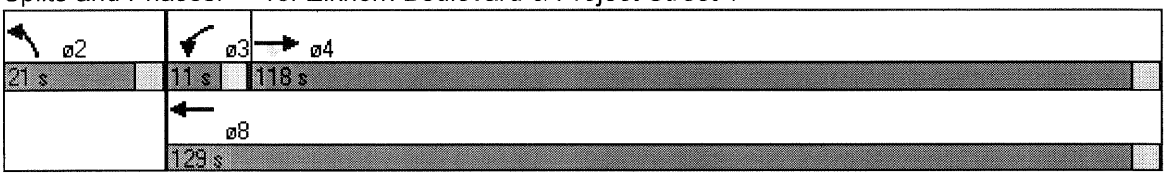


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt		0.850			0.896	
Flt Protected			0.950		0.989	
Satd. Flow (prot)	5085	1583	1770	5085	1651	0
Flt Permitted			0.950		0.989	
Satd. Flow (perm)	5085	1583	1770	5085	1651	0
Satd. Flow (RTOR)		71			63	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4850	115	92	1007	36	122
Adj. Flow (vph)	4850	115	92	1007	36	122
Lane Group Flow (vph)	4850	115	92	1007	158	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	118.0	118.0	11.0	129.0	21.0	0.0
Act Effct Green (s)	114.1	114.1	7.0	125.0	13.0	
Actuated g/C Ratio	0.78	0.78	0.05	0.86	0.09	
v/c Ratio	1.22	0.09	1.08	0.23	0.77	
Uniform Delay, d1	16.0	1.4	69.6	1.9	38.8	
Delay	122.9	1.9	162.8	2.1	38.8	
LOS	F	A	F	A	D	
Approach Delay	120.1			15.5	38.8	
Approach LOS	F			B	D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 146.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 99.6 Intersection LOS: F
Intersection Capacity Utilization 118.3% ICU Level of Service G

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1

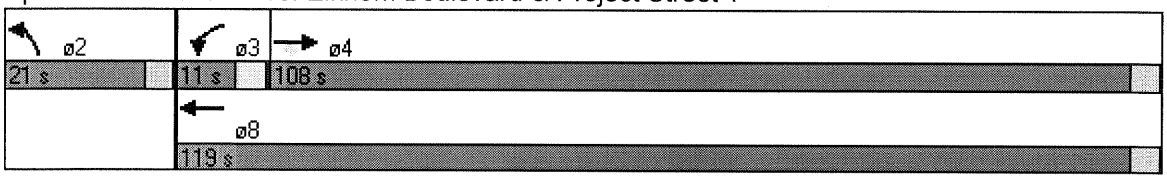


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⅄	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.896	
Flt Protected			0.950		0.989	
Satd. Flow (prot)	6408	1583	1770	6408	1651	0
Flt Permitted			0.950		0.989	
Satd. Flow (perm)	6408	1583	1770	6408	1651	0
Satd. Flow (RTOR)		90			69	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4850	115	92	1007	36	122
Adj. Flow (vph)	4850	115	92	1007	36	122
Lane Group Flow (vph)	4850	115	92	1007	158	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	108.0	108.0	11.0	119.0	21.0	0.0
Act Effct Green (s)	104.0	104.0	7.0	115.1	12.2	
Actuated g/C Ratio	0.77	0.77	0.05	0.85	0.09	
v/c Ratio	0.98	0.09	1.00	0.18	0.75	
Uniform Delay, d1	14.8	0.8	64.2	1.8	33.4	
Delay	26.1	1.4	137.5	2.0	33.5	
LOS	C	A	F	A	C	
Approach Delay	25.5			13.3	33.5	
Approach LOS	C			B	C	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 135.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 23.6 Intersection LOS: C
Intersection Capacity Utilization 94.9% ICU Level of Service E

Splits and Phases: 18: Elkhorn Boulevard & Project Street 1

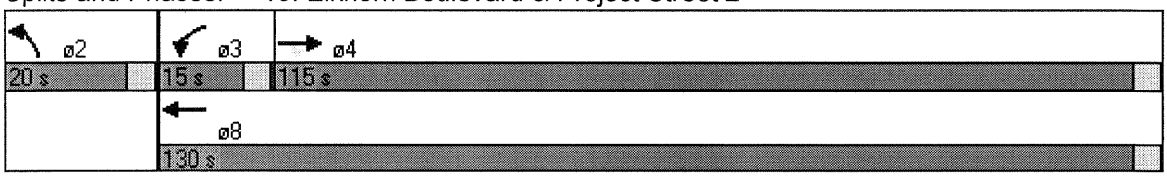


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt		0.850			0.956	
Flt Protected			0.950		0.967	
Satd. Flow (prot)	5085	1583	1770	5085	1722	0
Flt Permitted			0.950		0.967	
Satd. Flow (perm)	5085	1583	1770	5085	1722	0
Satd. Flow (RTOR)		22			13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	523	22	64	4549	92	44
Adj. Flow (vph)	523	22	64	4549	92	44
Lane Group Flow (vph)	523	22	64	4549	136	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	115.0	115.0	15.0	130.0	20.0	0.0
Act Effct Green (s)	114.6	114.6	9.7	126.1	14.3	
Actuated g/C Ratio	0.77	0.77	0.06	0.85	0.10	
v/c Ratio	0.13	0.02	0.56	1.05	0.77	
Uniform Delay, d1	4.4	0.0	68.9	11.1	59.4	
Delay	4.8	1.8	68.0	45.1	63.0	
LOS	A	A	E	D	E	
Approach Delay	4.7			45.5	63.0	
Approach LOS	A			D	E	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 41.7 Intersection LOS: D
Intersection Capacity Utilization 102.3% ICU Level of Service F

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2

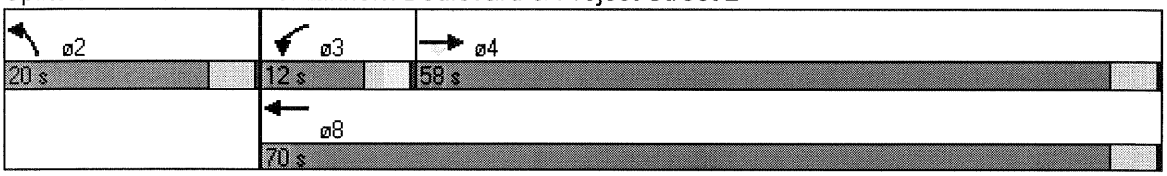


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⋎	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.956	
Flt Protected			0.950		0.967	
Satd. Flow (prot)	6408	1583	1770	6408	1722	0
Flt Permitted			0.950		0.967	
Satd. Flow (perm)	6408	1583	1770	6408	1722	0
Satd. Flow (RTOR)		22			23	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	523	22	64	4549	92	44
Adj. Flow (vph)	523	22	64	4549	92	44
Lane Group Flow (vph)	523	22	64	4549	136	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	58.0	58.0	12.0	70.0	20.0	0.0
Act Effct Green (s)	56.8	56.8	7.3	66.1	10.8	
Actuated g/C Ratio	0.67	0.67	0.08	0.78	0.13	
v/c Ratio	0.12	0.02	0.43	0.91	0.57	
Uniform Delay, d1	5.3	0.0	38.3	7.1	29.1	
Delay	6.0	3.0	38.2	11.0	28.7	
LOS	A	A	D	B	C	
Approach Delay	5.9			11.4	28.7	
Approach LOS	A			B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 80.4% ICU Level of Service D

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2

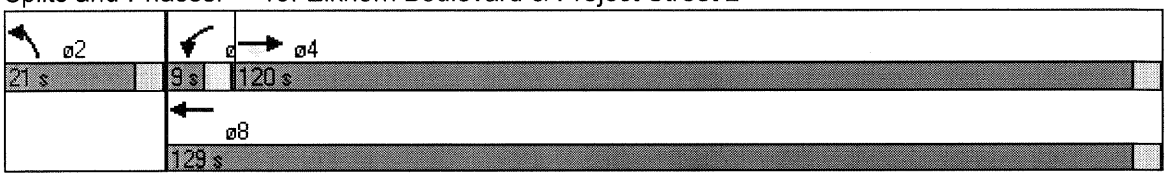


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱	↰	↑↑↑	⅄	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt		0.850			0.906	
Flt Protected			0.950		0.985	
Satd. Flow (prot)	5085	1583	1770	5085	1662	0
Flt Permitted			0.950		0.985	
Satd. Flow (perm)	5085	1583	1770	5085	1662	0
Satd. Flow (RTOR)		70			45	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4868	107	78	963	42	98
Adj. Flow (vph)	4868	107	78	963	42	98
Lane Group Flow (vph)	4868	107	78	963	140	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	120.0	120.0	9.0	129.0	21.0	0.0
Act Effct Green (s)	116.1	116.1	5.0	125.0	13.0	
Actuated g/C Ratio	0.79	0.79	0.03	0.86	0.09	
v/c Ratio	1.21	0.08	1.30	0.22	0.74	
Uniform Delay, d1	15.0	1.1	70.6	1.9	43.7	
Delay	115.7	1.6	214.2	2.0	43.7	
LOS	F	A	F	A	D	
Approach Delay	113.2			17.9	43.7	
Approach LOS	F			B	D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 146.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 95.5 Intersection LOS: F
Intersection Capacity Utilization 116.7% ICU Level of Service G

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2

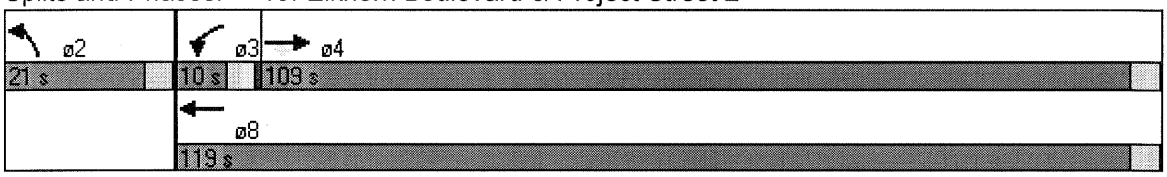


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⅄	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.906	
Flt Protected			0.950		0.985	
Satd. Flow (prot)	6408	1583	1770	6408	1662	0
Flt Permitted			0.950		0.985	
Satd. Flow (perm)	6408	1583	1770	6408	1662	0
Satd. Flow (RTOR)		86			59	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4868	107	78	963	42	98
Adj. Flow (vph)	4868	107	78	963	42	98
Lane Group Flow (vph)	4868	107	78	963	140	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	109.0	109.0	10.0	119.0	21.0	0.0
Act Effct Green (s)	105.1	105.1	6.0	115.1	11.7	
Actuated g/C Ratio	0.78	0.78	0.04	0.85	0.09	
v/c Ratio	0.97	0.09	0.99	0.18	0.71	
Uniform Delay, d1	13.6	0.7	64.3	1.7	34.2	
Delay	23.0	1.3	139.1	1.9	34.2	
LOS	C	A	F	A	C	
Approach Delay	22.6			12.2	34.2	
Approach LOS	C			B	C	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 134.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 21.1 Intersection LOS: C
Intersection Capacity Utilization 93.2% ICU Level of Service E

Splits and Phases: 19: Elkhorn Boulevard & Project Street 2

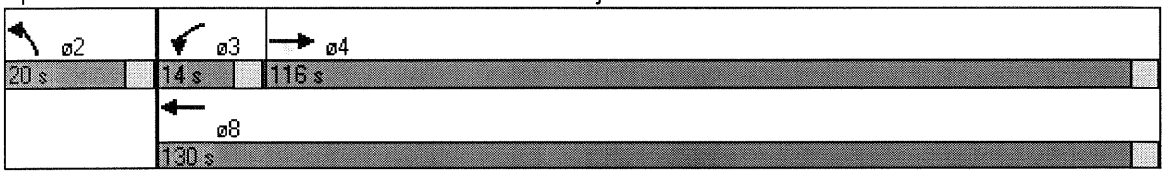


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt		0.850			0.956	
Flt Protected			0.950		0.967	
Satd. Flow (prot)	5085	1583	1770	5085	1722	0
Flt Permitted			0.950		0.967	
Satd. Flow (perm)	5085	1583	1770	5085	1722	0
Satd. Flow (RTOR)		29			13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	496	29	57	4589	96	46
Adj. Flow (vph)	496	29	57	4589	96	46
Lane Group Flow (vph)	496	29	57	4589	142	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	116.0	116.0	14.0	130.0	20.0	0.0
Act Effct Green (s)	115.2	115.2	9.0	126.0	14.5	
Actuated g/C Ratio	0.78	0.78	0.06	0.85	0.10	
v/c Ratio	0.13	0.02	0.54	1.06	0.79	
Uniform Delay, d1	4.3	0.0	69.5	11.3	59.8	
Delay	4.7	1.6	68.5	49.8	65.5	
LOS	A	A	E	D	E	
Approach Delay	4.5			50.0	65.5	
Approach LOS	A			D	E	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 45.9 Intersection LOS: D
Intersection Capacity Utilization 103.5% ICU Level of Service F

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3

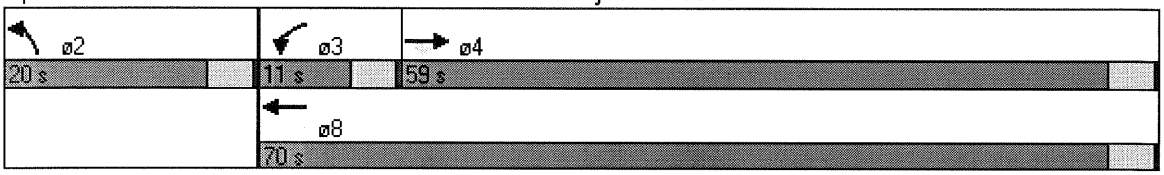


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⋔	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.956	
Flt Protected			0.950		0.967	
Satd. Flow (prot)	6408	1583	1770	6408	1722	0
Flt Permitted			0.950		0.967	
Satd. Flow (perm)	6408	1583	1770	6408	1722	0
Satd. Flow (RTOR)		29			23	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	496	29	57	4589	96	46
Adj. Flow (vph)	496	29	57	4589	96	46
Lane Group Flow (vph)	496	29	57	4589	142	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	59.0	59.0	11.0	70.0	20.0	0.0
Act Effct Green (s)	59.7	59.7	6.7	66.1	11.0	
Actuated g/C Ratio	0.70	0.70	0.08	0.78	0.13	
v/c Ratio	0.11	0.03	0.43	0.92	0.58	
Uniform Delay, d1	4.6	0.0	40.7	7.3	29.8	
Delay	5.2	2.6	39.6	11.9	29.0	
LOS	A	A	D	B	C	
Approach Delay	5.1			12.2	29.0	
Approach LOS	A			B	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 11.9 — Intersection LOS: B
Intersection Capacity Utilization 81.3% — ICU Level of Service D

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3

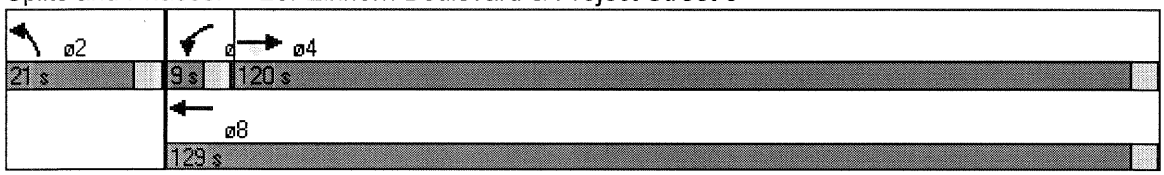


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt		0.850			0.914	
Flt Protected			0.950		0.982	
Satd. Flow (prot)	5085	1583	1770	5085	1672	0
Flt Permitted			0.950		0.982	
Satd. Flow (perm)	5085	1583	1770	5085	1672	0
Satd. Flow (RTOR)		73			45	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4887	112	72	931	51	90
Adj. Flow (vph)	4887	112	72	931	51	90
Lane Group Flow (vph)	4887	112	72	931	141	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	120.0	120.0	9.0	129.0	21.0	0.0
Act Effct Green (s)	116.1	116.1	5.0	125.1	13.1	
Actuated g/C Ratio	0.79	0.79	0.03	0.86	0.09	
v/c Ratio	1.21	0.09	1.20	0.21	0.74	
Uniform Delay, d1	15.0	1.1	70.6	1.9	43.8	
Delay	117.9	1.5	196.3	2.0	44.0	
LOS	F	A	F	A	D	
Approach Delay	115.2			16.0	44.0	
Approach LOS	F			B	D	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 146.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 97.4 Intersection LOS: F
Intersection Capacity Utilization 116.8% ICU Level of Service G

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3

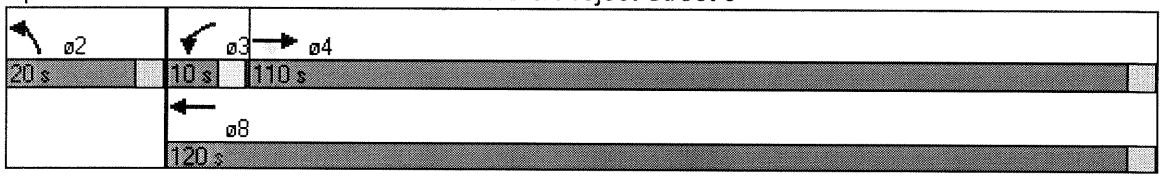


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↱	↰	↑↑↑↑	⋎	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.86	1.00	1.00	0.86	1.00	1.00
Frt		0.850			0.914	
Flt Protected			0.950		0.982	
Satd. Flow (prot)	6408	1583	1770	6408	1672	0
Flt Permitted			0.950		0.982	
Satd. Flow (perm)	6408	1583	1770	6408	1672	0
Satd. Flow (RTOR)		92			51	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	4887	112	72	931	51	90
Adj. Flow (vph)	4887	112	72	931	51	90
Lane Group Flow (vph)	4887	112	72	931	141	0
Turn Type		Perm	Prot			
Protected Phases	4		3	8	2	
Permitted Phases		4				
Total Split (s)	110.0	110.0	10.0	120.0	20.0	0.0
Act Effct Green (s)	106.1	106.1	6.0	116.1	12.1	
Actuated g/C Ratio	0.78	0.78	0.04	0.85	0.09	
v/c Ratio	0.98	0.09	0.92	0.17	0.72	
Uniform Delay, d1	14.0	0.6	64.9	1.7	38.2	
Delay	23.8	1.2	128.2	1.9	38.3	
LOS	C	A	F	A	D	
Approach Delay	23.3			11.0	38.3	
Approach LOS	C			B	D	

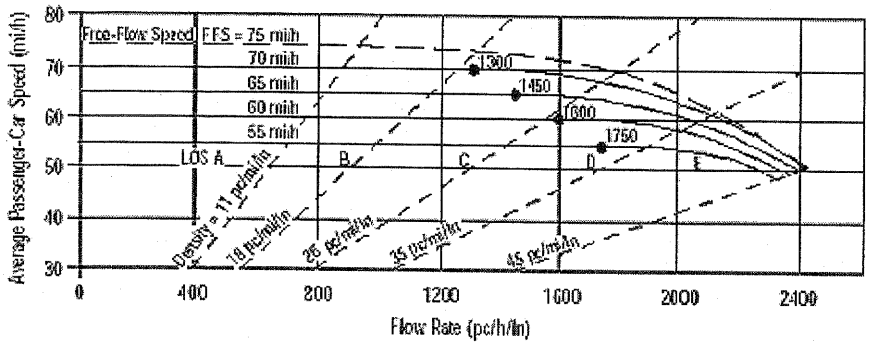
Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 136.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 93.2% ICU Level of Service E

Splits and Phases: 20: Elkhorn Boulevard & Project Street 3



BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6231 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	3728	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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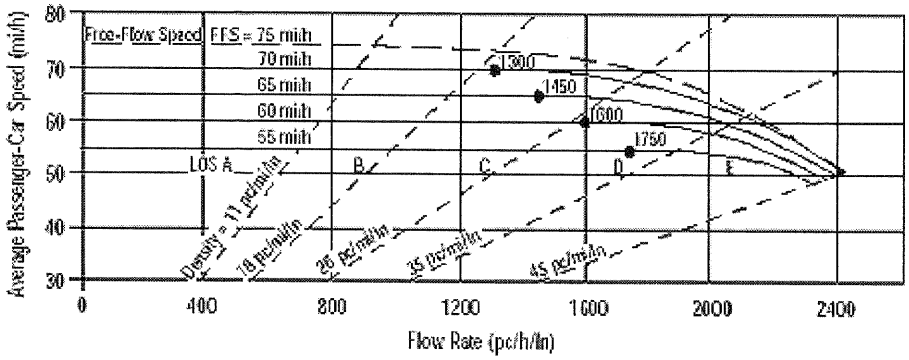
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/07
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Proj Mit

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6231 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1864	pc/h/ln
S	63.3	mi/h
D = v_p / S	29.4	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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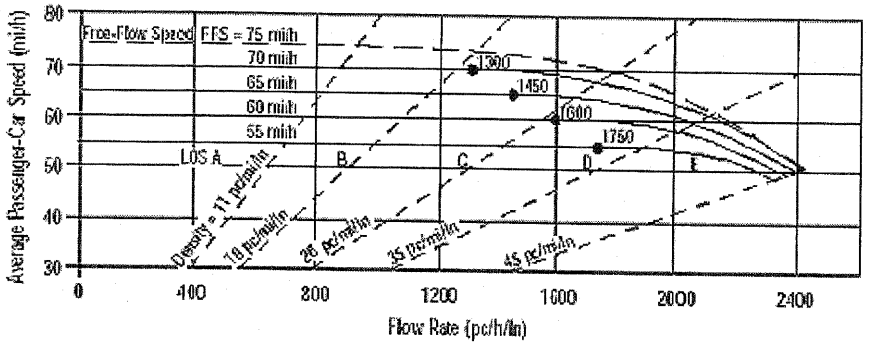
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3772 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2257	pc/h/ln
S	55.4	mi/h
D = v_p / S	40.8	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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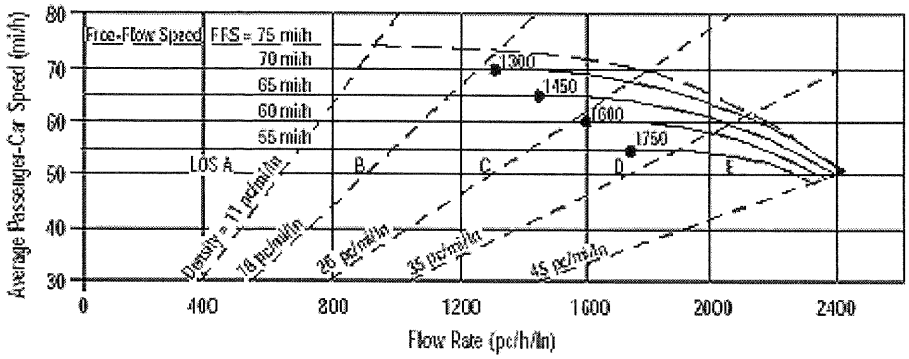

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Proj Mit

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3772 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1128	pc/h/ln
S	65.0	mi/h
D = v_p / S	17.4	pc/mi/ln
LOS	B	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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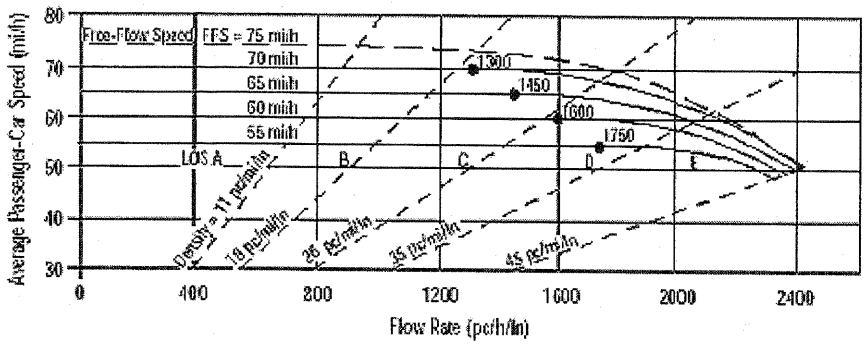
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	9845 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2945	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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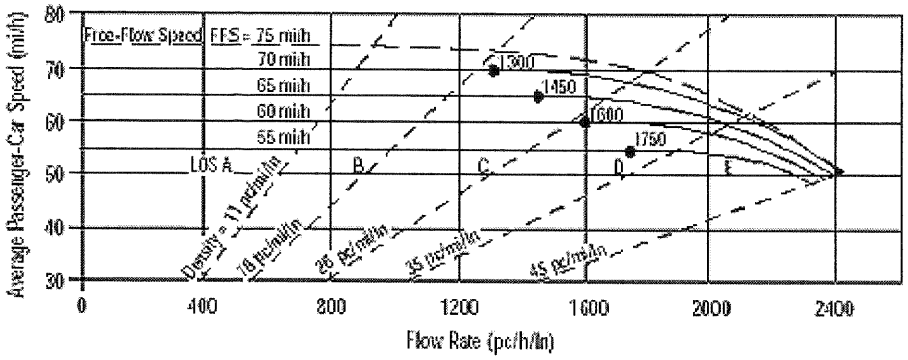
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	9845 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1964	pc/h/ln
S	62.0	mi/h
D = v_p / S	31.7	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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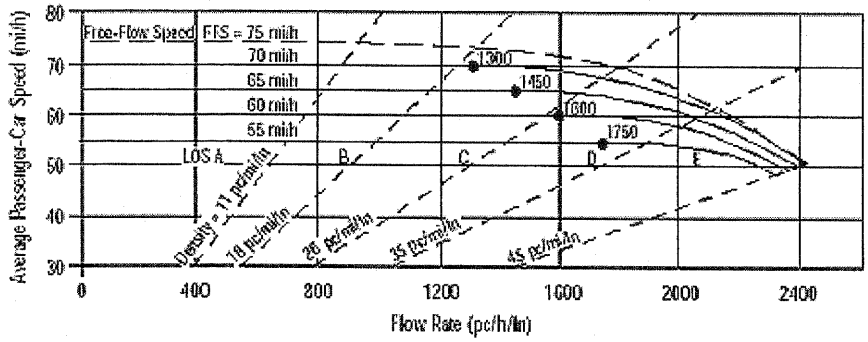
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6334 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1895	pc/h/ln
S	63.0	mi/h
D = v_p / S	30.1	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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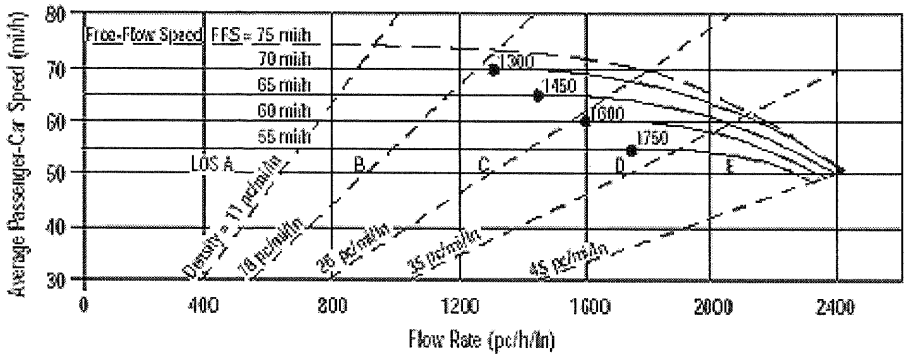
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6334 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1263	pc/h/ln
S	65.0	mi/h
D = v_p / S	19.4	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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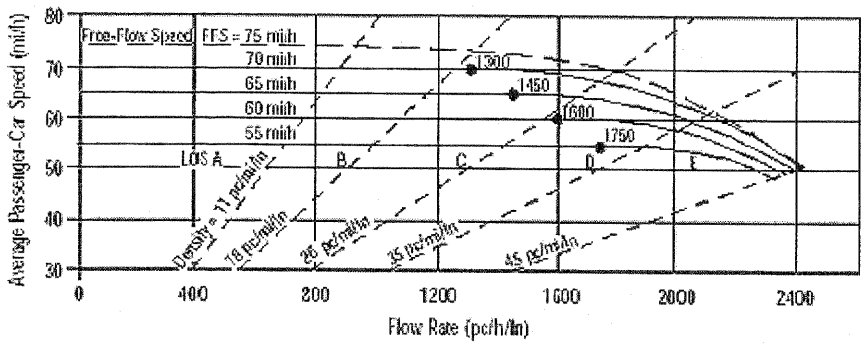
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	10527 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	3149	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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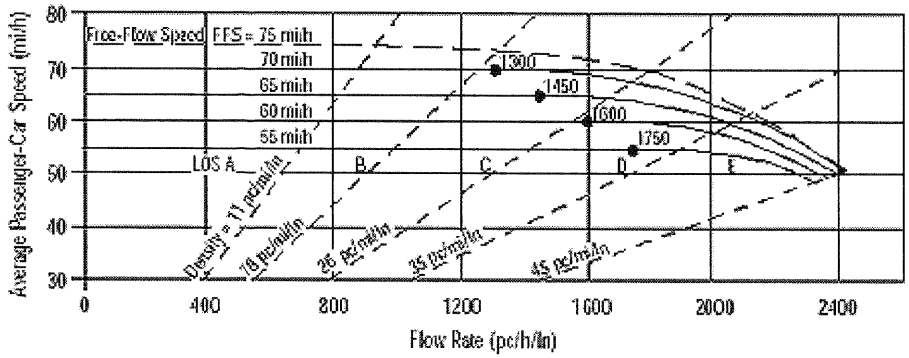
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	10527 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2100	pc/h/ln
S	59.5	mi/h
D = v_p / S	35.3	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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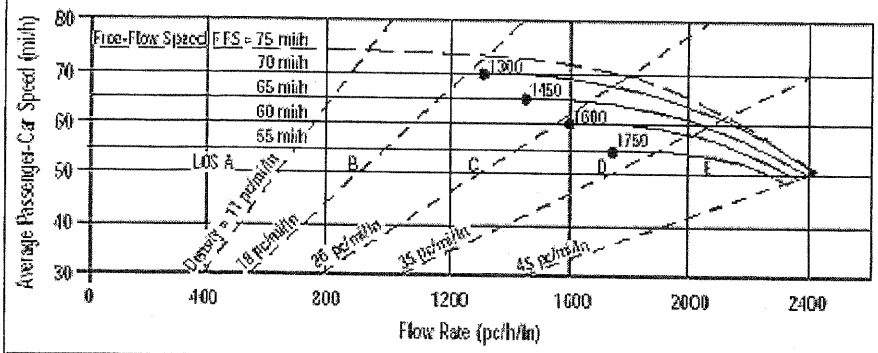

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7412 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2217	pc/h/ln
S	56.6	mi/h
D = v_p / S	39.2	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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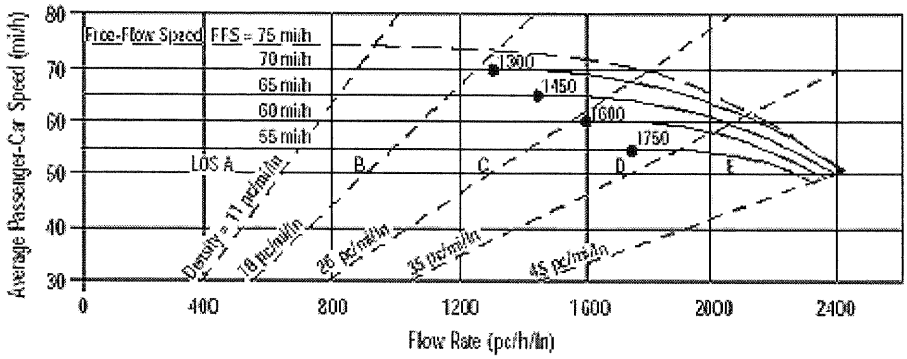

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7412 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1478	pc/h/ln
S	65.0	mi/h
D = v_p / S	22.7	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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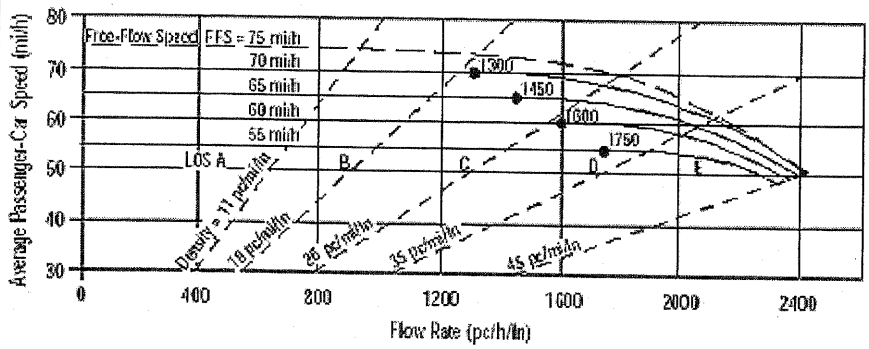

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2272 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1359	pc/h/ln
S	65.0	mi/h
D = v_p / S	20.9	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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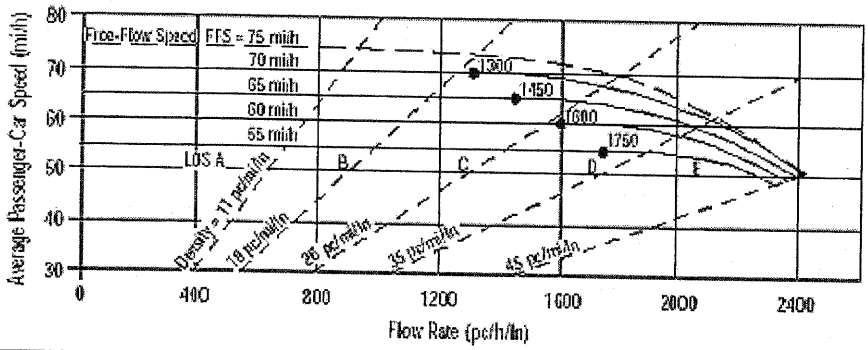

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2828 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1692	pc/h/ln
S	64.6	mi/h
D = v_p / S	26.2	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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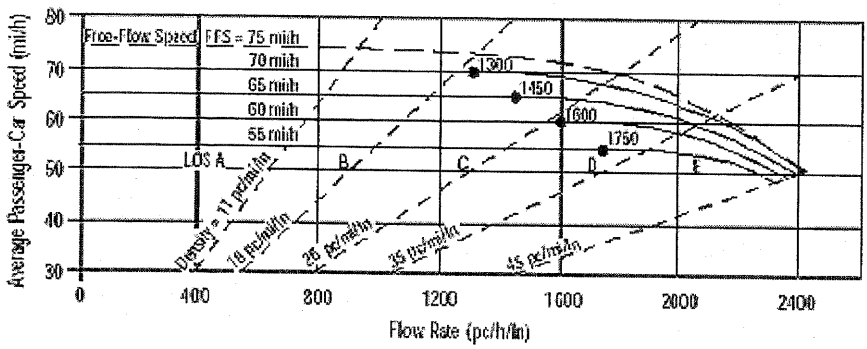
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	4171 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1664	pc/h/ln
S	64.7	mi/h
D = v_p / S	25.7	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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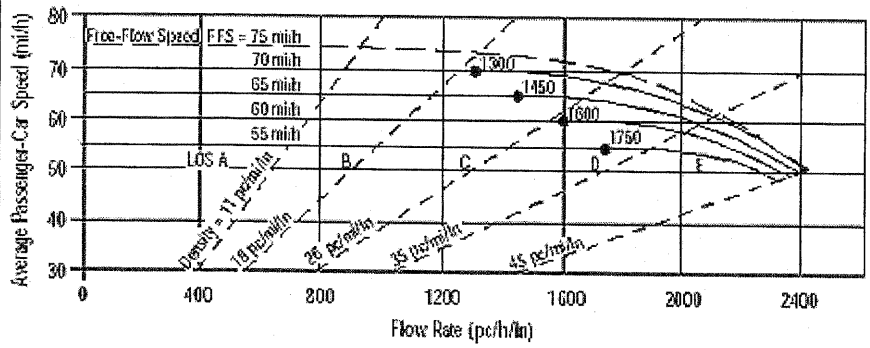
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	A.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3119 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1244	pc/h/ln
S	65.0	mi/h
D = v_p / S	19.1	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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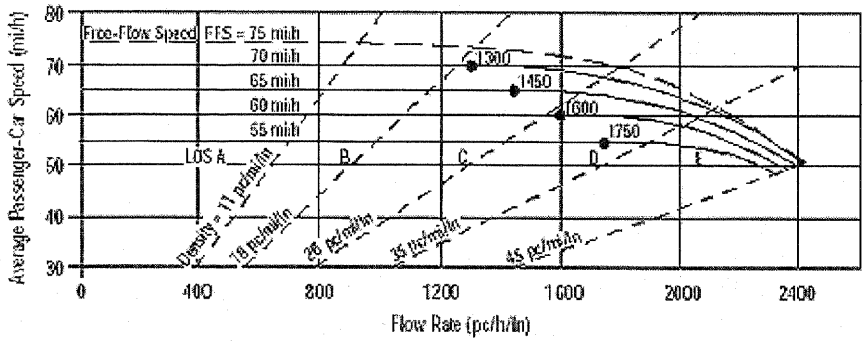
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3896 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2331	pc/h/ln
S	52.9	mi/h
D = v_p / S	44.1	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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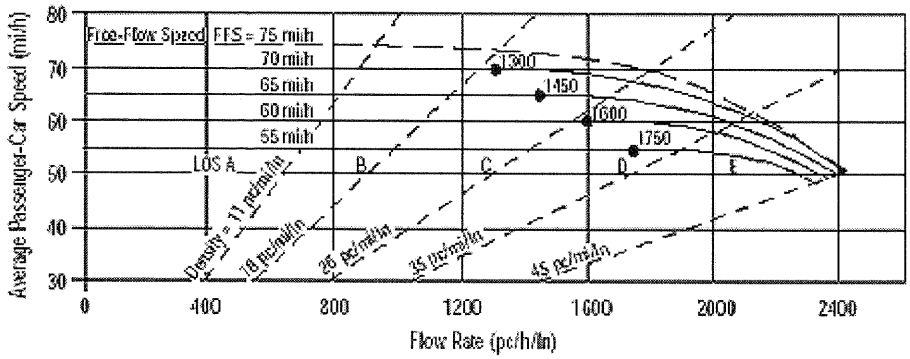

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3896 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1166	pc/h/ln
S	65.0	mi/h
D = v_p / S	17.9	pc/mi/ln
LOS	B	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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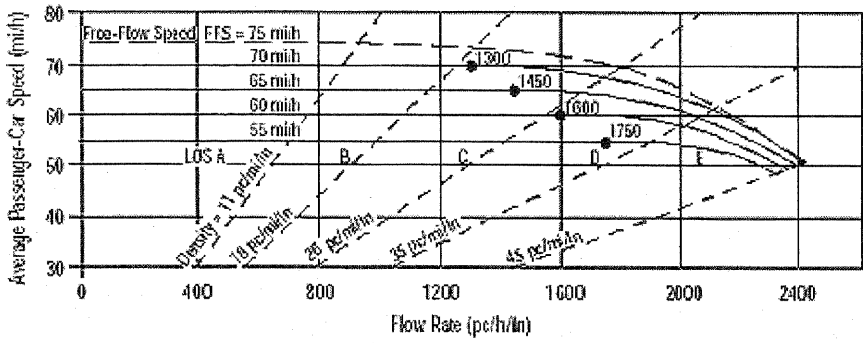

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7340 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	4392	pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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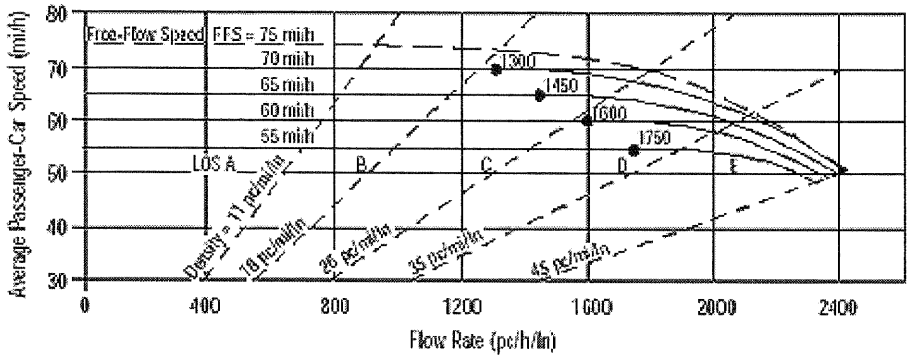
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	East of Powerline Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + PROJ MIT

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7340 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2196	pc/h/ln
S	57.2	mi/h
D = v_p / S	38.4	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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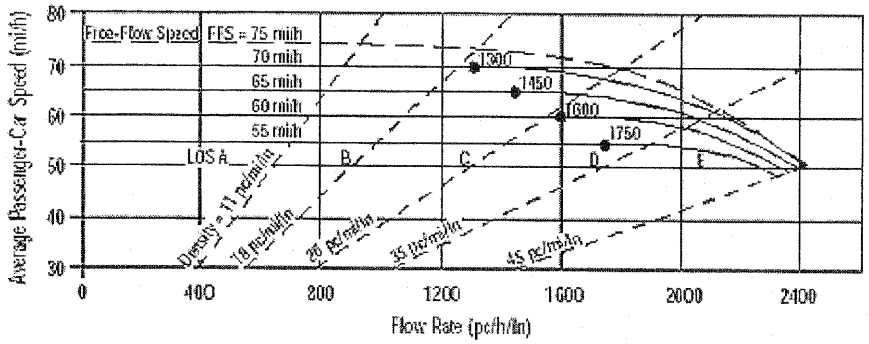
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6478 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1938	pc/h/ln
S	62.4	mi/h
D = v_p / S	31.1	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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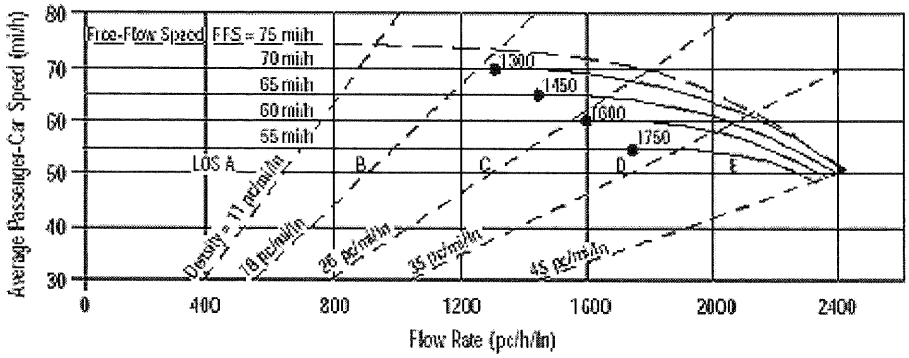
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	6478 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1292	pc/h/ln
S	65.0	mi/h
D = v_p / S	19.9	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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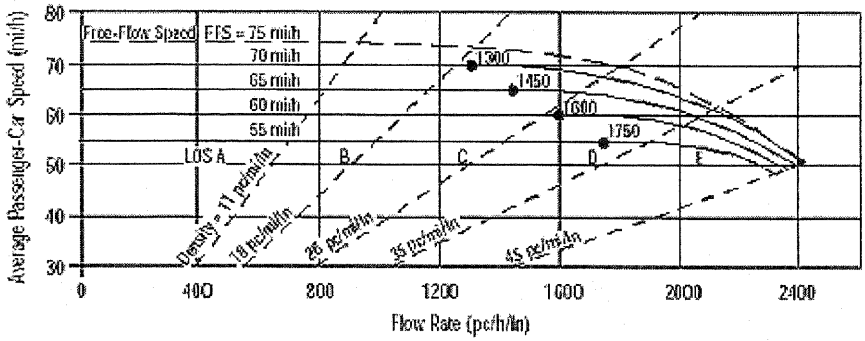
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative+Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	10240 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) 3063		pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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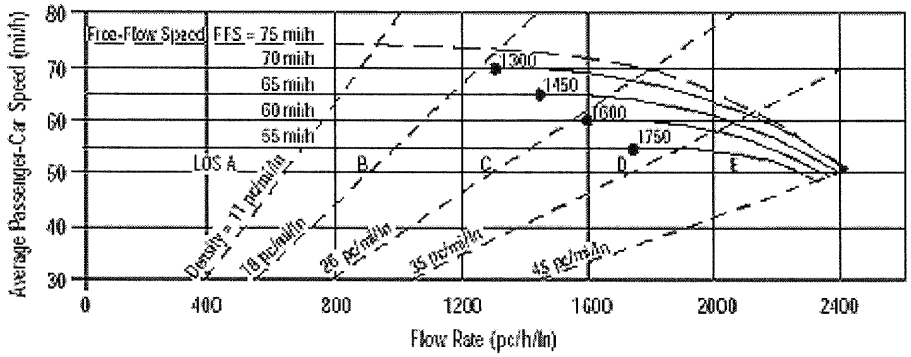
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of Del Paso Road
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	10240 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2042	pc/h/ln
S	60.7	mi/h
D = v_p / S	33.6	pc/mi/ln
LOS	D	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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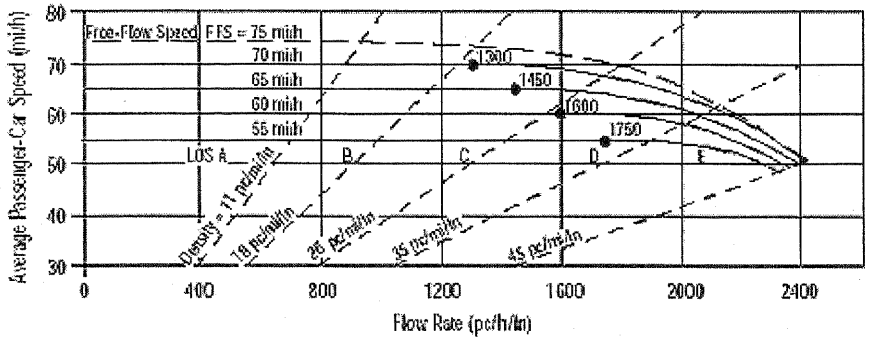

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7858 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) 2351		pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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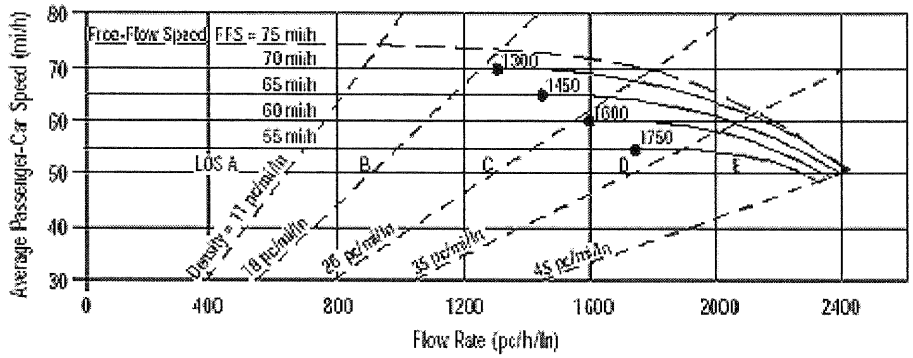

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Northbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	7858 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1567	pc/h/ln
S	64.9	mi/h
D = v_p / S	24.1	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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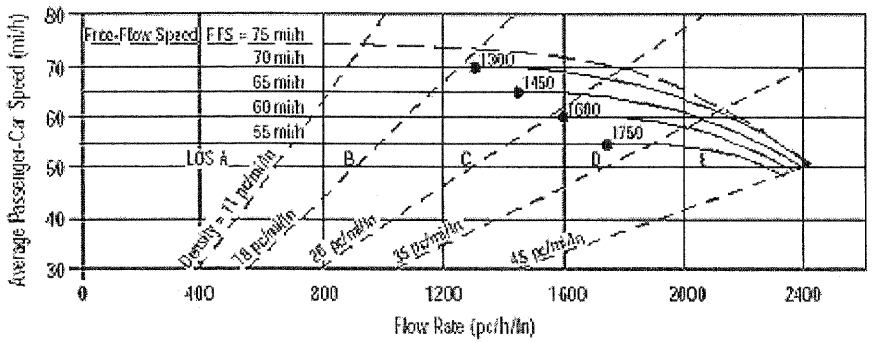

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	11398 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)3410		pc/h/ln
S		mi/h
D = v_p / S		pc/mi/ln
LOS	F	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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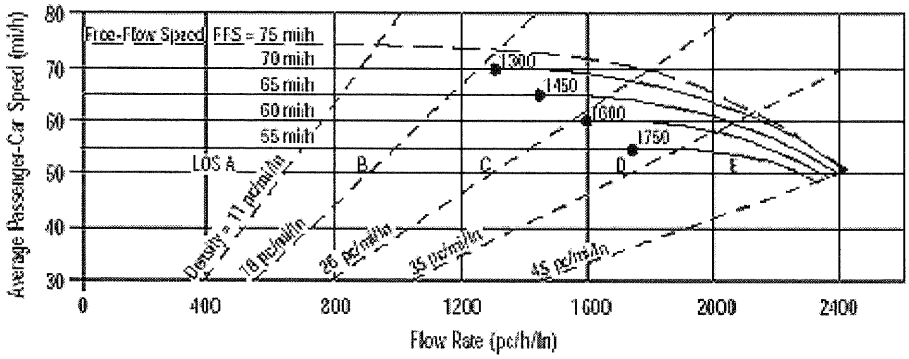

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	01/04/2007
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	Interstate 5 Southbound
From/To	North of I-80/S of Arena Blvd
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	11398 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	6	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2273	pc/h/ln
S	54.9	mi/h
D = v_p / S	41.4	pc/mi/ln
LOS	E	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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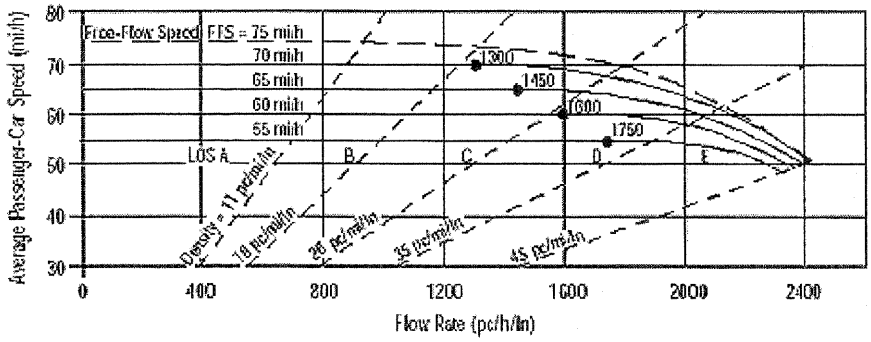
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	2756 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1649	pc/h/ln
S	64.7	mi/h
D = v_p / S	25.5	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h
S	mi/h
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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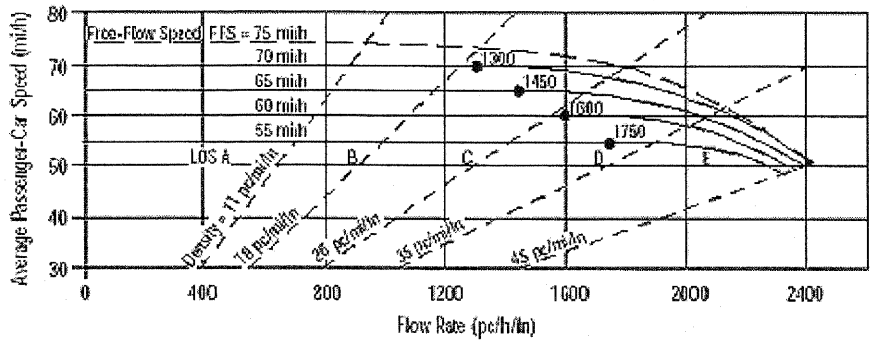

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Southbound
From/To	Elverta Road/Elkhorn Boulevard
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative +Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	1706 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	2	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1021	pc/h/ln
S	65.0	mi/h
D = v_p / S	15.7	pc/mi/ln
LOS	B	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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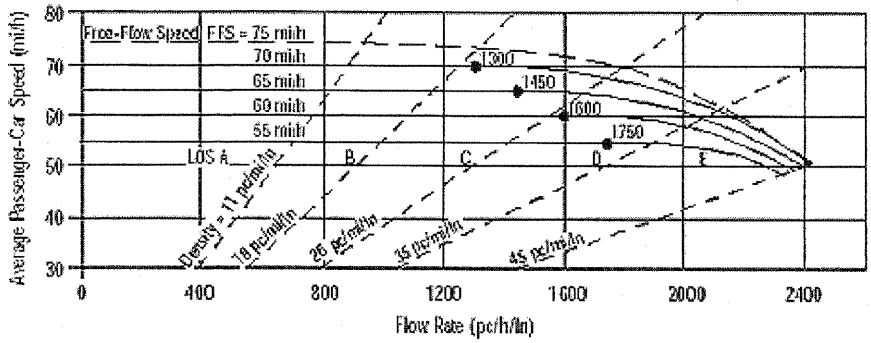

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

Highway/Direction of Travel	SR 99 Northbound
From/To	Elkhorn Boulevard / I-5 IC
Jurisdiction	Sacramento
Analysis Year	2025-Cumulative + Project w/OP

Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3312 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1321	pc/h/ln
S	65.0	mi/h
D = v_p / S	20.3	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits23-8, 23-10	f_{LW} - Exhibit 23-4
E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exhibit 23-5
f_p - Page 23-12	f_N - Exhibit 23-6
LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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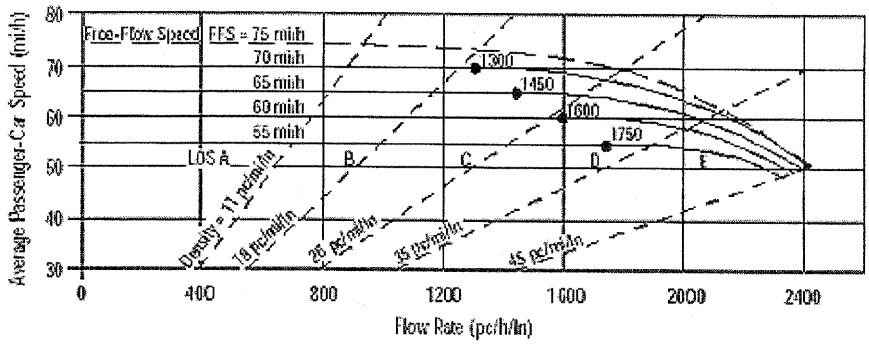

Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	Allen Nie
Agency or Company	TJKM
Date Performed	12/27/2006
Analysis Time Period	P.M. Peak

Site Information

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Project Description 41-091 Sacramento - Greenbriar Development Freeway Analysis

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	3629 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P_T	15
Peak-Hr Prop. of AADT, K		%RVs, P_R	1
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.929

Speed Inputs

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	3	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

Calc Speed Adj and FFS

f_{LW}		mi/h
f_{LC}		mi/h
f_{ID}		mi/h
f_N		mi/h
FFS	65.0	mi/h

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	1448	pc/h/ln
S	65.0	mi/h
D = v_p / S	22.3	pc/mi/ln
LOS	C	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h
S		mi/h
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

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LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exhibit 23-7

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