FEBRUARY 2009

Swanston Station Transit Village Specific Plan

Draft Environmental Impact Report
Technical Appendices

Prepared for
The City of Sacramento

SCH # 2007062130

Swanston Station Transit Village Specific Plan
Draft Environmental Impact Report

Technical Appendices

SCH # 2007062130

Prepared for:

City of Sacramento
Environmental Planning Services
Development Services Department
300 Richards Boulevard
Sacramento, CA 95811

Prepared by:

PBS&J
1200 2nd Street
Sacramento, CA 95814

February 18, 2009

Appendices

A. Notice of Preparation & Responses to Notice of Preparation

B. Air Quality

- URBEMIS Model Results
- CALINE 4 Model Results

C. Biological Resources

- US Fish and Wildlife Service Species List
- California Department of Fish and Game Natural Diversity Database
- California Native Plant Society Inventory of Rare and Endangered Plants

D. Noise

- Traffic Noise Model Results

E. Traffic

- Traffic Count Data
- Worksheets for Existing Conditions
- Worksheets for Baseline Conditions
- Worksheets for Baseline plus Proposed Project Conditions
- Worksheets for Cumulative (2025) No Project Conditions
- Worksheets for Cumulative (2025) Plus Proposed Project Conditions

Appendix A

Notice of Preparation & Responses to Notice of Preparation

DEVELOPMENT SERVICES DEPARTMENT

CITY OF SACRAMENTO

CALIFORNIA

2101 ARENA BLVD 2nd FLOOR
SACRAMENTO, CA 95834

NOTICE OF PREPARATION FOR AN ENVIRONMENTAL IMPACT REPORT (EIR) FOR THE SWANSTON STATION TRANSIT VILLAGE SPECIFIC PLAN (M04-057)

PUBLIC REVIEW PERIOD: June 29, 2007 through July 30, 2007

The City of Sacramento, Development Services Department, will be the Lead Agency for the preparation of an Environmental Impact Report (EIR) for the Swanston Station Transit Village Specific Plan project (proposed project, (M04-057). The California Environmental Quality Act (CEQA), Section 15082, states that once a decision is made to prepare an EIR, the lead agency must prepare a Notice of Preparation (NOP) to inform all responsible agencies of that decision. The purpose of this NOP is to provide responsible agencies and interested persons with sufficient information describing the proposed project and its potential environmental effects to enable them to make a meaningful response as to the scope and content of the information to be included in the EIR. The responses to this NOP will help the City of Sacramento determine the scope of the EIR and ensure an appropriate level of environmental review.

The EIR will evaluate the potential environmental impacts of the proposed project and recommend mitigation measures, as required. Pursuant to CEQA Guidelines Section 15168, the EIR is being prepared as a program level EIR. A program EIR may be prepared on a series of related actions that can be characterized as one project. Subsequent development activities in the Swanston Station Transit Village Specific Plan area will include an evaluation of the environmental effects of the proposed project and will determine whether any further environmental review is required.

Project Location

The Swanston Station Transit Village Specific Plan project area is located approximately three miles northeast of Downtown Sacramento. The project area encompasses approximately 230 acres, and is roughly bounded by El Camino Avenue on the north, Arden Way on the south and the Capital City Freeway (Business 80) on the east. Erickson Street defines the western edge of the project area (see page 4 for Project Location map). The project area is bifurcated by the Regional Transit light rail lines and the Union Pacific (UP) railroad tracks.

Project Description

The Swanston Station Transit Village Specific Plan is intended to create a safe and comfortable transit village with a mix of uses, and a bicycle- and pedestrian-friendly environment. In keeping with the City and the Sacramento region's goals to promote public transit ridership, the plan proposes higher-intensity infill residential development, small neighborhood-serving retail, small- to medium-scale professional office uses, and public open space – all within convenient walking distances of the light rail station. In order to achieve the village plan, two new General Plan land use designations would be applied to the area. The proposed Mixed Use land use designation would promote a mixture of office, commercial, open space, and medium and high-density residential uses; the

proposed Residential Mixed Use land use designation would support a mixture of residential densities, as well as commercial and/or office use. The specific plan will not result in any demolition or displacement of existing residents or businesses. The intent of the plan is to direct and support future development and redevelopment in a manner that accomplishes the transit village vision.

The specific plan will include new development regulations to create the desired urban design character and form, and to allow a mix of uses that are more difficult to accommodate with traditional single-use zoning districts. These development regulations, which will replace the existing zoning and development regulations, will be combined with recommendations for traffic and circulation improvements for automobiles, transit, bicyclists and pedestrians; infrastructure and utility improvements; and public/open space amenities, including parks, pocket and transit plazas. The plan will also include a strategy for funding the proposed plan improvements over several phases.

Required Discretionary Actions

In order for the Swanston Station Transit Village Specific Plan to be implemented, the City of Sacramento will need to take a number of discretionary actions. The actions necessary for project approval include, but are not limited to, the following:

- Certification of an EIR pursuant to the California Environmental Quality Act and associated Guidelines;
- Adoption of a Mitigation Monitoring Plan;
- General Plan Amendment; and
- Rezone.

Potential Environmental Effects

At this time, it is anticipated that the following issue areas will be addressed in the EIR:

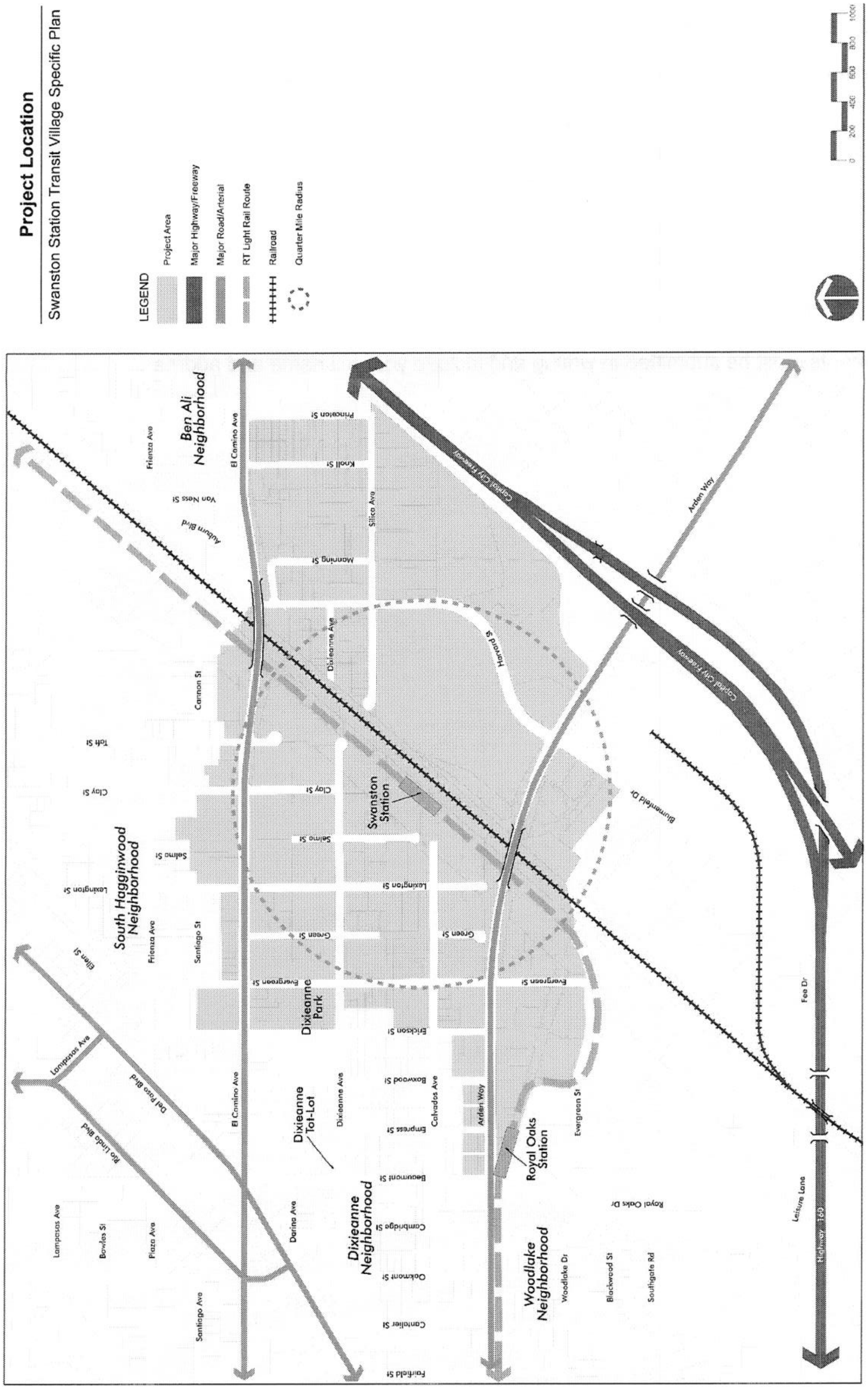
- Aesthetics;
- Air Quality;
- Biological Resources;
- Cultural and Historic Resources;
- Geology and Soils;
- Hazardous Materials;
- Hydrology and Water Quality;
- Land Use;
- Noise;
- Population, Housing, and Employment;
- Public Services and Utilities; and
- Transportation and Circulation

Submitting Comments

Comments on this NOP are due no later than 5:00 p.m. on July 30, 2007 and can be sent to:

Jennifer Hageman, Senior Planner
Environmental Planning Services
Development Services Department
2101 Arena Blvd., 2nd Floor
Sacramento, CA 95834
Phone: (916) 808-5538
Fax: (916) 566-3968
E-mail: jhageman@cityofsacramento.org

Comments must be submitted in writing and include your full name and address.


Project Location
Swanston Station Transit Village Specific Plan
LEGEND
Project Area
Major Highway/Freeway
Major Road/Arterial
RT Light Rail Route
Railroad
Quarter Mile Radius
Ben Ali Neighborhood
South Hagginwood Neighborhood
Dixieanne Park
Dixieanne Tot-Lot
Dixieanne Neighborhood
Woodlake Neighborhood
Swanston Station
Royal Oaks Station
Capitol City Freeway
Arden Way
Highway 160
El Camino Ave
Del Paso Blvd
Rio Linda Blvd
Lampasas Ave
Auburn Blvd
Fee Dr
Leisure Lane
Blumenfeld Dr
Evergreen St
Royal Oaks Dr
Harvard St
Silica Ave
Dixieanne Ave
Santiago Ave
Frienza Ave
Ellen St
Van Ness St
Cannon St
Toft St
Clay St
Selma St
Lexington St
Green St
Erickson St
Boxwood St
Empress St
Beaumont St
Cambridge St
Oakmont St
Cantalier St
Fairfield St
Princeton St
Knoll St
Manning St
Calvados Ave
Darina Ave
Plaza Ave
Bowles St
Woodlake Dr
Blackwood St
Southgate Rd

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

July 17, 2007

Jennifer Hageman
City of Sacramento
2101 Arena Boulevard, Second Floor
Sacramento, California 95834

Swanston Station Transit Village Project
State Clearinghouse (SCH) Number: 2007062130

The project corresponding to the subject SCH identification number has come to our attention. The limited project description suggests your project may be an encroachment on the State Adopted Plan of Flood Control. You may refer to the California Code of Regulations, Title 23 and Designated Floodway maps at http://recbd.ca.gov/. Please be advised that your county office also has copies of the Board's designated floodways for your review. If indeed your project encroaches on an adopted food control plan, you will need to obtain an encroachment permit from the Reclamation Board prior to initiating any activities. The attached Fact Sheet explains the permitting process. Please note that the permitting process may take as much as 45 to 60 days to process. Also note that a condition of the permit requires the securing all of the appropriate additional permits before initiating work. This information is provided so that you may plan accordingly.

If after careful evaluation, it is your assessment that your project is not within the authority of the Reclamation Board, you may disregard this notice. For further information, please contact me at (916) 574-1249.

Sincerely,

Christopher Huitt
Staff Environmental Scientist
Floodway Protection Section

cc: Governor's Office of Planning and Research
State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, CA 95814

Encroachment Permits Fact Sheet

Basis for Authority

State law (Water Code Sections 8534, 8608, 8609, and 8710 – 8723) tasks the Reclamation Board with enforcing appropriate standards for the construction, maintenance, and protection of adopted flood control plans. Regulations implementing these directives are found in California Code of Regulations (CCR) Title 23, Division 1.

Area of Reclamation Board Jurisdiction

The adopted plan of flood control under the jurisdiction and authority of the Reclamation Board includes the Sacramento and San Joaquin Rivers and their tributaries and distributaries and the designated floodways.

Streams regulated by the Reclamation Board can be found in Title 23 Section 112. Information on designated floodways can be found on the Reclamation Board's website at http://recbd.ca.gov/designated_floodway/ and CCR Title 23 Sections 101 - 107.

Regulatory Process

The Reclamation Board ensures the integrity of the flood control system through a permit process (Water Code Section 8710). A permit must be obtained prior to initiating any activity, including excavation and construction, removal or planting of landscaping within floodways, levees, and 10 feet landward of the landside levee toes. Additionally, activities located outside of the adopted plan of flood control but which may foreseeable interfere with the functioning or operation of the plan of flood control is also subject to a permit of the Reclamation Board.

Details regarding the permitting process and the regulations can be found on the Reclamation Board's website at http://recbd.ca.gov/ under "Frequently Asked Questions" and "Regulations," respectively. The application form and the accompanying environmental questionnaire can be found on the Reclamation Board's website at http://recbd.ca.gov/forms.cfm.

Application Review Process

Applications when deemed complete will undergo technical and environmental review by Reclamation Board and/or Department of Water Resources staff.

Technical Review

A technical review is conducted of the application to ensure consistency with the regulatory standards designed to ensure the function and structural integrity of the adopted plan of flood control for the protection of public welfare and safety. Standards and permitted uses of designated floodways are found in CCR Title 23 Sections 107 and Article 8 (Sections 111 to 137). The permit contains 12 standard conditions and additional special conditions may be placed on the permit as the situation warrants. Special conditions, for example, may include mitigation for the hydraulic impacts of the project by reducing or eliminating the additional flood risk to third parties that may caused by the project.

Additional information may be requested in support of the technical review of

your application pursuant to CCR Title 23 Section 8(b)(4). This information may include but not limited to geotechnical exploration, soil testing, hydraulic or sediment transport studies, and other analyses may be required at any time prior to a determination on the application.

Environmental Review

A determination on an encroachment application is a discretionary action by the Reclamation Board and its staff and subject to the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code 21000 et seq.). Additional environmental considerations are placed on the issuance of the encroachment permit by Water Code Section 8608 and the corresponding implementing regulations (California Code of Regulations – CCR Title 23 Sections 10 and 16).

In most cases, the Reclamation Board will be assuming the role of a "responsible agency" within the meaning of CEQA. In these situations, the application must include a certified CEQA document by the "lead agency" [CCR Title 23 Section 8(b)(2)]. We emphasize that such a document must include within its project description and environmental assessment of the activities for which are being considered under the permit.

Encroachment applications will also undergo a review by an interagency Environmental Review Committee (ERC) pursuant to CCR Title 23 Section 10. Review of your application will be facilitated by providing as much additional environmental information as pertinent and available to the applicant at the time of submission of the encroachment application.

These additional documentations may include the following documentation:

- California Department of Fish and Game Streambed Alteration Notification (http://www.dfg.ca.gov/1600/),
- Clean Water Act Section 404 applications, and Rivers and Harbors Section 10 application (US Army Corp of Engineers),
- Clean Water Act Section 401 Water Quality Certification, and
- corresponding determinations by the respective regulatory agencies to the aforementioned applications, including Biological Opinions, if available at the time of submission of your application.

The submission of this information, if pertinent to your application, will expedite review and prevent overlapping requirements. This information should be made available as a supplement to your application as it becomes available. Transmittal information should reference the application number provided by the Reclamation Board.

In some limited situations, such as for minor projects, there may be no other agency with approval authority over the project, other than the encroachment permit by Reclamation Board. In these limited instances, the Reclamation Board

may choose to serve as the "lead agency" within the meaning of CEQA and in most cases the projects are of such a nature that a categorical or statutory exemption will apply. The Reclamation Board cannot invest staff resources to prepare complex environmental documentation.

Additional information may be requested in support of the environmental review of your application pursuant to CCR Title 23 Section 8(b)(4). This information may include biological surveys or other environmental surveys and may be required at anytime prior to a determination on the application.

USAA®
9800 Fredericksburg Road
San Antonio, Texas 78288

July 23, 2007

City of Sacramento
Development Services Department
Attn: Jennifer Hageman, Senior Planner
2101 Arena Blvd., 2nd Floor
Sacramento, CA 95834

Re: Notice of Preparation for an Environmental Impact Report (EIR) for the Swanston Station Transit Village Specific Plan (M04-057)

Dear Ms. Hageman:

This letter is to provide comments on the Notice of Preparation for an Environmental Impact Report (EIR) for the Swanston Station Transit Village Specific Plan (M04-057).

USAA supports the overall principles and objective of the Swanston Station Transit Village Plan. USAA does not object to the Environmental Impact Report. We do, however, request that the EIR acknowledge and reference existing plans and agreements currently governing the property including the adopted Planned Unit Development (PUD) and Regional Transit Agreement that affect our site. We have met with City Planning Staff and they have indicated that the Swanston Station Transit Plan will not affect the existing PUD and as a consequence we request that the following comments be included in the EIR:

1. **A PUD has been adopted for a portion of the Plan area which is depicted in the EIR. Based on our discussions with the City as noted above, USAA and the City do not expect any modifications in the (PUD) which is described in Resolution No. 84-810 adopted by the Sacramento City Council on September 18, 1984. The EIR assumes development of the USAA site in accordance with the PUD.**

2. **The terms and conditions of the Swanston Pedestrian Bridge and Sidewalk Access Easement Agreement as described in City Agreement No. 94-035 dated March 10, 1994 remain in full force and effect. To that end, USAA suggests an assessment on the viability and benefit of alternative locations of the Swanston Pedestrian Bridge and Sidewalk Access Easement. Specifically, USAA requests the EIR analysis include an alternative of locating the Pedestrian Bridge at Silica Avenue to improve public access and safety as well as to avoid the bisection of a viable parcel.**

Please feel free to contact me if you need further details or clarification on the comments above. We are available to meet with you at your convenience. Additionally, when available, we would like to obtain a copy of the Draft Environmental Impact Report prior to public release. If this is not possible, we would appreciate a meeting with the City staff prior to release to review and address any items.

USAA®
9800 Fredericksburg Road
San Antonio, Texas 78288

We appreciate the cooperative relationship with the City of Sacramento in accomplishing the future goals of both the City and USAA.

For any further communications on this matter, I will be your point of contact. Please do not hesitate to give me a call at (210) 498-3084 if you have any additional questions.

Sincerely,

Scott Syamken
AVP, Portfolio Management
USAA Corporate Real Estate

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390

July 12, 2007

Jennifer Hageman
City of Sacramento
2101 Arena Blvd, Second Floor
Sacramento, CA 95834

RE: SCH# 2007062130, Swanston Station Transit Village project, Sacramento County

Dear Ms. Hageman:

The Native American Heritage Commission has reviewed the above mentioned NOP. To adequately assess and mitigate project-related impacts on archaeological resources, the Commission recommends the following actions be required:

1. Contact the appropriate Information Center for a record search. The record search will determine:
   - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
   - If any known cultural resources have already been recorded on or adjacent to the APE.
   - If the probability is low, moderate, or high that cultural resources are located in the APE.
   - If a survey is required to determine whether previously unrecorded cultural resources are present.
2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure.
   - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
3. Contact the Native American Heritage Commission for:
   - A Sacred Lands File Check. Requests must be made in writing with the County, Quad map name, township, range and section.
   - A list of appropriate Native American Contacts for consultation concerning the project site and to assist in the mitigation measures.
4. Lack of surface evidence of archeological resources does not preclude their subsurface existence.
   - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5 (f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
   - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
   - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5 (e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

If you have any questions, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

CC: State Clearinghouse

STATE OF CALIFORNIA Arnold Schwarzenegger, *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

July 24, 2007

Jennifer Hageman
City of Sacramento
2101 Arco Arena Boulevard, Second Floor
Sacramento, CA 95834

RE: Swanston Station Transit Village Project, SCH# 2007062130

Dear Ms. Hageman:

As the state agency responsible for rail safety within California, we recommend that any development projects planned adjacent to or near the rail corridor in the City be planned with the safety of the rail corridor in mind. New developments may increase traffic volumes not only on streets and at intersections, but also at at-grade highway-rail crossings. This includes considering pedestrian circulation patterns/destinations with respect to railroad right-of-way (ROW).

Safety factors to consider include, but are not limited to, the planning for grade separations for major thoroughfares, improvements to existing at-grade highway-rail crossings due to increase in traffic volumes and appropriate fencing to limit the access of trespassers onto the railroad right-of-way. Any project that includes a modification to an exiting crossing or proposes a new crossing is legally required to obtain authority to construct from the Commission. If the project includes a proposed new crossing, the Commission will be a responsible party under CEQA and the impacts of the crossing must be discussed within the environmental documents.

Of specific concern is that the installation of continuous vandal-resistant fencing should be a requirement of approval for any development project adjacent to the Sacramento Regional Transit ROW to deter trespassing.

The above-mentioned safety improvements should be considered when approval is sought for the new development. Working with Commission staff early in the conceptual design phase will help improve the safety to motorists and pedestrians in the City.

If you have any questions in this matter, please call me at (415) 703-2795.

Very truly yours,

Kevin Boles
Environmental Specialist
Rail Crossings Engineering Section
Consumer Protection and Safety Division

cc: Diane Nakano, Sacramento RT

Appendix B

Air Quality

- URBEMIS Model Results
- CALINE 4 Model Results

11/30/2007 10:59:54 AM

Urbemis 2007 Version 9.2.2

Combined Summer Emissions Reports (Pounds/Day)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\URBEMIS runs\Swanston - Strategic Plan Area 2025.urb9

Project Name: Swanston - Strategic Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2008 TOTALS (lbs/day unmitigated)	420.03	37.80	58.51	0.05	129.01	2.03	131.04	26.94	1.87	28.81	6,556.21

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	19.96	4.21	5.14	0.00	0.02	0.02	5,272.86

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	27.00	20.21	289.83	0.65	102.55	19.44	64,732.04

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	46.96	24.42	294.97	0.65	102.57	19.46	70,004.90

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 1/7/2008-2/22/2008 Active Days: 35	4.67	**37.80**	20.52	0.00	**129.01**	**2.03**	**131.04**	**26.94**	**1.87**	**28.81**	3,146.84
Mass Grading 01/07/2008-02/22/2008	4.67	37.80	20.52	0.00	129.01	2.03	131.04	26.94	1.87	28.81	3,146.84
Mass Grading Dust	0.00	0.00	0.00	0.00	129.00	0.00	129.00	26.94	0.00	26.94	0.00
Mass Grading Off Road Diesel	4.62	37.73	18.93	0.00	0.00	2.03	2.03	0.00	1.87	1.87	3,007.48
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.07	1.59	0.00	0.01	0.00	0.01	0.00	0.00	0.00	139.36
Time Slice 2/25/2008-3/7/2008 Active Days: 10	4.92	22.27	13.02	0.01	0.04	1.65	1.68	0.01	1.51	1.53	2,119.47
Asphalt 02/25/2008-03/07/2008	4.92	22.27	13.02	0.01	0.04	1.65	1.68	0.01	1.51	1.53	2,119.47
Paving Off-Gas	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.78	16.39	8.47	0.00	0.00	1.40	1.40	0.00	1.29	1.29	1,131.92
Paving On Road Diesel	0.37	5.76	2.00	0.01	0.03	0.24	0.27	0.01	0.22	0.23	764.58
Paving Worker Trips	0.07	0.12	2.55	0.00	0.01	0.00	0.01	0.00	0.00	0.01	222.98
Time Slice 3/10/2008-10/10/2008 Active Days: 155	5.88	28.10	**58.51**	**0.05**	0.21	1.74	1.95	0.07	1.60	1.67	**6,556.21**
Building 03/10/2008-10/10/2008	5.88	28.10	58.51	0.05	0.21	1.74	1.95	0.07	1.60	1.67	6,556.21
Building Off Road Diesel	4.07	18.22	11.80	0.00	0.00	1.33	1.33	0.00	1.22	1.22	1,621.20
Building Vendor Trips	0.66	8.11	7.44	0.01	0.05	0.34	0.39	0.02	0.31	0.33	1,497.56
Building Worker Trips	1.15	1.78	39.27	0.03	0.15	0.07	0.23	0.06	0.06	0.12	3,437.45
Time Slice 10/13/2008-11/14/2008 Active Days: 25	**420.03**	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28
Coating 10/13/2008-11/14/2008	420.03	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28
Architectural Coating	419.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.18	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28

Phase Assumptions

Phase: Mass Grading 1/7/2008 - 2/22/2008 - Default Fine Site Grading Description

Total Acres Disturbed: 25.81

Maximum Daily Acreage Disturbed: 6.45

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

11/30/2007 10:59:54 AM

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/25/2008 - 3/7/2008 - Default Paving Description

Acres to be Paved: 6.45

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 3/10/2008 - 10/10/2008 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2008 - 11/14/2008 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/30/2007 10:59:55 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.32	4.17	2.05	0.00	0.01	0.01	5,267.24
Hearth - No Summer Emissions							
Landscape	0.25	0.04	3.09	0.00	0.01	0.01	5.62
Consumer Products	16.52						
Architectural Coatings	2.87						
TOTALS (lbs/day, unmitigated)	19.96	4.21	5.14	0.00	0.02	0.02	5,272.86

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	11.08	6.75	100.27	0.22	34.47	6.54	21,889.07
Regnl shop. center	15.92	13.46	189.56	0.43	68.08	12.90	42,842.97
TOTALS (lbs/day, unmitigated)	27.00	20.21	289.83	0.65	102.55	19.44	64,732.04

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 95 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 10:59:55 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	22.60	6.42	dwelling units	366.00	2,349.72	20,089.40
Regnl shop. center		76.94	1000 sq ft	70.00	5,385.80	39,693.35
					7,735.52	59,782.75

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/30/2007 10:59:55 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

11/30/2007 11:11:30 AM

Urbemis 2007 Version 9.2.2

Combined Winter Emissions Reports (Pounds/Day)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\URBEMIS runs\Swanston - Strategic Plan Area 2025.urb9

Project Name: Swanston - Strategic Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2008 TOTALS (lbs/day unmitigated)	420.03	37.80	58.51	0.05	129.01	2.03	131.04	26.94	1.87	28.81	6,556.21

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	19.83	6.19	2.91	0.01	0.17	0.17	7,850.77

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	25.29	30.50	246.41	0.51	102.55	19.44	51,724.96

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	45.12	36.69	249.32	0.52	102.72	19.61	59,575.73

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 1/7/2008-2/22/2008 Active Days: 35	4.67	**37.80**	20.52	0.00	**129.01**	**2.03**	**131.04**	**26.94**	**1.87**	**28.81**	3,146.84
Mass Grading 01/07/2008-02/22/2008	4.67	37.80	20.52	0.00	129.01	2.03	131.04	26.94	1.87	28.81	3,146.84
Mass Grading Dust	0.00	0.00	0.00	0.00	129.00	0.00	129.00	26.94	0.00	26.94	0.00
Mass Grading Off Road Diesel	4.62	37.73	18.93	0.00	0.00	2.03	2.03	0.00	1.87	1.87	3,007.48
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.05	0.07	1.59	0.00	0.01	0.00	0.01	0.00	0.00	0.00	139.36
Time Slice 2/25/2008-3/7/2008 Active Days: 10	4.92	22.27	13.02	0.01	0.04	1.65	1.68	0.01	1.51	1.53	2,119.47
Asphalt 02/25/2008-03/07/2008	4.92	22.27	13.02	0.01	0.04	1.65	1.68	0.01	1.51	1.53	2,119.47
Paving Off-Gas	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.78	16.39	8.47	0.00	0.00	1.40	1.40	0.00	1.29	1.29	1,131.92
Paving On Road Diesel	0.37	5.76	2.00	0.01	0.03	0.24	0.27	0.01	0.22	0.23	764.58
Paving Worker Trips	0.07	0.12	2.55	0.00	0.01	0.00	0.01	0.00	0.00	0.01	222.98
Time Slice 3/10/2008-10/10/2008 Active Days: 155	5.88	28.10	**58.51**	**0.05**	0.21	1.74	1.95	0.07	1.60	1.67	**6,556.21**
Building 03/10/2008-10/10/2008	5.88	28.10	58.51	0.05	0.21	1.74	1.95	0.07	1.60	1.67	6,556.21
Building Off Road Diesel	4.07	18.22	11.80	0.00	0.00	1.33	1.33	0.00	1.22	1.22	1,621.20
Building Vendor Trips	0.66	8.11	7.44	0.01	0.05	0.34	0.39	0.02	0.31	0.33	1,497.56
Building Worker Trips	1.15	1.78	39.27	0.03	0.15	0.07	0.23	0.06	0.06	0.12	3,437.45
Time Slice 10/13/2008-11/14/2008 Active Days: 25	**420.03**	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28
Coating 10/13/2008-11/14/2008	420.03	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28
Architectural Coating	419.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.18	0.28	6.24	0.01	0.02	0.01	0.04	0.01	0.01	0.02	546.28

Phase Assumptions

Phase: Mass Grading 1/7/2008 - 2/22/2008 - Default Fine Site Grading Description

Total Acres Disturbed: 25.81

Maximum Daily Acreage Disturbed: 6.45

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

11/30/2007 11:11:30 AM

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/25/2008 - 3/7/2008 - Default Paving Description

Acres to be Paved: 6.45

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 3/10/2008 - 10/10/2008 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2008 - 11/14/2008 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/30/2007 11:11:30 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.32	4.17	2.05	0.00	0.01	0.01	5,267.24
Hearth	0.12	2.02	0.86	0.01	0.16	0.16	2,583.53
Landscaping - No Winter Emissions							
Consumer Products	16.52						
Architectural Coatings	2.87						
TOTALS (lbs/day, unmitigated)	19.83	6.19	2.91	0.01	0.17	0.17	7,850.77

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	8.69	10.20	84.35	0.17	34.47	6.54	17,518.17
Regnl shop. center	16.60	20.30	162.06	0.34	68.08	12.90	34,206.79
TOTALS (lbs/day, unmitigated)	25.29	30.50	246.41	0.51	102.55	19.44	51,724.96

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 50 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 11:11:30 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	22.60	6.42	dwelling units	366.00	2,349.72	20,089.40
Regnl shop. center		76.94	1000 sq ft	70.00	5,385.80	39,693.35
					7,735.52	59,782.75

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/30/2007 11:11:30 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

11/30/2007 11:20:05 AM

Urbemis 2007 Version 9.2.2

Combined Annual Emissions Reports (Tons/Year)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\URBEMIS runs\Swanston - Strategic Plan Area 2025.urb9

Project Name: Swanston - Strategic Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2008 TOTALS (tons/year unmitigated)	5.81	2.95	5.04	0.00	2.27	0.18	2.45	0.48	0.16	0.64	580.60

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	3.62	0.76	0.65	0.00	0.00	0.00	963.07

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	4.83	4.31	50.25	0.11	18.71	3.54	11,022.33

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	8.45	5.07	50.90	0.11	18.71	3.54	11,985.40

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2008	5.81	2.95	5.04	0.00	2.27	0.18	2.45	0.48	0.16	0.64	580.60
Mass Grading 01/07/2008-02/22/2008	0.08	0.66	0.36	0.00	2.26	0.04	2.29	0.47	0.03	0.50	55.07
Mass Grading Dust	0.00	0.00	0.00	0.00	2.26	0.00	2.26	0.47	0.00	0.47	0.00
Mass Grading Off Road Diesel	0.08	0.66	0.33	0.00	0.00	0.04	0.04	0.00	0.03	0.03	52.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44
Asphalt 02/25/2008-03/07/2008	0.02	0.11	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	10.60
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.01	0.08	0.04	0.00	0.00	0.01	0.01	0.00	0.01	0.01	5.66
Paving On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.82
Paving Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11
Building 03/10/2008-10/10/2008	0.46	2.18	4.53	0.00	0.02	0.14	0.15	0.01	0.12	0.13	508.11
Building Off Road Diesel	0.32	1.41	0.91	0.00	0.00	0.10	0.10	0.00	0.09	0.09	125.64
Building Vendor Trips	0.05	0.63	0.58	0.00	0.00	0.03	0.03	0.00	0.02	0.03	116.06
Building Worker Trips	0.09	0.14	3.04	0.00	0.01	0.01	0.02	0.00	0.00	0.01	266.40
Coating 10/13/2008-11/14/2008	5.25	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.83
Architectural Coating	5.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.83

Phase Assumptions

Phase: Mass Grading 1/7/2008 - 2/22/2008 - Default Fine Site Grading Description

Total Acres Disturbed: 25.81

Maximum Daily Acreage Disturbed: 6.45

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/25/2008 - 3/7/2008 - Default Paving Description

Acres to be Paved: 6.45

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

Phase: Building Construction 3/10/2008 - 10/10/2008 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2008 - 11/14/2008 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/30/2007 11:20:05 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.06	0.76	0.37	0.00	0.00	0.00	961.27
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	1.29
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	3.02						
Architectural Coatings	0.52						
TOTALS (tons/year, unmitigated)	3.62	0.76	0.65	0.00	0.00	0.00	963.07

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	1.88	1.44	17.33	0.04	6.29	1.19	3,728.86
Regnl shop. center	2.95	2.87	32.92	0.07	12.42	2.35	7,293.47
TOTALS (tons/year, unmitigated)	4.83	4.31	50.25	0.11	18.71	3.54	11,022.33

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 11:20:05 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	22.60	6.42	dwelling units	366.00	2,349.72	20,089.40
Regnl shop. center		76.94	1000 sq ft	70.00	5,385.80	39,693.35
					7,735.52	59,782.75

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

11/30/2007 10:56:49 AM

Urbemis 2007 Version 9.2.2

Combined Summer Emissions Reports (Pounds/Day)

File Name:

Project Name: Swanston Station - Strategic Plan LUs to be replaced

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2007 TOTALS (lbs/day unmitigated)	8.16	53.66	30.21	0.01	63.83	3.42	67.25	13.33	3.14	16.48	4,371.87
2008 TOTALS (lbs/day unmitigated)	289.78	82.99	77.96	0.05	64.01	5.17	69.19	13.40	4.75	18.15	10,575.80

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	2.03	2.09	4.81	0.00	0.01	0.01	2,461.41

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	27.38	21.88	309.25	0.70	110.82	20.99	69,776.02

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	29.41	23.97	314.06	0.70	110.83	21.00	72,237.43

11/30/2007 10:56:49 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.15	2.05	1.72	0.00	0.00	0.00	2,455.79
Hearth - No Summer Emissions							
Landscape	0.25	0.04	3.09	0.00	0.01	0.01	5.62
Consumer Products	0.00						
Architectural Coatings	1.63						
TOTALS (lbs/day, unmitigated)	2.03	2.09	4.81	0.00	0.01	0.01	2,461.41

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Regnl shop. center	24.11	20.18	284.20	0.64	102.06	19.33	64,231.73
General light industry	3.27	1.70	25.05	0.06	8.76	1.66	5,544.29
TOTALS (lbs/day, unmitigated)	27.38	21.88	309.25	0.70	110.82	20.99	69,776.02

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 95 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 10:56:49 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Regnl shop. center		61.86	1000 sq ft	130.53	8,074.59	59,509.70
General light industry		3.82	1000 sq ft	147.69	564.18	5,105.79
					8,638.77	64,615.49

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/30/2007 10:56:49 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0
General light industry				50.0	25.0	25.0

11/30/2007 10:57:26 AM

Urbemis 2007 Version 9.2.2

Combined Winter Emissions Reports (Pounds/Day)

File Name:

Project Name: Swanston Station - Strategic Plan LUs to be replaced

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2007 TOTALS (lbs/day unmitigated)	8.16	53.66	30.21	0.01	63.83	3.42	67.25	13.33	3.14	16.48	4,371.87
2008 TOTALS (lbs/day unmitigated)	289.78	82.99	77.96	0.05	64.01	5.17	69.19	13.40	4.75	18.15	10,575.80

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	1.78	2.05	1.72	0.00	0.00	0.00	2,455.79

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	27.12	33.01	263.83	0.55	110.82	20.99	55,717.46

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	28.90	35.06	265.55	0.55	110.82	20.99	58,173.25

11/30/2007 10:57:26 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.15	2.05	1.72	0.00	0.00	0.00	2,455.79
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping - No Winter Emissions							
Consumer Products	0.00						
Architectural Coatings	1.63						
TOTALS (lbs/day, unmitigated)	1.78	2.05	1.72	0.00	0.00	0.00	2,455.79

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Regnl shop. center	24.91	30.44	242.96	0.51	102.06	19.33	51,284.05
General light industry	2.21	2.57	20.87	0.04	8.76	1.66	4,433.41
TOTALS (lbs/day, unmitigated)	27.12	33.01	263.83	0.55	110.82	20.99	55,717.46

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 50 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 10:57:26 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Regnl shop. center		61.86	1000 sq ft	130.53	8,074.59	59,509.70
General light industry		3.82	1000 sq ft	147.69	564.18	5,105.79
					8,638.77	64,615.49

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0
General light industry				50.0	25.0	25.0

11/30/2007 10:57:59 AM

Urbemis 2007 Version 9.2.2

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: Swanston Station - Strategic Plan LUs to be replaced

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2007 TOTALS (tons/year unmitigated)	0.04	0.35	0.19	0.00	0.70	0.02	0.72	0.15	0.02	0.16	27.96
2008 TOTALS (tons/year unmitigated)	3.49	2.82	4.11	0.00	0.30	0.17	0.47	0.07	0.15	0.22	522.97

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.35	0.37	0.59	0.00	0.00	0.00	448.69

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	4.98	4.67	53.68	0.12	20.23	3.83	11,878.89

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	5.33	5.04	54.27	0.12	20.23	3.83	12,327.58

11/30/2007 10:57:59 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.03	0.37	0.31	0.00	0.00	0.00	448.18
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	0.00						
Architectural Coatings	0.30						
TOTALS (tons/year, unmitigated)	0.35	0.37	0.59	0.00	0.00	0.00	448.69

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Regnl shop. center	4.45	4.31	49.36	0.11	18.63	3.53	10,934.64
General light industry	0.53	0.36	4.32	0.01	1.60	0.30	944.25
TOTALS (tons/year, unmitigated)	4.98	4.67	53.68	0.12	20.23	3.83	11,878.89

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/30/2007 10:57:59 AM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Regnl shop. center		61.86	1000 sq ft	130.53	8,074.59	59,509.70
General light industry		3.82	1000 sq ft	147.69	564.18	5,105.79
					8,638.77	64,615.49

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/30/2007 10:57:59 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0
General light industry				50.0	25.0	25.0

11/27/2007 4:01:00 PM

Urbemis 2007 Version 9.2.2

Combined Summer Emissions Reports (Pounds/Day)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\Swanston - Long Term Plan Area.urb9

Project Name: Swanston - Long Term Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2025 TOTALS (lbs/day unmitigated)	2,847.55	34.91	101.35	0.33	645.61	1.46	647.06	134.83	1.33	136.16	35,811.88

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	133.09	28.32	17.09	0.00	0.06	0.06	35,744.55

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	187.31	140.77	2,016.91	4.49	713.99	135.35	450,641.73

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	320.40	169.09	2,034.00	4.49	714.05	135.41	486,386.28

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 1/6/2025-2/21/2025 Active Days: 35	5.13	**34.91**	28.39	0.00	**645.61**	1.45	**647.06**	**134.83**	**1.33**	**136.16**	7,468.42
Mass Grading 01/06/2025-02/21/2025	5.13	34.91	28.39	0.00	645.61	1.45	647.06	134.83	1.33	136.16	7,468.42
Mass Grading Dust	0.00	0.00	0.00	0.00	645.60	0.00	645.60	134.83	0.00	134.83	0.00
Mass Grading Off Road Diesel	5.11	34.88	27.61	0.00	0.00	1.44	1.44	0.00	1.33	1.33	7,216.54
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.03	0.77	0.00	0.01	0.01	0.02	0.00	0.00	0.01	251.88
Time Slice 2/24/2025-3/7/2025 Active Days: 10	10.74	15.54	12.56	0.04	0.14	1.01	1.15	0.05	0.93	0.98	5,385.19
Asphalt 02/24/2025-03/07/2025	10.74	15.54	12.56	0.04	0.14	1.01	1.15	0.05	0.93	0.98	5,385.19
Paving Off-Gas	8.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	1.70	10.53	9.66	0.00	0.00	0.82	0.82	0.00	0.75	0.75	1,418.81
Paving On Road Diesel	0.58	4.99	2.48	0.04	0.13	0.19	0.32	0.04	0.18	0.22	3,826.44
Paving Worker Trips	0.01	0.02	0.43	0.00	0.01	0.00	0.01	0.00	0.00	0.00	139.93
Time Slice 3/10/2025-10/10/2025 Active Days: 155	4.55	22.86	**101.35**	**0.33**	1.41	**1.46**	2.87	0.50	1.28	1.78	**35,811.88**
Building 03/10/2025-10/10/2025	4.55	22.86	101.35	0.33	1.41	1.46	2.87	0.50	1.28	1.78	35,811.88
Building Off Road Diesel	1.71	10.50	12.03	0.00	0.00	0.50	0.50	0.00	0.46	0.46	2,259.28
Building Vendor Trips	1.33	9.75	17.34	0.10	0.36	0.48	0.84	0.12	0.43	0.55	10,142.47
Building Worker Trips	1.51	2.61	71.98	0.23	1.04	0.49	1.53	0.38	0.39	0.77	23,410.13
Time Slice 10/13/2025-11/14/2025 Active Days: 25	**2,847.55**	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90
Coating 10/13/2025-11/14/2025	2,847.55	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90
Architectural Coating	2,847.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.24	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90

Phase Assumptions

Phase: Mass Grading 1/6/2025 - 2/21/2025 - Default Fine Site Grading Description

Total Acres Disturbed: 129.12

Maximum Daily Acreage Disturbed: 32.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

11/27/2007 4:01:00 PM

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/24/2025 - 3/7/2025 - Default Paving Description

Acres to be Paved: 32.28

Off-Road Equipment:

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 3/10/2025 - 10/10/2025 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2025 - 11/14/2025 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/27/2007 4:01:00 PM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	2.16	28.28	14.00	0.00	0.05	0.05	35,738.93
Hearth - No Summer Emissions							
Landscape	0.25	0.04	3.09	0.00	0.01	0.01	5.62
Consumer Products	111.23						
Architectural Coatings	19.45						
TOTALS (lbs/day, unmitigated)	133.09	28.32	17.09	0.00	0.06	0.06	35,744.55

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	74.58	45.47	675.01	1.47	232.08	44.06	147,362.47
Regnl shop. center	112.73	95.30	1,341.90	3.02	481.91	91.29	303,279.26
TOTALS (lbs/day, unmitigated)	187.31	140.77	2,016.91	4.49	713.99	135.35	450,641.73

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 95 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/27/2007 4:01:00 PM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	106.37	6.42	dwelling units	2,464.00	15,818.88	135,246.68
Regnl shop. center		76.94	1000 sq ft	495.52	38,125.31	280,983.54
					53,944.19	416,230.22

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/27/2007 4:01:00 PM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

11/27/2007 4:01:43 PM

Urbemis 2007 Version 9.2.2

Combined Winter Emissions Reports (Pounds/Day)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\Swanston - Long Term Plan Area.urb9

Project Name: Swanston - Long Term Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2025 TOTALS (lbs/day unmitigated)	2,847.55	34.91	101.35	0.33	645.61	1.46	647.06	134.83	1.33	136.16	35,811.88

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	133.64	41.90	19.80	0.09	1.15	1.14	53,131.87

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	176.03	212.40	1,715.06	3.57	713.99	135.35	360,081.48

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	309.67	254.30	1,734.86	3.66	715.14	136.49	413,213.35

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 1/6/2025-2/21/2025 Active Days: 35	5.13	**34.91**	28.39	0.00	**645.61**	1.45	**647.06**	**134.83**	**1.33**	**136.16**	7,468.42
Mass Grading 01/06/2025-02/21/2025	5.13	34.91	28.39	0.00	645.61	1.45	647.06	134.83	1.33	136.16	7,468.42
Mass Grading Dust	0.00	0.00	0.00	0.00	645.60	0.00	645.60	134.83	0.00	134.83	0.00
Mass Grading Off Road Diesel	5.11	34.88	27.61	0.00	0.00	1.44	1.44	0.00	1.33	1.33	7,216.54
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.03	0.77	0.00	0.01	0.01	0.02	0.00	0.00	0.01	251.88
Time Slice 2/24/2025-3/7/2025 Active Days: 10	10.74	15.54	12.56	0.04	0.14	1.01	1.15	0.05	0.93	0.98	5,385.19
Asphalt 02/24/2025-03/07/2025	10.74	15.54	12.56	0.04	0.14	1.01	1.15	0.05	0.93	0.98	5,385.19
Paving Off-Gas	8.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	1.70	10.53	9.66	0.00	0.00	0.82	0.82	0.00	0.75	0.75	1,418.81
Paving On Road Diesel	0.58	4.99	2.48	0.04	0.13	0.19	0.32	0.04	0.18	0.22	3,826.44
Paving Worker Trips	0.01	0.02	0.43	0.00	0.01	0.00	0.01	0.00	0.00	0.00	139.93
Time Slice 3/10/2025-10/10/2025 Active Days: 155	4.55	22.86	**101.35**	**0.33**	1.41	**1.46**	2.87	0.50	1.28	1.78	**35,811.88**
Building 03/10/2025-10/10/2025	4.55	22.86	101.35	0.33	1.41	1.46	2.87	0.50	1.28	1.78	35,811.88
Building Off Road Diesel	1.71	10.50	12.03	0.00	0.00	0.50	0.50	0.00	0.46	0.46	2,259.28
Building Vendor Trips	1.33	9.75	17.34	0.10	0.36	0.48	0.84	0.12	0.43	0.55	10,142.47
Building Worker Trips	1.51	2.61	71.98	0.23	1.04	0.49	1.53	0.38	0.39	0.77	23,410.13
Time Slice 10/13/2025-11/14/2025 Active Days: 25	**2,847.55**	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90
Coating 10/13/2025-11/14/2025	2,847.55	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90
Architectural Coating	2,847.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.24	0.42	11.44	0.04	0.17	0.08	0.24	0.06	0.06	0.12	3,719.90

Phase Assumptions

Phase: Mass Grading 1/6/2025 - 2/21/2025 - Default Fine Site Grading Description

Total Acres Disturbed: 129.12

Maximum Daily Acreage Disturbed: 32.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

11/27/2007 4:01:43 PM

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/24/2025 - 3/7/2025 - Default Paving Description

Acres to be Paved: 32.28

Off-Road Equipment:

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 3/10/2025 - 10/10/2025 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2025 - 11/14/2025 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/27/2007 4:01:43 PM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	2.16	28.28	14.00	0.00	0.05	0.05	35,738.93
Hearth	0.80	13.62	5.80	0.09	1.10	1.09	17,392.94
Landscaping - No Winter Emissions							
Consumer Products	111.23						
Architectural Coatings	19.45						
TOTALS (lbs/day, unmitigated)	133.64	41.90	19.80	0.09	1.15	1.14	53,131.87

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	58.50	68.69	567.88	1.17	232.08	44.06	117,936.51
Regnl shop. center	117.53	143.71	1,147.18	2.40	481.91	91.29	242,144.97
TOTALS (lbs/day, unmitigated)	176.03	212.40	1,715.06	3.57	713.99	135.35	360,081.48

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Temperature (F): 50 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/27/2007 4:01:43 PM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	106.37	6.42	dwelling units	2,464.00	15,818.88	135,246.68
Regnl shop. center		76.94	1000 sq ft	495.52	38,125.31	280,983.54
					53,944.19	416,230.22

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/27/2007 4:01:43 PM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

11/27/2007 4:02:23 PM

Urbemis 2007 Version 9.2.2

Combined Annual Emissions Reports (Tons/Year)

File Name: P:\Projects - All Employees\51145.00 Swanston Station\Staff Folders\Angela\Swanston - Long Term Plan Area.urb9

Project Name: Swanston - Long Term Plan Area

Project Location: Sacramento County AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2025 TOTALS (tons/year unmitigated)	36.09	2.47	8.56	0.03	11.41	0.14	11.55	2.40	0.13	2.53	2,979.54

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	24.27	5.17	2.83	0.00	0.01	0.01	6,531.57

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	33.50	30.05	349.72	0.76	130.31	24.70	76,733.03

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	57.77	35.22	352.55	0.76	130.32	24.71	83,264.60

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2025	36.09	2.47	8.56	0.03	11.41	0.14	11.55	2.40	0.13	2.53	2,979.54
Mass Grading 01/06/2025-02/21/2025	0.09	0.61	0.50	0.00	11.30	0.03	11.32	2.36	0.02	2.38	130.70
Mass Grading Dust	0.00	0.00	0.00	0.00	11.30	0.00	11.30	2.36	0.00	2.36	0.00
Mass Grading Off Road Diesel	0.09	0.61	0.48	0.00	0.00	0.03	0.03	0.00	0.02	0.02	126.29
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.41
Asphalt 02/24/2025-03/07/2025	0.05	0.08	0.06	0.00	0.00	0.01	0.01	0.00	0.00	0.00	26.93
Paving Off-Gas	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.01	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.09
Paving On Road Diesel	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.13
Paving Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
Building 03/10/2025-10/10/2025	0.35	1.77	7.85	0.03	0.11	0.11	0.22	0.04	0.10	0.14	2,775.42
Building Off Road Diesel	0.13	0.81	0.93	0.00	0.00	0.04	0.04	0.00	0.04	0.04	175.09
Building Vendor Trips	0.10	0.76	1.34	0.01	0.03	0.04	0.07	0.01	0.03	0.04	786.04
Building Worker Trips	0.12	0.20	5.58	0.02	0.08	0.04	0.12	0.03	0.03	0.06	1,814.29
Coating 10/13/2025-11/14/2025	35.59	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.50
Architectural Coating	35.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.50

Phase Assumptions

Phase: Mass Grading 1/6/2025 - 2/21/2025 - Default Fine Site Grading Description

Total Acres Disturbed: 129.12

Maximum Daily Acreage Disturbed: 32.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

2 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 2/24/2025 - 3/7/2025 - Default Paving Description

Acres to be Paved: 32.28

Off-Road Equipment:

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 3/10/2025 - 10/10/2025 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 10/13/2025 - 11/14/2025 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

11/27/2007 4:02:23 PM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.39	5.16	2.55	0.00	0.01	0.01	6,522.36
Hearth	0.01	0.01	0.00	0.00	0.00	0.00	8.70
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	20.30						
Architectural Coatings	3.55						
TOTALS (tons/year, unmitigated)	24.27	5.17	2.83	0.00	0.01	0.01	6,531.57

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with natural gas fireplaces changed from 65% to 100%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments low rise	12.63	9.71	116.67	0.25	42.36	8.04	25,103.57
Regnl shop. center	20.87	20.34	233.05	0.51	87.95	16.66	51,629.46
TOTALS (tons/year, unmitigated)	33.50	30.05	349.72	0.76	130.31	24.70	76,733.03

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

11/27/2007 4:02:23 PM

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments low rise	106.37	6.42	dwelling units	2,464.00	15,818.88	135,246.68
Regnl shop. center		76.94	1000 sq ft	495.52	38,125.31	280,983.54
					53,944.19	416,230.22

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.5	0.0	100.0	0.0
Light Truck < 3750 lbs	10.0	0.0	98.0	2.0
Light Truck 3751-5750 lbs	22.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	10.2	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.9	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	1.6	0.0	18.8	81.2
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	10.8	7.3	7.3
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

11/27/2007 4:02:23 PM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

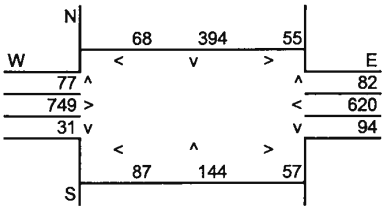
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2008

Roadway Data

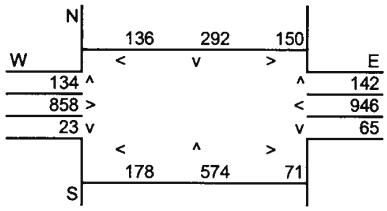
Intersection: Arden Way and Del Paso Boulevard
Analysis Condition: Baseline Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Del Paso Boulevard	At Grade	4	5	5
East-West Roadway:	Arden Way	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	820	N-S Road:	1,428
E-W Road:	1,657	E-W Road:	2,275

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	820	9.53	0.20	0.17	0.13
East-West Road	7.0	5.4	3.8	1,657	9.53	1.11	0.85	0.60
P.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	1,428	9.53	0.35	0.30	0.23
East-West Road	7.0	5.4	3.8	2,275	9.53	1.52	1.17	0.82

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	1.3	1.9	5.0
50 Feet from Roadway Edge	1.0	1.5	4.7
100 Feet from Roadway Edge	0.7	1.1	4.3

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

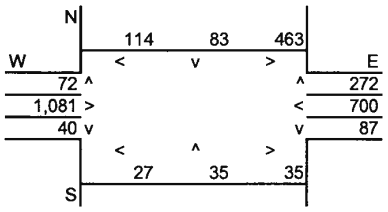
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2008

Roadway Data

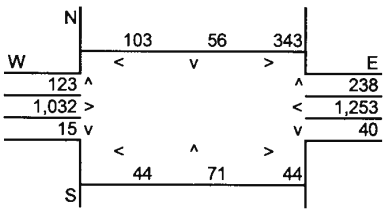
Intersection: Arden Way and Harvard Street
Analysis Condition: Baseline Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Harvard Street	At Grade	2	5	5
East-West Roadway:	Arden Way	At Grade	6	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	1,039	N-S Road:	934
E-W Road:	2,638	E-W Road:	2,950

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	1,039	9.53	0.27	0.22	0.17
East-West Road	6.1	4.9	3.5	2,638	9.53	1.53	1.23	0.88
P.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	934	9.53	0.24	0.20	0.15
East-West Road	6.1	4.9	3.5	2,950	9.53	1.71	1.38	0.98

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	1.8	2.0	5.1
50 Feet from Roadway Edge	1.4	1.6	4.8
100 Feet from Roadway Edge	1.0	1.1	4.4

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

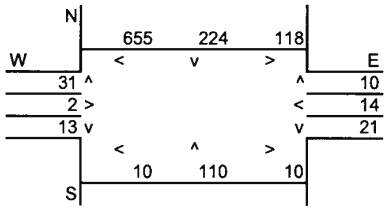
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2008

Roadway Data

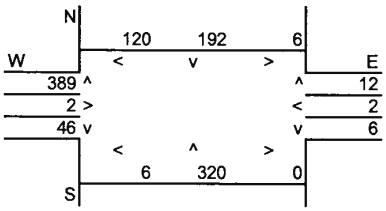
Intersection: Auburn Boulevard/Van Ness Street and Frienza Avenue
Analysis Condition: Baseline Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Auburn Boulevard/Van Ness	At Grade	2	5	5
East-West Roadway:	Frienza Avenue	At Grade	2	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	1,148	N-S Road:	1,039
E-W Road:	725	E-W Road:	565

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	7.6	5.7	4.0	1,148	9.53	0.83	0.62	0.44
East-West Road	2.7	2.2	1.7	725	9.53	0.19	0.15	0.12
P.M. Peak Traffic Hour								
North-South Road	7.6	5.7	4.0	1,039	9.53	0.75	0.56	0.40
East-West Road	2.7	2.2	1.7	565	9.53	0.15	0.12	0.09

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	1.0	0.9	4.3
50 Feet from Roadway Edge	0.8	0.7	4.1
100 Feet from Roadway Edge	0.6	0.5	3.9

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

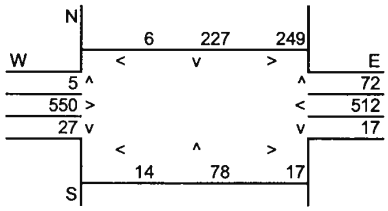
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2008

Roadway Data

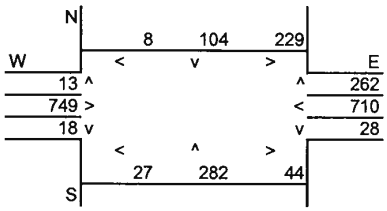
Intersection: El Camino Avenue and Evergreen Street
Analysis Condition: Baseline Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Evergreen Street	At Grade	2	5	5
East-West Roadway:	El Camino Avenue	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	637	N-S Road:	898
E-W Road:	1,417	E-W Road:	2,022

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	637	9.53	0.16	0.13	0.10
East-West Road	7.0	5.4	3.8	1,417	9.53	0.95	0.73	0.51
P.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	898	9.53	0.23	0.19	0.15
East-West Road	7.0	5.4	3.8	2,022	9.53	1.35	1.04	0.73

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	1.1	1.6	4.8
50 Feet from Roadway Edge	0.9	1.2	4.5
100 Feet from Roadway Edge	0.6	0.9	4.2

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

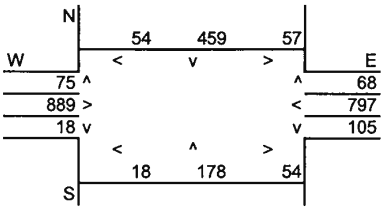
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

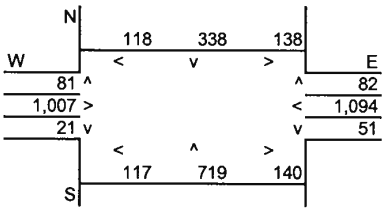
Intersection: Arden Way and Del Paso Boulevard
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Del Paso Boulevard	At Grade	4	5	5
East-West Roadway:	Arden Way	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	891	N-S Road:	1,476
E-W Road:	1,970	E-W Road:	2,512

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	891	2.09	0.05	0.04	0.03
East-West Road	7.0	5.4	3.8	1,970	2.09	0.29	0.22	0.16
P.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	1,476	2.09	0.08	0.07	0.05
East-West Road	7.0	5.4	3.8	2,512	2.09	0.37	0.28	0.20

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.3	0.4	3.9
50 Feet from Roadway Edge	0.3	0.4	3.8
100 Feet from Roadway Edge	0.2	0.3	3.7

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

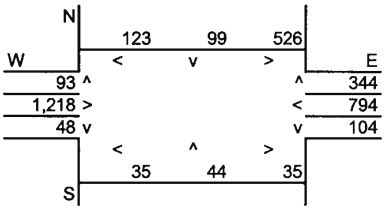
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

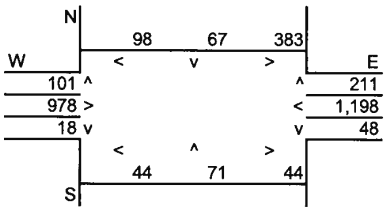
Intersection: Arden Way and Harvard Street
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Harvard Street	At Grade	2	5	5
East-West Roadway:	Arden Way	At Grade	6	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	1,229	N-S Road:	931
E-W Road:	3,021	E-W Road:	2,862

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	1,229	2.09	0.07	0.06	0.04
East-West Road	6.1	4.9	3.5	3,021	2.09	0.38	0.31	0.22
P.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	931	2.09	0.05	0.04	0.03
East-West Road	6.1	4.9	3.5	2,862	2.09	0.36	0.29	0.21

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.5	0.4	3.9
50 Feet from Roadway Edge	0.4	0.3	3.8
100 Feet from Roadway Edge	0.3	0.2	3.7

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

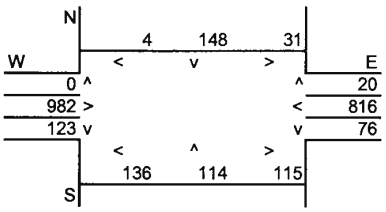
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

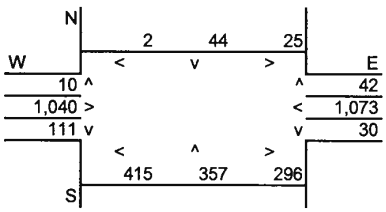
Intersection: Arden Way and Royal Oaks/Beaumont Street
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Royal Oaks/Beaumont Stree	At Grade	2	5	5
East-West Roadway:	Arden Way	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	712	N-S Road:	1,253
E-W Road:	2,061	E-W Road:	2,651

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	712	2.09	0.04	0.03	0.03
East-West Road	7.0	5.4	3.8	2,061	2.09	0.30	0.23	0.16
P.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	1,253	2.09	0.07	0.06	0.04
East-West Road	7.0	5.4	3.8	2,651	2.09	0.39	0.30	0.21

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.3	0.5	3.9
50 Feet from Roadway Edge	0.3	0.4	3.8
100 Feet from Roadway Edge	0.2	0.3	3.7

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

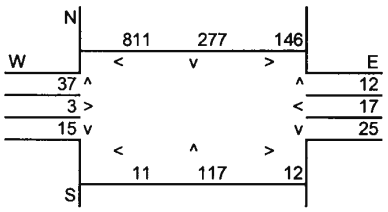
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

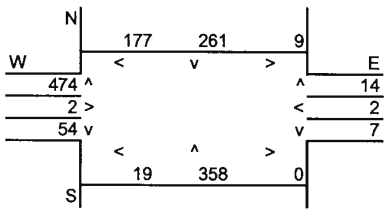
Intersection: Auburn Boulevard/Van Ness Street and Frienza Avenue
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Auburn Boulevard/Van Ness	At Grade	2	5	5
East-West Roadway:	Frienza Avenue	At Grade	2	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	1,400	N-S Road:	1,293
E-W Road:	894	E-W Road:	728

Roadway CO Contributions and Concentrations
Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	7.6	5.7	4.0	1,400	2.09	0.22	0.17	0.12
East-West Road	2.7	2.2	1.7	894	2.09	0.05	0.04	0.03
P.M. Peak Traffic Hour								
North-South Road	7.6	5.7	4.0	1,293	2.09	0.21	0.15	0.11
East-West Road	2.7	2.2	1.7	728	2.09	0.04	0.03	0.03

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations
Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.3	0.2	3.7
50 Feet from Roadway Edge	0.2	0.2	3.7
100 Feet from Roadway Edge	0.1	0.1	3.6

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

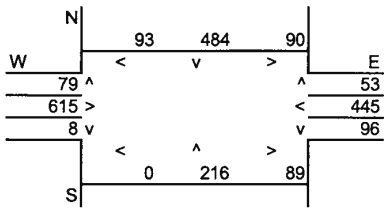
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

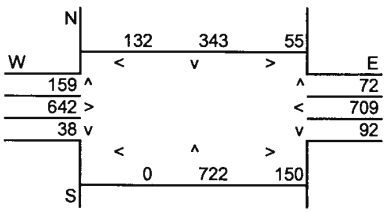
Intersection: El Camino Avenue and Del Paso Road
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Del Paso Road	At Grade	4	5	5
East-West Roadway:	El Camino Avenue	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	1,015	N-S Road:	1,483
E-W Road:	1,388	E-W Road:	1,720

Roadway CO Contributions and Concentrations

Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	1,015	2.09	0.06	0.05	0.04
East-West Road	7.0	5.4	3.8	1,388	2.09	0.20	0.16	0.11
P.M. Peak Traffic Hour								
North-South Road	2.6	2.2	1.7	1,483	2.09	0.08	0.07	0.05
East-West Road	7.0	5.4	3.8	1,720	2.09	0.25	0.19	0.14

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations

Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.3	0.3	3.8
50 Feet from Roadway Edge	0.2	0.3	3.7
100 Feet from Roadway Edge	0.1	0.2	3.7

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

SIMPLIFIED CALINE4 CARBON MONOXIDE ANALYSIS

Project Number: D51145.00
Project Title: Swanston Station Transit Village

Background Information

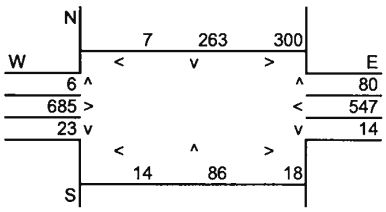
Nearest Air Monitoring Station measuring CO:	Del Paso Manor Station
Background 1-hour CO Concentration (ppm):	0.0
Background 8-hour CO Concentration (ppm):	3.5
Persistence Factor:	0.8
Analysis Year:	2025

Roadway Data

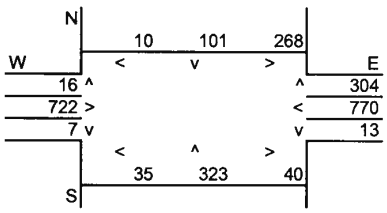
Intersection: El Camino Avenue and Del Paso Road
Analysis Condition: Cumulative Plus Project

		Roadway Type	No. of Lanes	Average Speed A.M.	Average Speed P.M.
North-South Roadway:	Evergreen Street	At Grade	2	5	5
East-West Roadway:	El Camino Avenue	At Grade	4	5	5

A.M. Peak Hour Traffic Volumes



P.M. Peak Hour Traffic Volumes



Highest Traffic Volumes (Vehicles per Hour)

N-S Road:	742	N-S Road:	1,022
E-W Road:	1,644	E-W Road:	2,117

Roadway CO Contributions and Concentrations
Emissions = (A x B x C) / 100,000[1]

Roadway	A_1 Reference CO Concentrations 25 Feet	A_2 50 Feet	A_3 100 Feet	B Traffic Volume	C Emission Factors[2]	Estimated CO Concentrations 25 Feet	50 Feet	100 Feet
A.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	742	2.09	0.04	0.03	0.03
East-West Road	7.0	5.4	3.8	1,644	2.09	0.24	0.19	0.13
P.M. Peak Traffic Hour								
North-South Road	2.7	2.2	1.7	1,022	2.09	0.06	0.05	0.04
East-West Road	7.0	5.4	3.8	2,117	2.09	0.31	0.24	0.17

[1] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).
[2] Emission factors from EMFAC2002 (2003).

Total Roadway CO Concentrations
Peak Hour Emissions = North-South Concentration + East-West Concentration + Background 1-hour Concentration[2]
8-Hour Emissions = ((Highest Peak Hour Concentration - Background 1-hour Concentration) x Persistence Factor) + Background 8-hour Concentration[2]

	A.M. Peak Hour	P.M. Peak Hour	8-Hour
25 Feet from Roadway Edge	0.3	0.4	3.8
50 Feet from Roadway Edge	0.2	0.3	3.7
100 Feet from Roadway Edge	0.2	0.2	3.7

[2] Methodology from Bay Area Air Quality Management District *BAAQMD CEQA Guidelines* (1996).

Swanston Station Transit Village Specific Plan Greenhouse Gas Emissions from Electricity Use (Update Jan 09)

Source	Electricity Use MWh/year	GHG Emissions (tons/year) CO2	N2O	CH4	CO2 Equivalent Emissions (tons/year) CO2	N2O	CH4	Total
State of California	272,464,000	109,604,093	504.1	912.8	109,604,093	156,258.1	19,167.8	109,779,519
Sacramento County	10,574,000	4,253,603	19.6	35.4	4,253,603	6,064.2	743.9	4,260,411
City of Sacramento	3,363,000	1,352,834	6.2	11.3	1,352,834	1,928.7	236.6	1,354,999
Project*	64,209	25,829	0.1	0.2	25,829	36.8	4.5	25,871

* Based on SMUD demand estimates.
The annual electricity use of the project was estimated by multiplying this demand by the number of hours in a year (8,760 hours).
Emission factors taken from California Climate Action Registry General Reporting Protocol, Version 2.2, March 2007; Appendix C, Table C1 & C2

Project Greenhouse Gas Emissions from Natural Gas Use

Source	Natural Gas Use Therms/year	GHG Emissions (tons/year) CO2	N2O	CH4	CO2 Equivalent Emissions (tons/year) CO2	N2O	CH4	Total
Project	2,928,538	17,045	0.03	1.90	17,045	10.0	40.0	17,095

Emission factors taken from California Climate Action Registry General Reporting Protocol, Version 2.2, March 2007; Appendix C, Table C1

Project Greenhouse Gas Emissions from Solid Waste

Source	Solid Waste tons/year	Landfill Gas tons/year	GHG Emissions (tons/year) CO2	CH4	CO2 Equivalent Emissions Emissions (tons/year) CO2	CH4	Total
City of Sacramento							
2005	291,691	33,106.3	21,067.7	12,038.7	21,067.7	252,812.1	273,880
2005 (including private hauling)	632,800	71,821.5	45,704.6	26,116.9	45,704.6	548,455.4	594,160
Project	3,321	376.9	239.9	137.1	239.9	2,878.4	3,118

Methodology and emission factors from State Workbook: Methodologies for Estimating Greenhouse Gas Emissions (pages 5-1 to 5-3).

Appendix C

Biological Resources

- US Fish and Wildlife Service Species List
- California Department of Fish and Game Natural Diversity Database
- California Native Plant Society Inventory of Rare and Endangered Plants

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

August 20, 2007

Document Number: 070820032405

Mr. Christopher Bronny
PBS&J
1200 Second Street, Suite 200
Sacramento, CA 95814

Subject: Species List for Swanston Station

Dear: Mr. Bronny

We are sending this official species list in response to your August 20, 2007 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area.* For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 18, 2007.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 070820032405

Database Last Updated: August 16, 2007

Quad Lists

Listed Species

Invertebrates

Branchinecta conservatio

Conservancy fairy shrimp (E)

Branchinecta lynchi

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

Critical habitat, valley elderberry longhorn beetle (X)

valley elderberry longhorn beetle (T)

Lepidurus packardi

Critical habitat, vernal pool tadpole shrimp (X)

vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

Critical Habitat, Central Valley spring-run chinook (X) (NMFS)

Critical habitat, winter-run chinook salmon (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana aurora draytonii

California red-legged frog (T)

Reptiles

Thamnophis gigas

giant garter snake (T)

Plants

Orcuttia tenuis

Critical habitat, slender Orcutt grass (X)

slender Orcutt grass (T)

Orcuttia viscida

Critical habitat, Sacramento Orcutt grass (X)

Sacramento Orcutt grass (E)

Candidate Species

Birds

Coccyzus americanus occidentalis

Western yellow-billed cuckoo (C)

Quads Containing Listed, Proposed or Candidate Species:

ELK GROVE (496A)

FLORIN (496B)

CLARKSBURG (497A)

CITRUS HEIGHTS (512A)

RIO LINDA (512B)

SACRAMENTO EAST (512C)

CARMICHAEL (512D)

TAYLOR MONUMENT (513A)

SACRAMENTO WEST (513D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The Unit States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by th list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in y quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat b air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Pl Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habit requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by yo project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act a "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, ther that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize th impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, the you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affectec the project, we recommend that you work with this office and the California Department of Fish and Game to devel plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related los habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide neec

space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shel and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species l Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we ha enough scientific information to eventually propose them for listing as threatened or endangered. By considering these spe early in your planning process you may be able to avoid the problems that could develop if one of these candidates was list before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies a organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate spec in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 18, 2007.

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	***Accipiter cooperii*** Cooper's hawk	ABNKC12040			G5	S3	SC
2	***Actinemys marmorata*** western pond turtle	ARAAD02030			G3G4	S3	SC
3	***Actinemys marmorata marmorata*** northwestern pond turtle	ARAAD02031			G3G4T3	S3	SC
4	***Agelaius tricolor*** tricolored blackbird	ABPBXB0020			G2G3	S2	SC
5	***Andrena subapasta*** A vernal pool andrenid bee	IIHYM35050			G1G3	S1S3	
6	***Archoplites interruptus*** Sacramento perch	AFCQB07010			G3	S1	SC
7	***Ardea alba*** great egret	ABNGA04040			G5	S4	
8	***Ardea herodias*** great blue heron	ABNGA04010			G5	S4	
9	***Athene cunicularia*** burrowing owl	ABNSB10010			G4	S2	SC
10	***Branchinecta lynchi*** vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
11	***Branchinecta mesovallensis*** midvalley fairy shrimp	ICBRA03150			G2	S2	
12	***Buteo regalis*** ferruginous hawk	ABNKC19120			G4	S3S4	SC
13	***Buteo swainsoni*** Swainson's hawk	ABNKC19070		Threatened	G5	S2	
14	***Coccyzus americanus occidentalis*** western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T2	S1	
15	***Desmocerus californicus dimorphus*** valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
16	***Downingia pusilla*** dwarf downingia	PDCAM060C0			G3	S3.1	2.2
17	***Dumontia oregonensis*** A water flea	ICBRA23010			G1G3	S1	
18	***Egretta thula*** snowy egret	ABNGA06030			G5	S4	
19	***Elanus leucurus*** white-tailed kite	ABNKC06010			G5	S3	
20	***Elderberry Savanna***	CTT63440CA			G2	S2.1	
21	***Gratiola heterosepala*** Boggs Lake hedge-hyssop	PDSCR0R060		Endangered	G3	S3.1	1B.2
22	***Great Valley Cottonwood Riparian Forest***	CTT61410CA			G2	S2.1	
23	***Great Valley Valley Oak Riparian Forest***	CTT61430CA			G1	S1.1	
24	***Hibiscus lasiocarpus*** rose-mallow	PDMAL0H0Q0			G4	S2.2	2.2
25	***Hydrochara ricksecker*** Ricksecker's water scavenger beetle	IICOL5V010			G1G2	S1S2	

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
26	***Juglans hindsii*** Northern California black walnut	PDJUG02040			G1	S1.1	1B.1
27	***Juncus leiospermus var. ahartii*** Ahart's dwarf rush	PMJUN011L1			G2T1	S1.2	1B.2
28	***Lasiurus cinereus*** hoary bat	AMACC05030			G5	S4?	SC
29	***Legenere limosa*** legenere	PDCAM0C010			G2	S2.2	1B.1
30	***Lepidurus packardi*** vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
31	***Linderiella occidentalis*** California linderiella	ICBRA06010			G3	S2S3	
32	***Northern Claypan Vernal Pool***	CTT44120CA			G1	S1.1	
33	***Northern Hardpan Vernal Pool***	CTT44110CA			G3	S3.1	
34	***Northern Volcanic Mud Flow Vernal Pool***	CTT44132CA			G1	S1.1	
35	***Nycticorax nycticorax*** black-crowned night heron	ABNGA11010			G5	S3	
36	***Orcuttia tenuis*** slender orcutt grass	PMPOA4G050	Threatened	Endangered	G3	S3.1	1B.1
37	***Orcuttia viscida*** Sacramento orcutt grass	PMPOA4G070	Endangered	Endangered	G1	S1.1	1B.1
38	***Phalacrocorax auritus*** double-crested cormorant	ABNFD01020			G5	S3	SC
39	***Pogonichthys macrolepidotus*** Sacramento splittail	AFCJB34020			G2	S2	SC
40	***Progne subis*** purple martin	ABPAU01010			G5	S3	SC
41	***Riparia riparia*** bank swallow	ABPAU08010		Threatened	G5	S2S3	
42	***Sagittaria sanfordii*** Sanford's arrowhead	PMALI040Q0			G3	S3.2	1B.2
43	***Spea hammondii*** western spadefoot	AAABF02020			G3	S3	SC
44	***Taxidea taxus*** American badger	AMAJF04010			G5	S4	SC
45	***Thamnophis gigas*** giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
46	***Xanthocephalus xanthocephalus*** yellow-headed blackbird	ABPBXB3010			G5	S3S4	

Inventory of Rare and Endangered Plants

v7-07c 7-09-07

Status: search results - Mon, Aug. 20, 2007 14:17 c

{QUADS_123} =~ m/512C|496A|496B|513D|513A|497A|512D|512/ Search

Tip: `Lathyrus Astragalus` returns species from both genera.[all tips and help.]
[search history]

Your Quad Selection: Sacramento East (512C) 3812154, Elk Grove (496A) 3812143, Florin (496B) 3812144, Sacramento West (513D) 3812155, Taylor Monument (513A) 3812165, Clarksburg (497A) 3812145, Carmichael (512D) 3812153, Citrus Heights (512A) 3812163, Rio Linda (512B) 3812164

Hits 1 to 9 of 9

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

open	save	hits	scientific	common	family	CNPS
		1	Downingia pusilla	dwarf downingia	Campanulaceae	List 2.2
		1	Gratiola heterosepala	Boggs Lake hedge-hyssop	Scrophulariaceae	List 1B.2
		1	Hibiscus lasiocarpus	rose-mallow	Malvaceae	List 2.2
		1	Juglans hindsii	Northern California black walnut	Juglandaceae	List 1B.1
		1	Juncus leiospermus var. ahartii	Ahart's dwarf rush	Juncaceae	List 1B.2
		1	Legenere limosa	legenere	Campanulaceae	List 1B.1
		1	Orcuttia tenuis	slender Orcutt grass	Poaceae	List 1B.1
		1	Orcuttia viscida	Sacramento Orcutt grass	Poaceae	List 1B.1
		1	Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	List 1B.2

To save selected records for later study, click the ADD button.

ADD checked items to Plant Press | check all | check none

Selections will appear in a new window.

No more hits.

Appendix D

Noise

- Traffic Noise Model Results

PBS&J
A. Campbell

20 November 2007
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Swanston Station
RUN: Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	74.2	66	74.2	10	Snd Lvl	74.2	0.0	8	-8.0
Receiver2	2	1	0.0	74.2	66	74.2	10	Snd Lvl	74.2	0.0	8	-8.0
Receiver3	3	1	0.0	60.1	66	60.1	10	----	60.1	0.0	8	-8.0
Receiver4	4	1	0.0	64.0	66	64.0	10	----	64.0	0.0	8	-8.0
Receiver5	5	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PBS&J
A. Campbell

20 November 2007
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Swanston Station
RUN: Baseline
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	74.3	66	74.3	10	Snd Lvl	74.3	0.0	8	-8.0
Receiver2	2	1	0.0	74.7	66	74.7	10	Snd Lvl	74.7	0.0	8	-8.0
Receiver3	3	1	0.0	60.2	66	60.2	10	----	60.2	0.0	8	-8.0
Receiver4	4	1	0.0	64.1	66	64.1	10	----	64.1	0.0	8	-8.0
Receiver5	5	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PBS&J
A. Campbell

20 November 2007
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Swanston Station
RUN: Baseline With Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type Impact	Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	74.1	66	74.1	10	Snd Lvl	74.1	0.0	8	-8.0
Receiver2	2	1	0.0	74.6	66	74.6	10	Snd Lvl	74.6	0.0	8	-8.0
Receiver3	3	1	0.0	60.0	66	60.0	10	----	60.0	0.0	8	-8.0
Receiver4	4	1	0.0	63.4	66	63.4	10	----	63.4	0.0	8	-8.0
Receiver5	5	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PBS&J
A. Campbell

20 November 2007
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Swanston Station
RUN: Cumulative
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type Impact	Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	74.5	66	74.5	10	Snd Lvl	74.5	0.0	8	-8.0
Receiver2	2	1	0.0	75.5	66	75.5	10	Snd Lvl	75.5	0.0	8	-8.0
Receiver3	3	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
Receiver4	4	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
Receiver5	5	1	0.0	66.0	66	66.0	10	Snd Lvl	66.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PBS&J
A. Campbell

20 November 2007
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Swanston Station
RUN: Cumulative With Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type Impact	Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	74.4	66	74.4	10	Snd Lvl	74.4	0.0	8	-8.0
Receiver2	2	1	0.0	75.3	66	75.3	10	Snd Lvl	75.3	0.0	8	-8.0
Receiver3	3	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0
Receiver4	4	1	0.0	63.6	66	63.6	10	----	63.6	0.0	8	-8.0
Receiver5	5	1	0.0	65.9	66	65.9	10	----	65.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PBSJ
Hornek
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Hornek
RUN: I80 Swanston
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

28 January 2009
TNM 2.5
Calculated with TNM 2.5
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	77.2	66	77.2	10	Snd Lvl	77.2	0.0	8	-8.0
Receiver2	2	1	0.0	70.6	66	70.6	10	Snd Lvl	70.6	0.0	8	-8.0
Receiver3	3	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
Receiver4	4	1	0.0	57.8	66	57.8	10	----	57.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Appendix E

Traffic

- Traffic Count Data
- Worksheets for Existing Conditions
- Worksheets for Baseline Conditions
- Worksheets for Baseline plus Proposed Project Conditions
- Worksheets for Cumulative (2025) No Project Conditions
- Worksheets for Cumulative (2025) Plus Proposed Project Conditions

Traffic Impact Analysis

Technical Appendix

Swanston Station Transit Village Plan Draft EIR

Sacramento, California

November 19, 2007

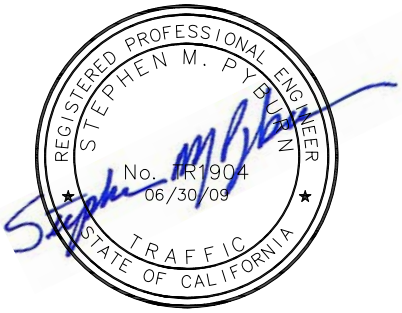
Prepared for:

City of Sacramento, California

Prepared by:

Kimley-Horn and Associates, Inc.
1430 Blue Oaks Boulevard, Suite 120
Roseville, California 95747

Phone: (916) 797-3811
Fax: (916) 797-3804



Appendix E-1:

Traffic Count Data

WILTEC

Phone: (925) 706-9911 Fax: (925) 706-9914

5-LEG INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIOD: 7:00 A.M. TO 9:00 A.M.
INTERSECTION: N/S DEL PASO ROAD
E/W EL CAMINO AVENUE

15 MIN COUNTS

	DEL PASO BLVD				EL CAMINO AVENUE				BEAUMONT STREET				DEL PASO BLVD				EL CAMINO AVENUE				
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	TOTALS
700-715	9	56	13	12	6	66	19	1	0	0	0	0	3	17	21	2	1	5	61	5	297
715-730	13	77	15	15	9	77	19	3	0	0	0	0	2	14	35	1	4	2	100	7	393
730-745	25	76	20	18	8	83	19	2	0	0	0	0	0	10	36	1	1	1	112	17	429
745-800	14	85	16	13	15	92	32	2	0	0	0	0	0	16	48	0	0	3	113	18	467
800-815	11	86	17	18	19	96	22	2	0	0	0	0	0	19	41	0	2	5	106	11	455
815-830	12	70	22	16	17	90	30	0	0	0	0	0	1	17	49	0	1	1	111	11	448
830-845	17	53	4	19	19	79	23	1	0	0	0	0	0	18	40	0	2	2	105	11	393
845-900	22	45	15	21	31	92	29	0	0	0	0	0	0	18	49	0	1	4	110	19	456

HOUR TOTALS

	DEL PASO BLVD				EL CAMINO AVENUE				BEAUMONT STREET				DEL PASO BLVD				EL CAMINO AVENUE				
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	TOTALS
700-800	61	294	64	58	38	318	89	8	0	0	0	0	5	57	140	4	6	11	386	47	1586
715-815	63	324	68	64	51	348	92	9	0	0	0	0	2	59	160	2	7	11	431	53	1744
730-830	62	317	75	65	59	361	103	6	0	0	0	0	1	62	174	1	4	10	442	57	1799
745-845	54	294	59	66	70	357	107	5	0	0	0	0	1	70	178	0	5	11	435	51	1763
800-900	62	254	58	74	86	357	104	3	0	0	0	0	1	72	179	0	6	12	432	52	1752

WILTEC

Phone: (925) 706-9911 Fax: (925) 706-9914

5-LEG INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S DEL PASO BLVD
E/W EL CAMINO AVENUE

15 MIN COUNTS

	DEL PASO BLVD				EL CAMINO AVENUE				BEAUMONT STREET				DEL PASO BLVD				EL CAMINO AVENUE				
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	TOTALS
400-415	13	52	8	27	26	144	36	9	0	0	0	0	1	38	112	0	3	6	112	22	609
415-430	14	52	6	18	19	142	20	5	0	0	0	0	1	40	115	0	5	5	145	30	617
430-445	19	57	15	23	27	137	22	3	0	0	0	0	1	43	122	0	3	1	131	29	633
445-500	29	43	4	22	23	148	20	0	0	0	0	0	0	29	113	0	5	0	132	32	600
500-515	16	57	5	18	16	128	28	1	0	0	0	0	1	36	134	0	2	4	129	37	612
515-530	17	50	5	19	28	132	25	2	0	0	0	0	2	24	116	0	5	1	127	41	594
530-545	23	53	10	12	20	134	28	3	0	0	0	0	0	42	121	0	4	2	141	30	623
545-600	19	53	9	25	18	153	15	3	0	0	0	0	1	28	121	0	4	2	123	28	602

HOUR TOTALS

	DEL PASO BLVD				EL CAMINO AVENUE				BEAUMONT STREET				DEL PASO BLVD				EL CAMINO AVENUE				
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	TOTALS
400-500	75	204	33	90	95	571	98	17	0	0	0	0	3	150	462	0	16	12	520	113	2459
415-500	78	209	30	81	85	555	90	9	0	0	0	0	3	148	484	0	15	10	537	128	2462
430-530	81	207	29	82	94	545	95	6	0	0	0	0	4	132	485	0	15	6	519	139	2439
445-545	85	203	24	71	87	542	101	6	0	0	0	0	3	131	484	0	16	7	529	140	2429
500-600	75	213	29	74	82	547	96	9	0	0	0	0	4	130	492	0	15	9	520	136	2431

WILTEC

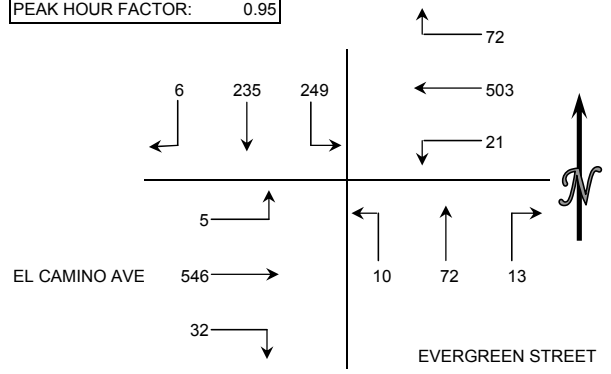
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S EVERGREEN STREET
E/W EL CAMINO AVENUE

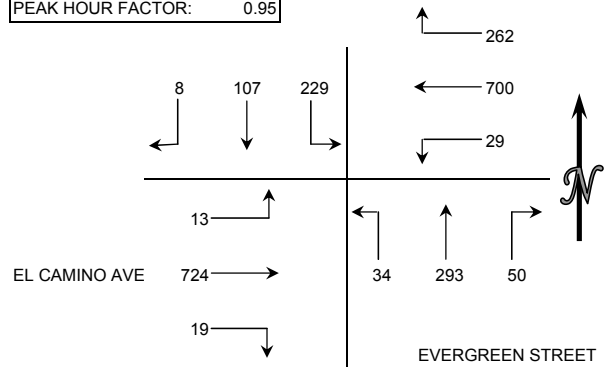
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	1	60	69	20	108	4	2	10	4	10	97	1	386
715-730	3	58	61	16	117	10	3	14	3	7	138	0	430
730-745	1	60	73	19	131	2	6	17	3	9	139	3	463
745-800	0	59	57	24	139	3	4	16	1	11	133	2	449
800-815	2	58	58	13	116	6	0	25	3	5	136	0	422
815-830	1	49	60	19	122	5	5	17	6	9	130	3	426
830-845	1	45	44	24	125	6	3	13	6	4	117	1	389
845-900	1	36	41	28	122	11	8	27	3	8	116	0	401
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	5	237	260	79	495	19	15	57	11	37	507	6	1728
715-815	6	235	249	72	503	21	13	72	10	32	546	5	1764
730-830	4	226	248	75	508	16	15	75	13	34	538	8	1760
745-845	4	211	219	80	502	20	12	71	16	29	516	6	1686
800-900	5	188	203	84	485	28	16	82	18	26	499	4	1638

AM PEAK HOUR: 715-815
PEAK HOUR FACTOR: 0.95



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	2	19	48	52	150	9	11	37	10	3	133	2	476
415-430	2	25	69	52	156	11	9	42	7	5	172	3	553
430-445	1	29	55	71	168	6	9	66	10	4	194	2	615
445-500	2	30	51	50	175	7	12	57	12	3	181	1	581
500-515	1	17	58	67	186	4	11	74	8	6	187	6	625
515-530	4	31	65	74	171	12	18	96	4	6	162	4	647
530-545	1	22	27	46	159	2	15	69	9	11	154	8	523
545-600	3	30	52	51	151	4	8	49	5	5	151	3	512
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	7	103	223	225	649	33	41	202	39	15	680	8	2225
415-515	6	101	233	240	685	28	41	239	37	18	734	12	2374
430-530	8	107	229	262	700	29	50	293	34	19	724	13	2468
445-545	8	100	201	237	691	25	56	296	33	26	684	19	2376
500-600	9	100	202	238	667	22	52	288	26	28	654	21	2307

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.95



WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S LEXINGTON STREET
E/W EL CAMINO AVENUE

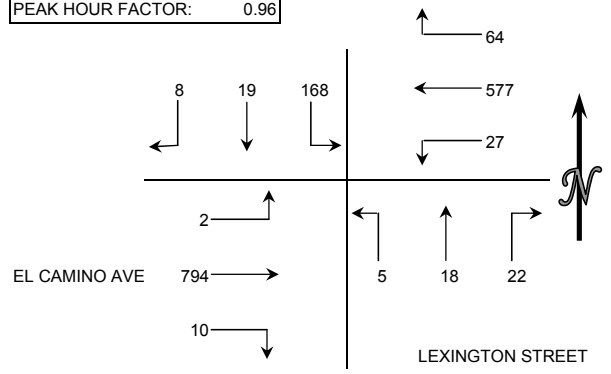
15 MIN COUNTS — 7:00 AM TO 9:00 AM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	0	2	27	7	85	3	1	1	1	1	113	0	241
715-730	0	1	34	8	105	2	5	2	1	0	154	0	312
730-745	1	3	40	15	137	6	6	4	2	1	179	0	394
745-800	2	6	46	21	147	4	3	4	1	1	194	0	429
800-815	1	3	45	15	153	4	5	5	2	3	211	1	448
815-830	4	4	38	15	132	9	2	1	1	4	199	0	409
830-845	1	6	39	13	145	10	12	8	1	2	190	1	428
845-900	2	4	22	23	141	5	6	3	1	2	160	0	369

HOUR TOTALS

TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	3	12	147	51	474	15	15	11	5	3	640	0	1376
715-815	4	13	165	59	542	16	19	15	6	5	738	1	1583
730-830	8	16	169	66	569	23	16	14	6	9	783	1	1680
745-845	8	19	168	64	577	27	22	18	5	10	794	2	1714
800-900	8	17	144	66	571	28	25	17	5	11	760	2	1654

AM PEAK HOUR: 745-845
PEAK HOUR FACTOR: 0.96



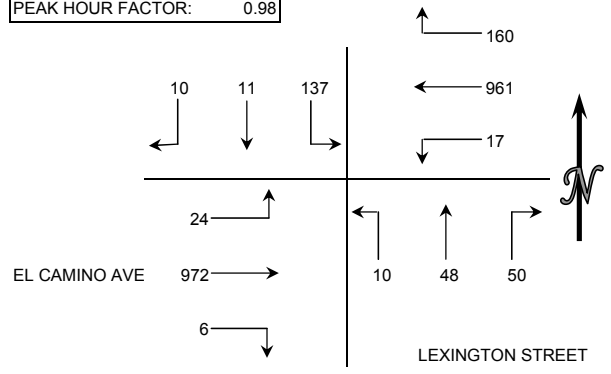
15 MIN COUNTS — 4:00 PM TO 6:00 PM

PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	9	6	36	50	235	8	21	10	2	1	228	8	614
415-430	7	6	34	38	230	2	12	4	1	2	226	11	573
430-445	4	1	43	38	239	3	13	7	3	0	250	4	605
445-500	2	1	27	54	244	7	14	4	2	4	248	6	613
500-515	3	5	26	35	256	3	12	6	3	0	242	6	597
515-530	1	4	41	33	222	4	11	31	2	2	232	8	591
530-545	2	5	33	16	209	1	4	3	1	2	207	1	484
545-600	3	2	17	54	187	3	9	4	1	1	194	2	477

HOUR TOTALS

TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	22	14	140	180	948	20	60	25	8	7	952	29	2405
415-515	16	13	130	165	969	15	51	21	9	6	966	27	2388
430-530	10	11	137	160	961	17	50	48	10	6	972	24	2406
445-545	8	15	127	138	931	15	41	44	8	8	929	21	2285
500-600	9	16	117	138	874	11	36	44	7	5	875	17	2149

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.98



WILTEC

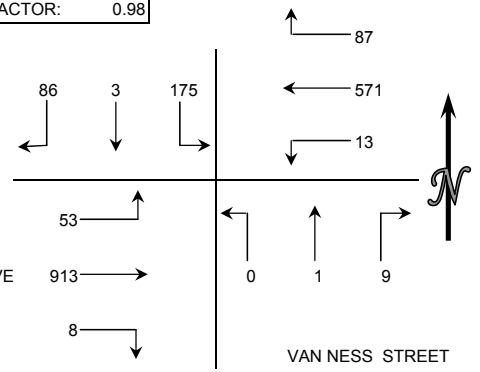
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S VAN NESS STREET
E/W EL CAMINO AVENUE

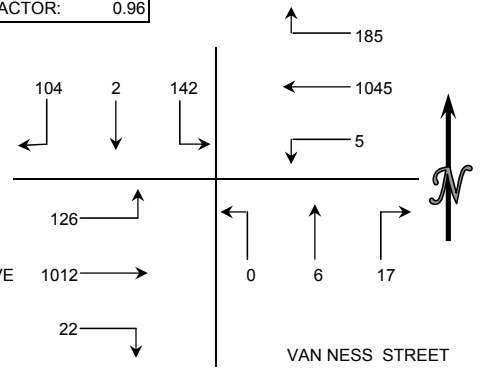
15 MIN COUNTS	7:00 AM TO 9:00 AM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	11	0	18	5	112	0	4	3	0	1	178	9	341
715-730	11	0	15	8	127	10	2	3	0	0	202	0	378
730-745	17	0	28	16	158	3	1	0	0	2	220	17	462
745-800	24	1	46	26	142	5	3	0	0	1	225	12	485
800-815	22	1	56	13	151	2	2	0	0	1	233	10	491
815-830	23	1	45	32	120	3	3	1	0	4	235	14	481
830-845	22	2	42	17	123	3	1	0	0	0	222	17	449
845-900	20	1	38	19	157	4	1	0	0	1	195	10	446
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	63	1	107	55	539	18	10	6	0	4	825	38	1666
715-815	74	2	145	63	578	20	8	3	0	4	880	39	1816
730-830	86	3	175	87	571	13	9	1	0	8	913	53	1919
745-845	91	5	189	88	536	13	9	1	0	6	915	53	1906
800-900	87	5	181	81	551	12	7	1	0	6	885	51	1867

AM PEAK HOUR: 730-830
PEAK HOUR FACTOR: 0.98



15 MIN COUNTS	4:00 PM TO 6:00 PM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	25	5	32	27	267	2	10	1	0	13	243	13	638
415-430	21	1	24	36	268	1	11	0	0	0	260	34	656
430-445	39	0	27	48	240	2	6	1	0	3	271	27	664
445-500	21	0	23	45	257	1	5	3	0	4	252	35	646
500-515	28	1	42	48	278	1	2	1	0	10	249	31	691
515-530	16	1	50	44	270	1	4	1	0	5	240	33	665
530-545	36	0	37	25	225	3	2	0	0	18	252	42	640
545-600	24	4	29	18	207	1	3	1	0	10	243	36	576
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	106	6	106	156	1032	6	32	5	0	20	1026	109	2604
415-515	109	2	116	177	1043	5	24	5	0	17	1032	127	2657
430-530	104	2	142	185	1045	5	17	6	0	22	1012	126	2666
445-545	101	2	152	162	1030	6	13	5	0	37	993	141	2642
500-600	104	6	158	135	980	6	11	3	0	43	984	142	2572

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.96



WILTEC

Phone: (925) 706-9911 Fax: (925) 706-9914

5-LEG INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIOD: 7:00 A.M. TO 9:00 A.M.
INTERSECTION: N/S DEL PASO BLVD
E/W ARDEN WAY

15 MIN COUNTS																															
	DEL PASO BLVD					ARDEN WAY					CANTERBURY ROAD					DEL PASO BLVD					ARDEN WAY					GROVE AVENUE					
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	TOTALS
700-715	5	9	89	2	5	6	7	139	8	4	0	0	0	0	0	2	10	30	21	4	5	3	117	10	7	0	0	0	0	0	483
715-730	1	16	98	0	9	7	13	139	17	2	0	0	0	0	0	1	13	36	25	7	3	0	138	14	3	0	0	0	0	0	542
730-745	1	15	105	5	7	6	13	150	18	0	0	0	0	0	0	1	11	35	10	8	4	8	162	12	7	0	0	0	0	0	578
745-800	0	16	102	0	6	6	6	145	23	0	0	0	0	0	0	1	17	33	18	2	3	4	181	16	7	0	0	0	0	0	586
80-815	3	12	100	2	11	8	5	167	21	1	0	0	0	0	0	3	10	35	35	3	4	2	190	10	3	0	0	0	0	0	625
815-830	2	15	83	0	9	6	10	150	23	0	0	0	0	0	0	1	12	39	9	2	4	2	215	18	2	0	0	0	0	0	602
830-845	1	12	68	0	4	5	17	138	28	1	0	0	0	0	0	2	14	29	14	7	6	0	142	13	4	0	0	0	0	0	505
845-900	2	11	55	2	9	9	8	117	21	1	0	0	0	0	0	4	8	28	13	4	4	0	124	11	5	0	0	0	0	0	436
HOUR TOTALS																															
	DEL PASO BLVD					ARDEN WAY					CANTERBURY ROAD					DEL PASO BLVD					ARDEN WAY					GROVE AVENUE					
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	TOTALS
700-800	7	56	394	7	27	25	39	573	66	6	0	0	0	0	0	5	51	134	74	21	15	15	598	52	24	0	0	0	0	0	2189
715-815	5	59	405	7	33	27	37	601	79	3	0	0	0	0	0	6	51	139	88	20	14	14	671	52	20	0	0	0	0	0	2331
730-830	6	58	390	7	33	26	34	612	85	1	0	0	0	0	0	6	50	142	72	15	15	16	748	56	19	0	0	0	0	0	2391
745-845	6	55	353	2	30	25	38	600	95	2	0	0	0	0	0	7	53	136	76	14	17	8	728	57	16	0	0	0	0	0	2318
800-900	8	50	306	4	33	28	40	572	93	3	0	0	0	0	0	10	44	131	71	16	18	4	671	52	14	0	0	0	0	0	2168

WILTEC

Phone: (925) 706-9911 Fax: (925) 706-9914

5-LEG INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S DEL PASO BLVD
E/W ARDEN WAY

15 MIN COUNTS

	DEL PASO BLVD					ARDEN WAY					CANTERBURY ROAD					DEL PASO BLVD					ARDEN WAY					GROVE AVENUE					
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	TOTALS
400-415	6	20	45	4	13	7	21	219	17	0	0	0	0	0	0	2	14	103	37	16	4	5	197	42	8	0	0	0	0	0	780
415-430	3	24	56	6	12	5	16	221	6	1	0	0	0	0	0	1	15	139	33	16	3	0	207	31	7	0	0	0	0	0	802
430-445	4	23	64	2	16	5	14	229	14	1	0	0	0	0	0	1	16	146	21	13	3	3	199	24	7	0	0	0	0	0	805
445-500	7	17	66	2	16	7	9	221	18	2	0	0	0	0	0	1	14	137	19	19	4	0	215	22	5	0	0	0	0	0	801
500-515	5	23	72	24	17	8	16	230	8	0	0	0	0	0	0	3	17	138	25	30	5	1	223	22	5	0	0	0	0	0	872
515-530	9	38	80	10	13	7	28	261	15	2	0	0	0	0	0	1	15	146	27	24	5	2	218	37	5	0	0	0	0	0	943
530-545	6	23	67	4	12	6	20	235	10	3	0	0	0	0	0	4	18	83	21	11	7	1	203	27	4	0	0	0	0	0	765
545-600	6	23	63	3	18	8	37	219	11	1	0	0	0	0	0	6	14	131	20	27	5	5	197	38	2	0	0	0	0	0	834

HOUR TOTALS

	DEL PASO BLVD					ARDEN WAY					CANTERBURY ROAD					DEL PASO BLVD					ARDEN WAY					GROVE AVENUE					
PERIOD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	TOTALS
400-500	20	84	231	14	57	24	60	890	55	4	0	0	0	0	0	5	59	525	110	64	14	8	818	119	27	0	0	0	0	0	3188
415-515	19	87	258	34	61	25	55	901	46	4	0	0	0	0	0	6	62	560	98	78	15	4	844	99	24	0	0	0	0	0	3280
430-530	25	101	282	38	62	27	67	941	55	5	0	0	0	0	0	6	62	567	92	86	17	6	855	105	22	0	0	0	0	0	3421
445-545	27	101	285	40	58	28	73	947	51	7	0	0	0	0	0	9	64	504	92	84	21	4	859	108	19	0	0	0	0	0	3381
500-600	26	107	282	41	60	29	101	945	44	6	0	0	0	0	0	14	64	498	93	92	22	9	841	124	16	0	0	0	0	0	3414

WILTEC

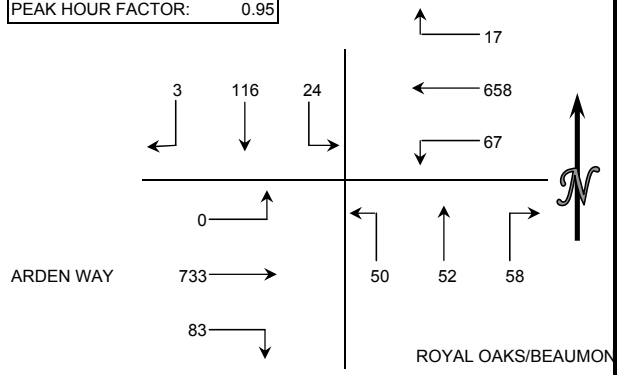
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S ROYAL OAKS/BEAUMONT STREET
E/W ARDEN WAY

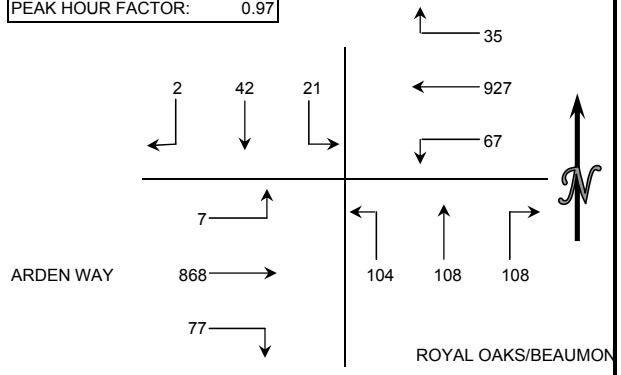
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	2	16	3	2	112	17	9	4	7	10	123	0	305
715-730	2	19	6	5	154	19	13	3	5	23	165	0	414
730-745	0	27	10	4	142	12	8	6	8	20	183	0	420
745-800	2	31	6	7	177	22	17	6	14	16	191	0	489
800-815	0	30	5	4	173	19	15	14	15	28	177	0	480
815-830	1	28	3	2	166	14	18	26	13	19	182	0	472
830-845	0	17	3	7	156	14	10	6	8	18	170	0	409
845-900	2	11	6	5	147	10	13	5	14	22	172	0	407
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	6	93	25	18	585	70	47	19	34	69	662	0	1628
715-815	4	107	27	20	646	72	53	29	42	87	716	0	1803
730-830	3	116	24	17	658	67	58	52	50	83	733	0	1861
745-845	3	106	17	20	672	69	60	52	50	81	720	0	1850
800-900	3	86	17	18	642	57	56	51	50	87	701	0	1768

AM PEAK HOUR: 730-830
PEAK HOUR FACTOR: 0.95



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	1	12	11	8	226	20	28	14	41	17	204	4	586
415-430	1	10	11	9	232	14	3	12	53	11	218	3	577
430-445	1	12	3	13	230	17	34	15	11	6	223	0	565
445-500	1	12	3	6	226	16	23	34	28	29	229	2	609
500-515	0	8	11	9	228	19	29	46	36	12	204	2	604
515-530	0	10	4	7	243	15	22	13	29	30	212	3	588
530-545	2	9	3	7	219	14	25	10	21	17	193	3	523
545-600	0	12	3	12	220	18	17	18	31	16	211	1	559
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	4	46	28	36	914	67	88	75	133	63	874	9	2337
415-515	3	42	28	37	916	66	89	107	128	58	874	7	2355
430-530	2	42	21	35	927	67	108	108	104	77	868	7	2366
445-545	3	39	21	29	916	64	99	103	114	88	838	10	2324
500-600	2	39	21	35	910	66	93	87	117	75	820	9	2274

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.97



WILTEC

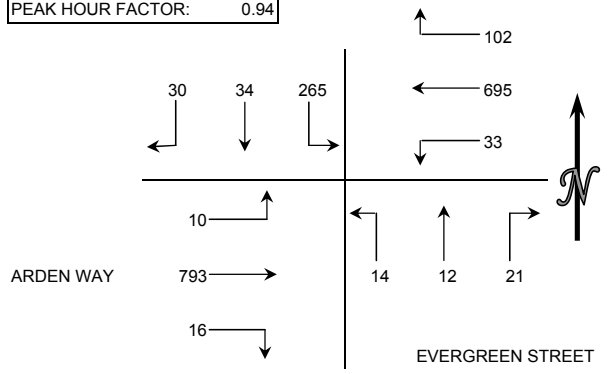
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S EVERGREEN STREET
E/W ARDEN WAY

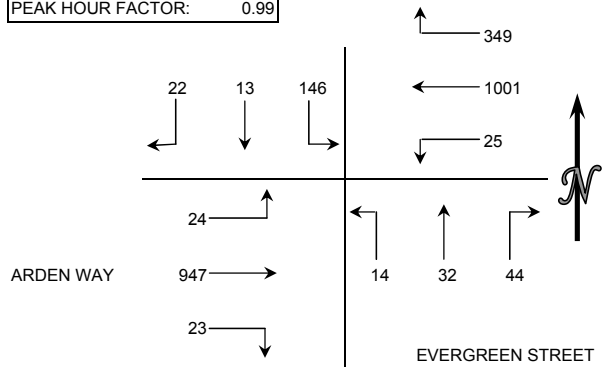
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	4	6	57	29	171	12	3	2	1	6	169	8	468
715-730	3	4	55	18	151	13	7	0	2	4	186	5	448
730-745	12	8	65	27	188	10	5	3	2	4	195	3	522
745-800	7	17	78	25	182	11	4	2	2	7	199	3	537
800-815	6	7	69	24	166	6	6	5	2	4	197	3	495
815-830	5	2	53	26	159	6	6	2	8	1	202	1	471
830-845	1	6	57	25	141	5	6	6	8	1	181	2	439
845-900	3	3	50	16	127	12	7	0	12	4	135	5	374
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	26	35	255	99	692	46	19	7	7	21	749	19	1975
715-815	28	36	267	94	687	40	22	10	8	19	777	14	2002
730-830	30	34	265	102	695	33	21	12	14	16	793	10	2025
745-845	19	32	257	100	648	28	22	15	20	13	779	9	1942
800-900	15	18	229	91	593	29	25	13	30	10	715	11	1779

AM PEAK HOUR: 730-830
PEAK HOUR FACTOR: 0.94



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	8	5	39	74	227	7	14	5	13	2	233	3	630
415-430	6	3	32	76	231	4	23	7	3	5	247	8	645
430-445	5	1	37	92	244	7	7	8	2	9	248	10	670
445-500	6	3	40	82	237	6	12	12	2	9	225	5	639
500-515	5	3	35	84	269	4	16	5	3	2	236	6	668
515-530	6	6	34	91	251	8	9	7	7	3	238	3	663
530-545	7	1	37	81	246	0	12	6	3	3	225	14	635
545-600	4	1	27	62	223	3	5	5	3	0	217	5	555
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	25	12	148	324	939	24	56	32	20	25	953	26	2584
415-515	22	10	144	334	981	21	58	32	10	25	956	29	2622
430-530	22	13	146	349	1001	25	44	32	14	23	947	24	2640
445-545	24	13	146	338	1003	18	49	30	15	17	924	28	2605
500-600	22	11	133	318	989	15	42	23	16	8	916	28	2521

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.99



WILTEC

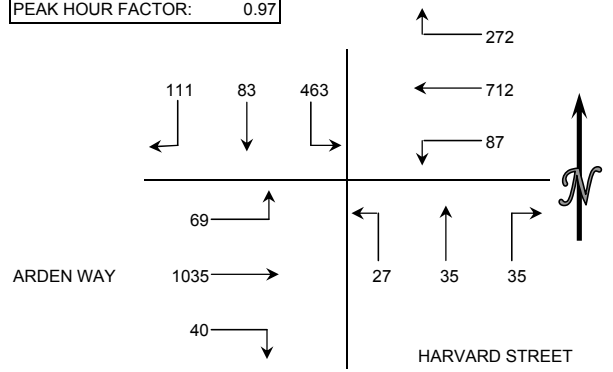
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S HARVARD STREET
E/W ARDEN WAY

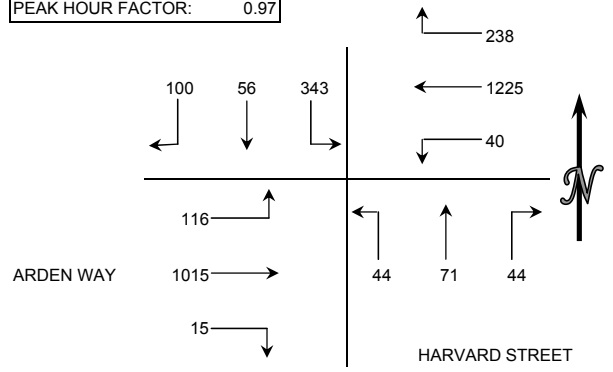
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	22	9	91	58	137	20	7	2	6	5	181	19	557
715-730	19	22	112	68	130	21	3	19	8	10	191	11	614
730-745	21	20	112	75	167	18	2	12	8	11	203	4	653
745-800	38	25	129	74	178	27	3	6	8	10	248	16	762
800-815	22	27	112	70	175	19	11	10	8	5	263	18	740
815-830	30	12	125	57	167	15	10	8	6	9	260	18	717
830-845	21	19	97	71	192	26	11	11	5	16	264	17	750
845-900	15	13	70	96	186	16	16	8	12	6	269	16	723
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	100	76	444	275	612	86	15	39	30	36	823	50	2586
715-815	100	94	465	287	650	85	19	47	32	36	905	49	2769
730-830	111	84	478	276	687	79	26	36	30	35	974	56	2872
745-845	111	83	463	272	712	87	35	35	27	40	1035	69	2969
800-900	88	71	404	294	720	76	48	37	31	36	1056	69	2930

AM PEAK HOUR: 745-845
PEAK HOUR FACTOR: 0.97



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	22	15	102	48	266	21	17	5	16	10	184	47	753
415-430	23	18	80	57	297	8	14	10	16	10	197	45	775
430-445	18	20	97	64	291	9	15	24	13	5	196	37	789
445-500	21	12	82	58	335	3	13	12	12	6	223	33	810
500-515	36	17	90	64	308	12	7	17	10	4	254	36	855
515-530	16	15	82	50	309	10	13	17	11	3	264	27	817
530-545	27	12	89	66	273	15	11	25	11	2	274	20	825
545-600	24	10	82	48	280	8	4	6	10	3	285	33	793
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	84	65	361	227	1189	41	59	51	57	31	800	162	3127
415-515	98	67	349	243	1231	32	49	63	51	25	870	151	3229
430-530	91	64	351	236	1243	34	48	70	46	18	937	133	3271
445-545	100	56	343	238	1225	40	44	71	44	15	1015	116	3307
500-600	103	54	343	228	1170	45	35	65	42	12	1077	116	3290

AM PEAK HOUR: 445-545
PEAK HOUR FACTOR: 0.97



WILTEC

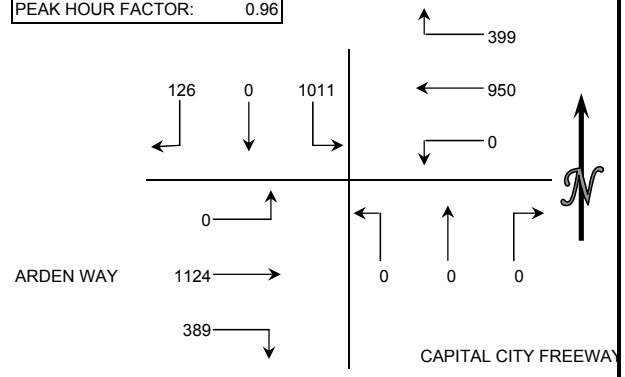
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S CAPITAL CITY FREEWAY (BUSINESS 80) WB RAMPS
E/W ARDEN WAY

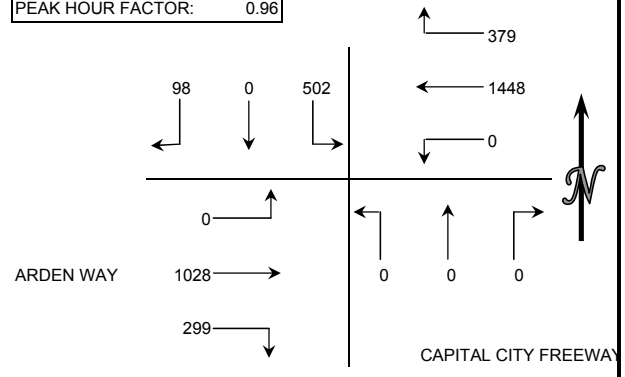
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	24	0	192	59	122	0	0	0	0	70	197	0	664
715-730	49	0	200	89	139	0	0	0	0	78	204	0	759
730-745	48	0	211	123	163	0	0	0	0	88	239	0	872
745-800	34	0	236	128	250	0	0	0	0	93	244	0	985
800-815	37	0	264	103	233	0	0	0	0	98	298	0	1033
815-830	27	0	271	94	238	0	0	0	0	109	303	0	1042
830-845	28	0	240	74	229	0	0	0	0	89	279	0	939
845-900	22	0	247	79	238	0	0	0	0	94	278	0	958
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	155	0	839	399	674	0	0	0	0	329	884	0	3280
715-815	168	0	911	443	785	0	0	0	0	357	985	0	3649
730-830	146	0	982	448	884	0	0	0	0	388	1084	0	3932
745-845	126	0	1011	399	950	0	0	0	0	389	1124	0	3999
800-900	114	0	1022	350	938	0	0	0	0	390	1158	0	3972

AM PEAK HOUR: 745-845
PEAK HOUR FACTOR: 0.96



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	15	0	84	48	285	0	0	0	0	28	162	0	622
415-430	23	0	123	66	293	0	0	0	0	46	199	0	750
430-445	25	0	124	82	343	0	0	0	0	62	234	0	870
445-500	23	0	140	84	338	0	0	0	0	64	269	0	918
500-515	22	0	128	105	365	0	0	0	0	85	263	0	968
515-530	20	0	128	105	372	0	0	0	0	85	268	0	978
530-545	29	0	120	81	351	0	0	0	0	61	244	0	886
545-600	27	0	126	88	360	0	0	0	0	68	253	0	922
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	86	0	471	280	1259	0	0	0	0	200	864	0	3160
415-515	93	0	515	337	1339	0	0	0	0	257	965	0	3506
430-530	90	0	520	376	1418	0	0	0	0	296	1034	0	3734
445-545	94	0	516	375	1426	0	0	0	0	295	1044	0	3750
500-600	98	0	502	379	1448	0	0	0	0	299	1028	0	3754

AM PEAK HOUR: 500-600
PEAK HOUR FACTOR: 0.96



WILTEC

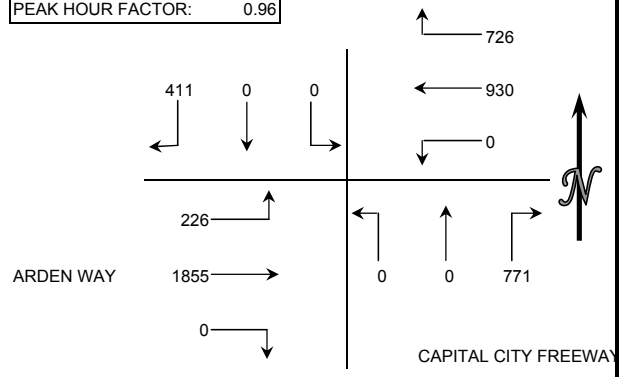
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S CAPITAL CITY FREEWAY (BUSINESS 80) EB RAMPS
E/W ARDEN WAY

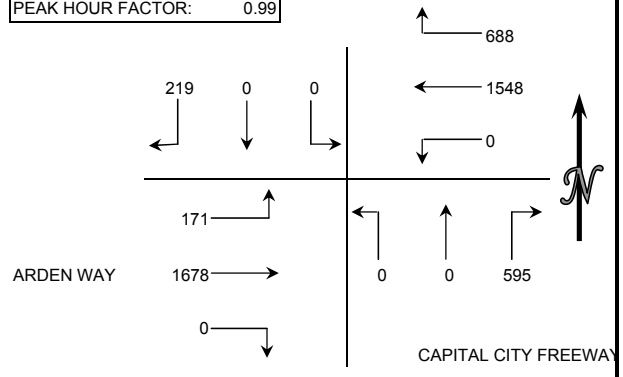
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	50	0	0	118	177	0	98	0	0	0	205	60	708
715-730	87	0	0	121	184	0	149	0	0	0	363	42	946
730-745	107	0	0	166	208	0	197	0	0	0	414	56	1148
745-800	119	0	0	177	245	0	174	0	0	0	437	57	1209
800-815	100	0	0	193	228	0	205	0	0	0	475	65	1266
815-830	97	0	0	184	233	0	206	0	0	0	512	45	1277
830-845	95	0	0	172	224	0	186	0	0	0	431	59	1167
845-900	102	0	0	179	233	0	203	0	0	0	430	40	1187
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	363	0	0	582	814	0	618	0	0	0	1419	215	4011
715-815	413	0	0	657	865	0	725	0	0	0	1689	220	4569
730-830	423	0	0	720	914	0	782	0	0	0	1838	223	4900
745-845	411	0	0	726	930	0	771	0	0	0	1855	226	4919
800-900	394	0	0	728	918	0	800	0	0	0	1848	209	4897

AM PEAK HOUR: 745-845
PEAK HOUR FACTOR: 0.96



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	54	0	0	173	310	0	89	0	0	0	380	30	1036
415-430	63	0	0	166	318	0	113	0	0	0	408	22	1090
430-445	77	0	0	181	368	0	117	0	0	0	409	36	1188
445-500	74	0	0	182	363	0	129	0	0	0	432	37	1217
500-515	70	0	0	158	390	0	145	0	0	0	420	60	1243
515-530	51	0	0	169	397	0	151	0	0	0	417	40	1225
530-545	51	0	0	177	376	0	151	0	0	0	417	41	1213
545-600	47	0	0	184	385	0	148	0	0	0	424	30	1218
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	268	0	0	702	1359	0	448	0	0	0	1629	125	4531
415-515	284	0	0	687	1439	0	504	0	0	0	1669	155	4738
430-530	272	0	0	690	1518	0	542	0	0	0	1678	173	4873
445-545	246	0	0	686	1526	0	576	0	0	0	1686	178	4898
500-600	219	0	0	688	1548	0	595	0	0	0	1678	171	4899

AM PEAK HOUR: 500-600
PEAK HOUR FACTOR: 0.99



WILTEC

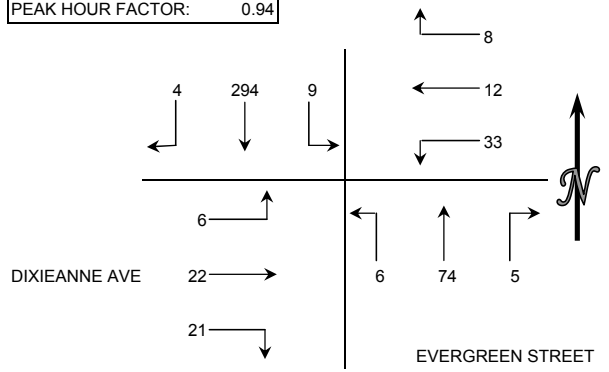
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S EVERGREEN STREET
E/W DIXIEANNE AVENUE

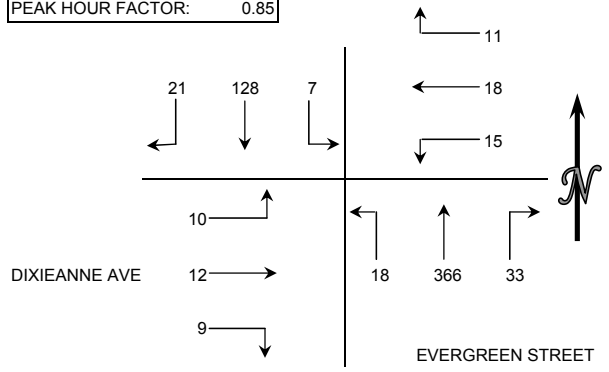
15 MIN COUNTS	7:00 AM TO 9:00 AM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	1	74	2	2	5	7	2	14	3	6	5	2	123
715-730	2	75	4	1	0	11	0	17	1	8	6	1	126
730-745	0	65	2	5	2	8	1	21	2	3	4	1	114
745-800	1	80	1	0	5	7	2	22	0	4	7	2	131
800-815	1	72	1	6	2	7	1	23	1	1	3	0	118
815-830	3	52	0	1	5	8	1	27	1	0	3	0	101
830-845	0	61	0	1	2	7	6	21	0	3	2	0	103
845-900	2	52	1	1	2	8	4	30	0	1	3	3	107
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	4	294	9	8	12	33	5	74	6	21	22	6	494
715-815	4	292	8	12	9	33	4	83	4	16	20	4	489
730-830	5	269	4	12	14	30	5	93	4	8	17	3	464
745-845	5	265	2	8	14	29	10	93	2	8	15	2	453
800-900	6	237	2	9	11	30	12	101	2	5	11	3	429

AM PEAK HOUR: 700-800
PEAK HOUR FACTOR: 0.94



15 MIN COUNTS	4:00 PM TO 6:00 PM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	3	27	5	6	3	8	6	73	2	3	4	3	143
415-430	5	24	3	6	6	2	3	75	2	1	3	1	131
430-445	4	29	1	5	6	2	4	81	3	0	5	4	144
445-500	9	36	3	5	9	7	14	91	6	5	3	3	191
500-515	4	29	1	2	1	3	6	88	6	1	2	1	144
515-530	5	31	1	2	5	4	8	94	4	3	2	4	163
530-545	3	32	2	2	3	1	5	93	2	0	5	2	150
545-600	8	33	3	6	2	4	2	83	1	2	3	1	148
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	21	116	12	22	24	19	27	320	13	9	15	11	609
415-515	22	118	8	18	22	14	27	335	17	7	13	9	610
430-530	22	125	6	14	21	16	32	354	19	9	12	12	642
445-545	21	128	7	11	18	15	33	366	18	9	12	10	648
500-600	20	125	7	12	11	12	21	358	13	6	12	8	605

AM PEAK HOUR: 445-545
PEAK HOUR FACTOR: 0.85



WILTEC

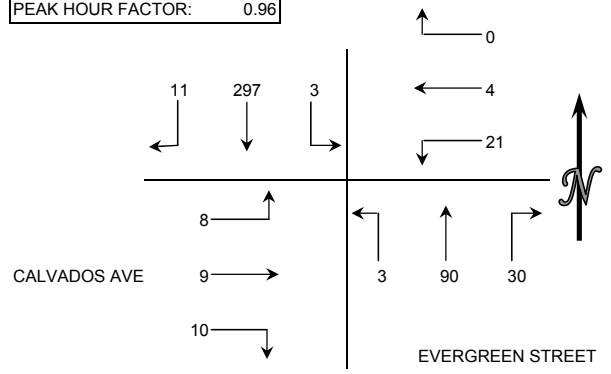
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S EVERGREEN STREET
E/W CALVADOS AVENUE

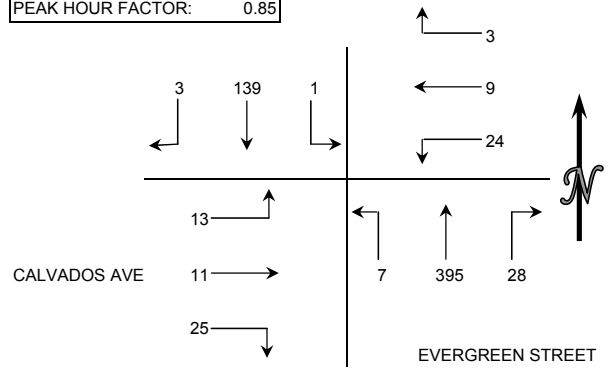
15 MIN COUNTS	7:00 AM TO 9:00 AM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	0	59	0	0	0	0	0	0	0	3	0	0	62
715-730	3	80	0	0	1	1	5	13	1	1	0	3	108
730-745	3	80	1	0	1	5	11	18	2	3	1	2	127
745-800	5	73	1	0	1	3	5	26	0	4	4	2	124
800-815	2	74	1	0	1	10	5	24	0	2	2	2	123
815-830	1	70	0	0	1	3	9	22	1	1	2	2	112
830-845	2	61	1	1	1	7	7	28	2	5	3	3	121
845-900	1	57	0	2	2	6	6	29	0	2	0	1	106
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	11	292	2	0	3	9	21	57	3	11	5	7	421
715-815	13	307	3	0	4	19	26	81	3	10	7	9	482
730-830	11	297	3	0	4	21	30	90	3	10	9	8	486
745-845	10	278	3	1	4	23	26	100	3	12	11	9	480
800-900	6	262	2	3	5	26	27	103	3	10	7	8	462

AM PEAK HOUR: 730-830
PEAK HOUR FACTOR: 0.96



15 MIN COUNTS	4:00 PM TO 6:00 PM												
	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	2	36	0	0	1	6	8	72	3	3	4	1	136
415-430	1	38	0	0	3	10	12	105	4	9	6	5	193
430-445	1	34	1	2	4	6	7	83	0	2	2	4	146
445-500	1	27	0	0	1	5	5	105	1	6	3	2	156
500-515	0	40	0	1	1	3	4	102	2	8	0	2	163
515-530	6	39	1	0	1	7	4	100	1	5	4	3	171
530-545	1	32	1	1	0	1	0	85	1	2	1	1	126
545-600	4	13	2	0	1	3	6	73	2	4	2	0	110
HOUR TOTALS													
	1	2	3	4	5	6	7	8	9	10	11	12	
TIME	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	5	135	1	2	9	27	32	365	8	20	15	12	631
415-515	3	139	1	3	9	24	28	395	7	25	11	13	658
430-530	8	140	2	3	7	21	20	390	4	21	9	11	636
445-545	8	138	2	2	3	16	13	392	5	21	8	8	616
500-600	11	124	4	2	3	14	14	360	6	19	7	6	570

AM PEAK HOUR: 415-515
PEAK HOUR FACTOR: 0.85



WILTEC

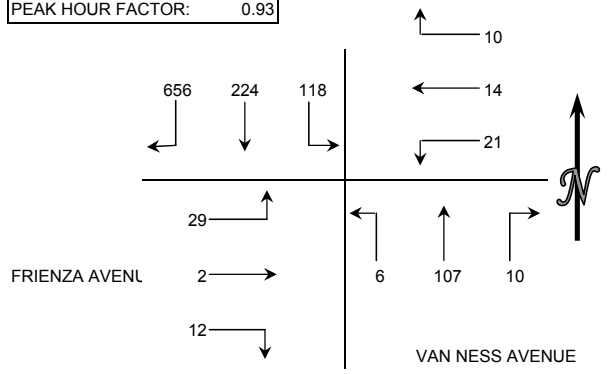
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: KIMLEY-HORN ASSOCIATES
PROJECT: SACRAMENTO TRAFFIC COUNTS
DATE: TUESDAY OCTOBER 16, 2007
PERIODS: 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM
INTERSECTION: N/S VAN NESS AVENUE
E/W FRIENZA AVENUE

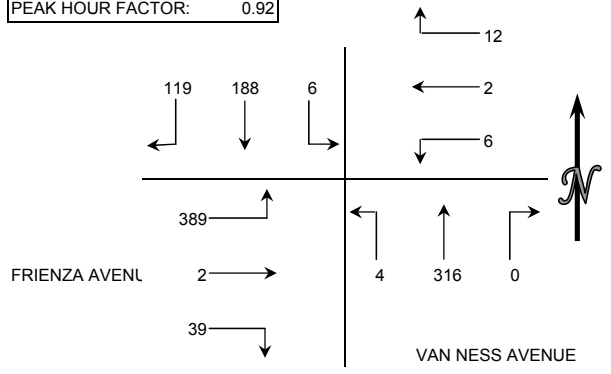
15 MIN COUNTS	7:00 AM TO 9:00 AM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-715	157	42	20	10	3	7	2	37	5	2	0	2	287
715-730	143	43	32	2	3	4	4	24	0	4	0	3	262
730-745	171	59	25	5	3	8	2	26	3	3	0	11	316
745-800	177	61	34	3	3	3	1	31	3	2	0	6	324
800-815	165	61	27	0	5	6	3	26	0	3	2	9	307
815-830	90	50	17	1	2	1	3	31	2	5	1	8	211
830-845	93	41	29	2	4	9	-5	22	1	2	0	6	204
845-900	76	25	18	3	1	1	11	26	3	3	0	9	176
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
700-800	648	205	111	20	12	22	9	118	11	11	0	22	1189
715-815	656	224	118	10	14	21	10	107	6	12	2	29	1209
730-830	603	231	103	9	13	18	9	114	8	13	3	34	1158
745-845	525	213	107	6	14	19	2	110	6	12	3	29	1046
800-900	424	177	91	6	12	17	12	105	6	13	3	32	898

AM PEAK HOUR: 715-815
PEAK HOUR FACTOR: 0.93



15 MIN COUNTS	4:00 PM TO 6:00 PM												
PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-415	23	39	7	1	1	2	0	43	2	2	0	72	192
415-430	35	57	2	3	0	4	1	54	1	5	1	80	243
430-445	29	46	1	2	1	0	0	71	1	9	2	87	249
445-500	36	56	0	2	0	2	0	82	1	6	0	98	283
500-515	27	43	2	5	1	1	0	88	2	15	0	109	293
515-530	27	43	3	3	0	3	0	75	0	9	0	95	258
530-545	38	42	1	2	1	0	1	68	0	5	1	70	229
545-600	20	51	0	3	2	5	1	49	1	8	0	76	216
HOUR TOTALS													
TIME	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTAL
400-500	123	198	10	8	2	8	1	250	5	22	3	337	967
415-515	127	202	5	12	2	7	1	295	5	35	3	374	1068
430-530	119	188	6	12	2	6	0	316	4	39	2	389	1083
445-545	128	184	6	12	2	6	1	313	3	35	1	372	1063
500-600	112	179	6	13	4	9	2	280	3	37	1	350	996

AM PEAK HOUR: 430-530
PEAK HOUR FACTOR: 0.92



WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: EL CAMINO AVENUE-EAST OF LEXINGTON STREET

DATE: THURSDAY, OCTOBER 18 , 2007

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	35	26	34	22	117
1:00	19	20	14	21	74
2:00	9	12	10	9	40
3:00	14	12	13	15	54
4:00	14	26	31	43	114
5:00	35	70	80	77	262
6:00	116	120	152	150	538
7:00	161	204	237	321	923
8:00	190	260	220	190	860
9:00	172	178	198	177	725
10:00	176	180	186	190	732
11:00	186	198	210	220	814
12:00	234	262	230	238	964
13:00	212	248	236	237	933
14:00	215	216	230	252	913
15:00	260	239	242	247	988
16:00	267	278	271	262	1078
17:00	294	290	258	255	1097
18:00	226	232	176	180	814
19:00	184	155	135	135	609
20:00	124	114	120	152	510
21:00	110	92	102	92	396
22:00	82	73	51	51	257
23:00	48	56	42	44	190
				TOTAL	14002

AM PEAK HOUR	0730-0830
VOLUME	1008
PM PEAK HOUR	1630-1730
VOLUME	1117

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	36	30	27	14	107
1:00	18	22	11	26	77
2:00	21	10	11	5	47
3:00	9	12	5	9	35
4:00	14	9	20	12	55
5:00	22	20	48	45	135
6:00	70	64	80	78	292
7:00	101	135	148	187	571
8:00	166	154	166	173	659
9:00	134	128	125	152	539
10:00	143	149	148	154	594
11:00	167	154	194	176	691
12:00	166	224	178	196	764
13:00	197	212	186	192	787
14:00	209	205	206	236	856
15:00	220	238	216	242	916
16:00	244	218	210	250	922
17:00	238	221	234	220	913
18:00	220	188	208	198	814
19:00	160	162	147	136	605
20:00	134	124	107	112	477
21:00	123	100	84	95	402
22:00	84	64	72	60	280
23:00	56	38	42	48	184
				TOTAL	11722

AM PEAK HOUR	1100-1200
VOLUME	691
PM PEAK HOUR	1645-1745
VOLUME	943

TOTAL BI-DIRECTIONAL VOLUME	25724

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	71	56	61	36	224
1:00	37	42	25	47	151
2:00	30	22	21	14	87
3:00	23	24	18	24	89
4:00	28	35	51	55	169
5:00	57	90	128	122	397
6:00	186	184	232	228	830
7:00	262	339	385	508	1494
8:00	356	414	386	363	1519
9:00	306	306	323	329	1264
10:00	319	329	334	344	1326
11:00	353	352	404	396	1505
12:00	400	486	408	434	1728
13:00	409	460	422	429	1720
14:00	424	421	436	488	1769
15:00	480	477	458	489	1904
16:00	511	496	481	512	2000
17:00	532	511	492	475	2010
18:00	446	420	384	378	1628
19:00	344	317	282	271	1214
20:00	258	238	227	264	987
21:00	233	192	186	187	798
22:00	166	137	123	111	537
23:00	104	94	84	92	374
				TOTAL	25724

AM PEAK HOUR	0745-0845
VOLUME	1664
AM PK HR FACTOR	0.82
PM PEAK HOUR	1645-1745
VOLUME	2047
PM PK HR FACTOR	0.96

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: ARDEN WAY -WEST OF ROYAL OAKS DRIVE/ BEAUMONT STREET

DATE: THURSDAY, OCTOBER 18, 2007

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	22	16	18	14	70
1:00	16	9	12	6	43
2:00	5	14	8	4	31
3:00	4	12	12	8	36
4:00	8	12	19	24	63
5:00	10	32	48	69	159
6:00	62	70	112	132	376
7:00	138	146	215	210	709
8:00	207	249	206	186	848
9:00	153	129	149	170	601
10:00	158	162	160	141	621
11:00	138	148	212	204	702
12:00	170	182	148	202	702
13:00	170	145	156	180	651
14:00	144	192	169	158	663
15:00	156	168	154	141	619
16:00	215	201	214	204	834
17:00	184	242	211	172	809
18:00	165	196	150	174	685
19:00	88	128	106	122	444
20:00	78	94	92	76	340
21:00	76	59	64	64	263
22:00	68	54	58	44	224
23:00	53	26	34	37	150
				TOTAL	10643

AM PEAK HOUR	0730-0830
VOLUME	881
PM PEAK HOUR	1630-1730
VOLUME	844

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	36	20	22	14	92
1:00	12	19	20	16	67
2:00	14	11	7	15	47
3:00	7	6	5	10	28
4:00	7	13	20	24	64
5:00	32	22	26	50	130
6:00	62	69	84	94	309
7:00	128	136	170	178	612
8:00	146	168	152	149	615
9:00	124	128	159	126	537
10:00	127	168	159	166	620
11:00	162	164	172	187	685
12:00	238	194	204	200	836
13:00	188	184	246	212	830
14:00	188	170	236	197	791
15:00	209	242	257	230	938
16:00	236	252	245	281	1014
17:00	273	280	245	252	1050
18:00	239	234	197	176	846
19:00	174	177	178	157	686
20:00	130	140	149	164	583
21:00	182	151	130	90	553
22:00	92	80	92	46	310
23:00	62	64	48	50	224
				TOTAL	12467

AM PEAK HOUR	1100-1200
VOLUME	685
PM PEAK HOUR	1630-1730
VOLUME	1079

TOTAL BI-DIRECTIONAL VOLUME	23110

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	58	36	40	28	162
1:00	28	28	32	22	110
2:00	19	25	15	19	78
3:00	11	18	17	18	64
4:00	15	25	39	48	127
5:00	42	54	74	119	289
6:00	124	139	196	226	685
7:00	266	282	385	388	1321
8:00	353	417	358	335	1463
9:00	277	257	308	296	1138
10:00	285	330	319	307	1241
11:00	300	312	384	391	1387
12:00	408	376	352	402	1538
13:00	358	329	402	392	1481
14:00	332	362	405	355	1454
15:00	365	410	411	371	1557
16:00	451	453	459	485	1848
17:00	457	522	456	424	1859
18:00	404	430	347	350	1531
19:00	262	305	284	279	1130
20:00	208	234	241	240	923
21:00	258	210	194	154	816
22:00	160	134	150	90	534
23:00	115	90	82	87	374
				TOTAL	23110

AM PEAK HOUR	0745-0845
VOLUME	1516
AM PK HR FACTOR	0.91
PM PEAK HOUR	1630-1730
VOLUME	1923
PM PK HR FACTOR	0.92

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: ARDEN WAY-WEST OF EVERGREEN STREET

DATE: THURSDAY, OCTOBER 18, 2007

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	17	16	18	18	69
1:00	18	7	12	8	45
2:00	3	16	8	4	31
3:00	6	14	12	7	39
4:00	9	15	17	28	69
5:00	13	35	49	72	169
6:00	62	76	120	134	392
7:00	146	160	246	258	810
8:00	222	280	224	202	928
9:00	168	146	157	194	665
10:00	174	169	168	181	692
11:00	152	162	220	212	746
12:00	200	184	184	223	791
13:00	190	166	173	206	735
14:00	181	192	194	197	764
15:00	174	192	194	179	739
16:00	242	244	249	270	1005
17:00	246	296	268	208	1018
18:00	192	224	166	193	775
19:00	124	141	109	130	504
20:00	98	90	111	90	389
21:00	72	65	68	74	279
22:00	66	58	51	41	216
23:00	56	25	36	38	155
				TOTAL	12025

AM PEAK HOUR	0730-0830
VOLUME	1006
PM PEAK HOUR	1645-1745
VOLUME	1080

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	34	20	28	15	97
1:00	12	18	15	18	63
2:00	11	12	7	12	42
3:00	12	8	4	8	32
4:00	7	15	20	27	69
5:00	26	26	31	55	138
6:00	62	76	83	96	317
7:00	134	137	168	168	607
8:00	146	144	145	131	566
9:00	126	106	122	104	458
10:00	121	132	148	151	552
11:00	140	146	156	152	594
12:00	195	168	217	168	748
13:00	178	168	221	187	754
14:00	185	174	216	171	746
15:00	206	220	235	240	901
16:00	230	245	250	248	973
17:00	241	238	258	216	953
18:00	198	194	181	157	730
19:00	166	149	166	148	629
20:00	109	138	128	152	527
21:00	165	142	132	89	528
22:00	99	80	84	48	311
23:00	60	54	52	39	205
				TOTAL	11540

AM PEAK HOUR	0730-0830
VOLUME	626
PM PEAK HOUR	1645-1745
VOLUME	985

TOTAL BI-DIRECTIONAL VOLUME	23565

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	51	36	46	33	166
1:00	30	25	27	26	108
2:00	14	28	15	16	73
3:00	18	22	16	15	71
4:00	16	30	37	55	138
5:00	39	61	80	127	307
6:00	124	152	203	230	709
7:00	280	297	414	426	1417
8:00	368	424	369	333	1494
9:00	294	252	279	298	1123
10:00	295	301	316	332	1244
11:00	292	308	376	364	1340
12:00	395	352	401	391	1539
13:00	368	334	394	393	1489
14:00	366	366	410	368	1510
15:00	380	412	429	419	1640
16:00	472	489	499	518	1978
17:00	487	534	526	424	1971
18:00	390	418	347	350	1505
19:00	290	290	275	278	1133
20:00	207	228	239	242	916
21:00	237	207	200	163	807
22:00	165	138	135	89	527
23:00	116	79	88	77	360
				TOTAL	23565

AM PEAK HOUR	0730-0830
VOLUME	1632
AM PK HR FACTOR	0.96
PM PEAK HOUR	1645-1745
VOLUME	2065
PM PK HR FACTOR	0.97

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: DIXIEANNE AVENUE-EAST OF BEAUMONT STREET

DATE: THURSDAY, OCTOBER 18 , 2007

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	4	3	0	11
1:00	3	1	1	4	9
2:00	0	1	0	5	6
3:00	1	0	0	1	2
4:00	0	1	1	1	3
5:00	1	3	8	5	17
6:00	9	3	4	9	25
7:00	8	10	13	17	48
8:00	8	17	10	9	44
9:00	12	9	7	7	35
10:00	10	10	11	19	50
11:00	19	17	16	19	71
12:00	22	15	19	11	67
13:00	17	21	18	17	73
14:00	13	16	23	22	74
15:00	19	26	26	15	86
16:00	33	27	28	23	111
17:00	34	33	25	17	109
18:00	12	15	15	12	54
19:00	12	12	11	6	41
20:00	7	10	8	11	36
21:00	5	8	7	7	27
22:00	4	5	4	10	23
23:00	4	6	3	6	19
				TOTAL	1041

AM PEAK HOUR	1045-1145
VOLUME	71
PM PEAK HOUR	1630-1730
VOLUME	118

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	3	5	1	13
1:00	2	3	1	0	6
2:00	0	1	2	1	4
3:00	1	0	0	0	1
4:00	0	0	2	2	4
5:00	0	3	2	6	11
6:00	3	4	4	6	17
7:00	8	13	11	16	48
8:00	12	7	7	18	44
9:00	9	7	10	10	36
10:00	6	5	9	7	27
11:00	10	11	13	23	57
12:00	17	18	16	8	59
13:00	19	25	15	11	70
14:00	7	16	12	14	49
15:00	18	16	22	20	76
16:00	15	17	8	5	45
17:00	10	22	15	10	57
18:00	17	21	8	7	53
19:00	7	13	8	8	36
20:00	8	10	4	9	31
21:00	10	11	18	11	50
22:00	5	11	5	6	27
23:00	5	6	5	10	26
				TOTAL	847

AM PEAK HOUR	1100-1200
VOLUME	57
PM PEAK HOUR	1500-1600
VOLUME	76

TOTAL BI-DIRECTIONAL VOLUME	1888

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	8	7	8	1	24
1:00	5	4	2	4	15
2:00	0	2	2	6	10
3:00	2	0	0	1	3
4:00	0	1	3	3	7
5:00	1	6	10	11	28
6:00	12	7	8	15	42
7:00	16	23	24	33	96
8:00	20	24	17	27	88
9:00	21	16	17	17	71
10:00	16	15	20	26	77
11:00	29	28	29	42	128
12:00	39	33	35	19	126
13:00	36	46	33	28	143
14:00	20	32	35	36	123
15:00	37	42	48	35	162
16:00	48	44	36	28	156
17:00	44	55	40	27	166
18:00	29	36	23	19	107
19:00	19	25	19	14	77
20:00	15	20	12	20	67
21:00	15	19	25	18	77
22:00	9	16	9	16	50
23:00	9	12	8	16	45
				TOTAL	1888

AM PEAK HOUR	1100-1200
VOLUME	128
AM PK HR FACTOR	0.76
PM PEAK HOUR	1530-1630
VOLUME	175
PM PK HR FACTOR	0.91

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: CALVADOS AVENUE -EAST OF BEAUMONT STREET

DATE: THURSDAY, OCTOBER 18 , 2007

DIRECTION:	EB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	3	4	1	0	8
1:00	1	3	0	0	4
2:00	0	1	0	0	1
3:00	0	0	0	0	0
4:00	1	1	0	3	5
5:00	1	1	1	2	5
6:00	2	1	1	2	6
7:00	0	6	8	7	21
8:00	11	11	8	5	35
9:00	7	8	4	6	25
10:00	3	4	8	7	22
11:00	6	10	7	5	28
12:00	9	3	8	8	28
13:00	9	7	8	9	33
14:00	8	8	9	14	39
15:00	12	6	8	12	38
16:00	6	16	18	15	55
17:00	18	14	15	15	62
18:00	14	5	7	13	39
19:00	7	10	2	3	22
20:00	4	6	2	5	17
21:00	2	3	2	2	9
22:00	6	1	1	1	9
23:00	5	2	3	1	11
				TOTAL	522

AM PEAK HOUR	0730-0830
VOLUME	37
PM PEAK HOUR	1615-1715
VOLUME	67

DIRECTION:	WB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	1	3	1	2	7
1:00	2	2	0	2	6
2:00	0	0	1	2	3
3:00	0	0	0	1	1
4:00	0	0	0	1	1
5:00	0	1	1	2	4
6:00	2	1	2	6	11
7:00	2	4	5	7	18
8:00	10	6	6	5	27
9:00	6	7	3	3	19
10:00	1	4	4	12	21
11:00	4	10	9	9	32
12:00	9	12	9	2	32
13:00	2	6	8	5	21
14:00	8	8	10	17	43
15:00	12	8	14	8	42
16:00	12	10	12	8	42
17:00	7	14	9	6	36
18:00	10	7	6	5	28
19:00	6	2	3	3	14
20:00	3	2	3	4	12
21:00	5	4	3	4	16
22:00	3	3	0	1	7
23:00	3	0	2	1	6
				TOTAL	449

AM PEAK HOUR	1045-1145
VOLUME	35
PM PEAK HOUR	1445-1545
VOLUME	51

TOTAL BI-DIRECTIONAL VOLUME	971

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	4	7	2	2	15
1:00	3	5	0	2	10
2:00	0	1	1	2	4
3:00	0	0	0	1	1
4:00	1	1	0	4	6
5:00	1	2	2	4	9
6:00	4	2	3	8	17
7:00	2	10	13	14	39
8:00	21	17	14	10	62
9:00	13	15	7	9	44
10:00	4	8	12	19	43
11:00	10	20	16	14	60
12:00	18	15	17	10	60
13:00	11	13	16	14	54
14:00	16	16	19	31	82
15:00	24	14	22	20	80
16:00	18	26	30	23	97
17:00	25	28	24	21	98
18:00	24	12	13	18	67
19:00	13	12	5	6	36
20:00	7	8	5	9	29
21:00	7	7	5	6	25
22:00	9	4	1	2	16
23:00	8	2	5	2	17
				TOTAL	971

AM PEAK HOUR	0745-0845
VOLUME	66
AM PK HR FACTOR	0.79
PM PEAK HOUR	1630-1730
VOLUME	106
PM PK HR FACTOR	0.88

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: EVERGREEN STREET-NORTH OF ARDEN WAY

DATE: THURSDAY, OCTOBER 18 , 2007

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	9	9	1	9	28
1:00	5	4	2	2	13
2:00	2	3	6	1	12
3:00	2	0	2	2	6
4:00	2	4	1	4	11
5:00	5	2	5	6	18
6:00	15	9	12	18	54
7:00	29	24	22	30	105
8:00	40	66	36	46	188
9:00	36	38	31	37	142
10:00	36	42	31	33	142
11:00	44	49	42	68	203
12:00	47	46	69	49	211
13:00	54	53	46	48	201
14:00	54	54	70	68	246
15:00	68	72	56	76	272
16:00	76	78	88	96	338
17:00	102	112	86	72	372
18:00	79	53	40	39	211
19:00	35	45	32	24	136
20:00	30	19	24	25	98
21:00	33	30	25	25	113
22:00	13	16	7	13	49
23:00	12	8	7	6	33
				TOTAL	3202

AM PEAK HOUR	1100-1200
VOLUME	203
PM PEAK HOUR	1630-1730
VOLUME	398

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	5	2	4	5	16
1:00	4	1	0	2	7
2:00	2	2	1	0	5
3:00	0	1	3	3	7
4:00	4	4	5	7	20
5:00	8	13	25	34	80
6:00	23	32	34	70	159
7:00	47	70	88	101	306
8:00	63	33	70	40	206
9:00	49	46	42	52	189
10:00	42	48	51	62	203
11:00	30	54	42	46	172
12:00	44	64	46	54	208
13:00	50	48	50	49	197
14:00	38	39	50	44	171
15:00	44	46	51	46	187
16:00	57	46	40	52	195
17:00	48	58	47	37	190
18:00	39	32	36	34	141
19:00	21	22	12	17	72
20:00	21	19	14	10	64
21:00	11	13	16	17	57
22:00	15	12	10	6	43
23:00	6	8	7	5	26
				TOTAL	2921

AM PEAK HOUR	0715-0815
VOLUME	322
PM PEAK HOUR	1215-1315
VOLUME	214

TOTAL BI-DIRECTIONAL VOLUME	6123

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	14	11	5	14	44
1:00	9	5	2	4	20
2:00	4	5	7	1	17
3:00	2	1	5	5	13
4:00	6	8	6	11	31
5:00	13	15	30	40	98
6:00	38	41	46	88	213
7:00	76	94	110	131	411
8:00	103	99	106	86	394
9:00	85	84	73	89	331
10:00	78	90	82	95	345
11:00	74	103	84	114	375
12:00	91	110	115	103	419
13:00	104	101	96	97	398
14:00	92	93	120	112	417
15:00	112	118	107	122	459
16:00	133	124	128	148	533
17:00	150	170	133	109	562
18:00	118	85	76	73	352
19:00	56	67	44	41	208
20:00	51	38	38	35	162
21:00	44	43	41	42	170
22:00	28	28	17	19	92
23:00	18	16	14	11	59
				TOTAL	6123

AM PEAK HOUR	0730-0830
VOLUME	443
AM PK HR FACTOR	0.85
PM PEAK HOUR	1645-1745
VOLUME	601
PM PK HR FACTOR	0.88

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

24-HOUR ADT COUNT SUMMARY

CLIENT: KIMLEY HORN AND ASSOCIATES, INC
PROJECT: SACRAMENTO TRAFFIC COUNTS
LOCATION: ROYAL OAKS DRIVE -SOUTH OF ARDEN WAY

DATE: THURSDAY, OCTOBER 18, 2007

DIRECTION:	NB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	7	0	1	3	11
1:00	8	6	8	1	23
2:00	1	3	1	3	8
3:00	2	0	3	3	8
4:00	0	1	2	7	10
5:00	8	1	2	8	19
6:00	8	17	18	16	59
7:00	31	22	37	45	135
8:00	58	57	33	21	169
9:00	36	43	48	44	171
10:00	44	45	52	60	201
11:00	57	50	72	64	243
12:00	79	56	68	56	259
13:00	50	47	54	56	207
14:00	29	50	59	87	225
15:00	62	62	74	57	255
16:00	80	60	77	77	294
17:00	82	60	63	68	273
18:00	59	58	49	34	200
19:00	40	28	22	20	110
20:00	32	17	21	21	91
21:00	17	19	4	14	54
22:00	9	7	4	4	24
23:00	20	10	14	9	53
				TOTAL	3102

AM PEAK HOUR	1100-1200
VOLUME	243
PM PEAK HOUR	1615-1715
VOLUME	296

DIRECTION:	SB				
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	6	4	5	2	17
1:00	4	7	2	4	17
2:00	0	0	1	1	2
3:00	1	2	2	3	8
4:00	1	4	4	5	14
5:00	2	3	18	22	45
6:00	16	19	24	35	94
7:00	49	52	72	74	247
8:00	87	55	38	44	224
9:00	40	34	40	36	150
10:00	38	32	50	60	180
11:00	32	46	56	58	192
12:00	44	56	44	54	198
13:00	35	46	48	38	167
14:00	44	78	74	42	238
15:00	57	41	58	33	189
16:00	44	46	54	38	182
17:00	54	46	44	49	193
18:00	36	34	38	40	148
19:00	22	18	13	21	74
20:00	9	10	8	14	41
21:00	12	9	15	15	51
22:00	3	4	9	12	28
23:00	15	5	4	5	29
				TOTAL	2728

AM PEAK HOUR	0730-0830
VOLUME	288
PM PEAK HOUR	1415-1515
VOLUME	251

TOTAL BI-DIRECTIONAL VOLUME	5830

DIRECTION:		TOTAL BOTH DIRECTIONS			
TIME	00-15	15-30	30-45	45-60	HOUR TOTALS
0:00	13	4	6	5	28
1:00	12	13	10	5	40
2:00	1	3	2	4	10
3:00	3	2	5	6	16
4:00	1	5	6	12	24
5:00	10	4	20	30	64
6:00	24	36	42	51	153
7:00	80	74	109	119	382
8:00	145	112	71	65	393
9:00	76	77	88	80	321
10:00	82	77	102	120	381
11:00	89	96	128	122	435
12:00	123	112	112	110	457
13:00	85	93	102	94	374
14:00	73	128	133	129	463
15:00	119	103	132	90	444
16:00	124	106	131	115	476
17:00	136	106	107	117	466
18:00	95	92	87	74	348
19:00	62	46	35	41	184
20:00	41	27	29	35	132
21:00	29	28	19	29	105
22:00	12	11	13	16	52
23:00	35	15	18	14	82
				TOTAL	5830

AM PEAK HOUR	0730-0830
VOLUME	485
AM PK HR FACTOR	0.84
PM PEAK HOUR	1415-1515
VOLUME	509
PM PK HR FACTOR	0.96

Appendix E-2:

Worksheets for Existing Conditions

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 507 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4798	0.90	Level	5	0	0.976	1.00	5464
Ramp	120	0.90	Level	5	0	0.976	1.00	137
UpStream								
DownStream	507	0.90	Level	5	0	0.976	1.00	577

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.344 using Equation (Exhibit 25-5)

V_{12}= 1880 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	5601	See Exhibit 25-7	No
V_{R12}	2017	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.3 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.319 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= 50.3 mph(Exhibit 25-19)

S= 50.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 195 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8988	0.90	Level	5	0	0.976	1.00	10236
Ramp	337	0.90	Level	5	0	0.976	1.00	384
UpStream	195	0.90	Level	5	0	0.976	1.00	222
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.393 using Equation (Exhibit 25-5)

V_{12}= 4021 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10620	See Exhibit 25-7	Yes
V_{R12}	4405	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 35.3 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.591 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 43.6 mph(Exhibit 25-19)

S= 45.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5085	0.90	Level	5	0	0.976	1.00	5791
Ramp	628	0.90	Level	5	0	0.976	1.00	715
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.347 using Equation (Exhibit 25-5)

V_{12}= 2007 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6506	See Exhibit 25-7	No
V_{R12}	2722	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.332 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.0 mph(Exhibit 25-19)

S= 50.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8607	0.90	Level	5	0	0.976	1.00	9802
Ramp	831	0.90	Level	5	0	0.976	1.00	946
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 9802 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10748	See Exhibit 25-7	Yes
V_{R12}	11924	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 85.4 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 588.402 (Exibit 25-19)

S_R= -7594.2 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2380	0.90	Level	6	0	0.971	1.00	2724
Ramp	359	0.90	Level	6	0	0.971	1.00	411
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2724 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3135	See Exhibit 25-7	No
V_{R12}	3135	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.2 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.383 (Exibit 25-19)

S_R= 50.0 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.0 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 604 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9255	0.90	Level	5	0	0.976	1.00	10540
Ramp	158	0.90	Level	5	0	0.976	1.00	180
UpStream								
DownStream	604	0.90	Level	5	0	0.976	1.00	688

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.339 using Equation (Exhibit 25-5)

V_{12}= 3569 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10720	See Exhibit 25-7	Yes
V_{R12}	3749	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 31.8 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.455 (Exibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 41.4 mph(Exhibit 25-19)

S= 43.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 237 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5150	0.90	Level	5	0	0.976	1.00	5865
Ramp	451	0.90	Level	5	0	0.976	1.00	514
UpStream	237	0.90	Level	5	0	0.976	1.00	270
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.377 using Equation (Exhibit 25-5)

V_{12}= 2208 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6379	See Exhibit 25-7	No
V_{R12}	2722	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.331 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.2 mph(Exhibit 25-19)

S= 50.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9539	0.90	Level	5	0	0.976	1.00	10864
Ramp	806	0.90	Level	5	0	0.976	1.00	918
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.321 using Equation (Exhibit 25-5)

V_{12}= 3490 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11782	See Exhibit 25-7	Yes
V_{R12}	4408	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 35.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.593 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 40.1 mph(Exhibit 25-19)

S= 42.6 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	$v=V/PHF\ f_{HV}\ f_p$
Freeway	4782	0.90	Level	5	0	0.976	1.00	5446
Ramp	1123	0.90	Level	5	0	0.976	1.00	1279
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 5446 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6725	See Exhibit 25-7	No
V_{R12}	7378	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 47.0 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 6.353 (Exibit 25-19)

S_R= -27.6 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Exisiting

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1254	0.90	Level	6	0	0.971	1.00	1435
Ramp	192	0.90	Level	6	0	0.971	1.00	220
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1435 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1655	See Exhibit 25-7	No
V_{R12}	1655	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.8 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.313 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5713	0.90	Level	5	0	0.976	1.00	6506
Ramp	915	0.90	Level	5	0	0.976	1.00	1042
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2463 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6506	9000	No
V_{12}	2463	4400:All	No
$V_{FO} = V_F - V_R$	5464	9000	No
V_R	1042	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.2 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.522 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 56.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9062	0.90	Level	5	0	0.976	1.00	10321
Ramp	269	0.90	Level	5	0	0.976	1.00	306
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 4673 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10321	9000	Yes
V_{12}	4673	4400:All	Yes
$V_{FO} = V_F - V_R$	10015	9000	Yes
V_R	306	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 42.9 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.456 (Exhibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 53.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.3 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5381	0.90	Level	5	0	0.976	1.00	6128
Ramp	760	0.90	Level	5	0	0.976	1.00	866
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3160 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6128	9000	No
V_{12}	3160	4400:All	No
$V_{FO} = V_F - V_R$	5262	9000	No
V_R	866	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 22.4 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.506 (Exhibit 25-19)

S_R= 48.4 mph (Exhibit 25-19)

S_0= 58.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.8 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9325	0.90	Level	5	0	0.976	1.00	10620
Ramp	718	0.90	Level	5	0	0.976	1.00	818
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5092 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10620	9000	Yes
V_{12}	5092	4400:All	Yes
$V_{FO} = V_F - V_R$	9802	9000	Yes
V_R	818	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 46.7 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.502 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= 53.5 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.9 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	992	0.90	Level	6	0	0.971	1.00	1135
Ramp	528	0.90	Level	6	0	0.971	1.00	604
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 1135 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1135	4500	No
V_{12}	1135	4400:All	No
$V_{FO} = V_F - V_R$	531	4500	No
V_R	604	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.6 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.482 (Exhibit 25-19)

S_R= 48.7 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10345	0.90	Level	5	0	0.976	1.00	11782
Ramp	1090	0.90	Level	5	0	0.976	1.00	1241
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11782	9000	Yes
V_{12}	3982	4400:All	No
$V_{FO} = V_F - V_R$	10541	9000	Yes
V_R	1241	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 25.3 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.540 (Exhibit 25-19)

S_R= 48.0 mph (Exhibit 25-19)

S_0= 49.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5272	0.90	Level	5	0	0.976	1.00	6004
Ramp	359	0.90	Level	5	0	0.976	1.00	409
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 2848 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6004	9000	No
V_{12}	2848	4400:All	No
$V_{FO} = V_F - V_R$	5595	9000	No
V_R	409	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 27.2 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.465 (Exhibit 25-19)

S_R= 49.0 mph (Exhibit 25-19)

S_0= 58.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.4 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8878	0.90	Level	5	0	0.976	1.00	10111
Ramp	1003	0.90	Level	5	0	0.976	1.00	1142
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5052 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10111	9000	Yes
V_{12}	5052	4400:All	Yes
$V_{FO} = V_F - V_R$	8969	9000	No
V_R	1142	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 38.7 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.531 (Exhibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 54.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5601	0.90	Level	5	0	0.976	1.00	6379
Ramp	819	0.90	Level	5	0	0.976	1.00	933
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3307 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6379	9000	No
V_{12}	3307	4400:All	No
$V_{FO} = V_F - V_R$	5446	9000	No
V_R	933	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 31.3 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.512 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 58.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	3553	0.90	Level	6	0	0.971	1.00	4066
Ramp	1889	0.90	Level	6	0	0.971	1.00	2162
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 4066 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	4066	4500	No
V_{12}	4066	4400:All	No
$V_{FO} = V_F - V_R$	1904	4500	No
V_R	2162	2000	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 37.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

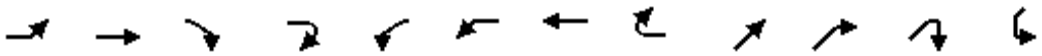
Speed Estimation

D_s = 0.623 (Exhibit 25-19)

S_R= 46.9 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 46.9 mph (Exhibit 25-15)

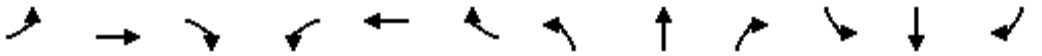


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	57	442	10	4	6	103	361	59	174	62	1	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3465		3397			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3465		3397			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	59	460	10	4	6	107	376	61	181	65	1	68
RTOR Reduction (vph)	0	0	0	2	0	0	11	0	0	0	0	0
Lane Group Flow (vph)	59	461	9	2	0	113	426	0	247	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	7.3	41.4	41.4	41.4		8.9	43.0		13.2			
Effective Green, g (s)	7.3	41.4	41.4	41.4		8.9	43.0		13.2			
Actuated g/C Ratio	0.08	0.46	0.46	0.46		0.10	0.48		0.15			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	144	1559	663	728		175	1656		498			
v/s Ratio Prot	0.03	c0.14	0.01			c0.06	0.12		c0.07			
v/s Ratio Perm				0.00								
v/c Ratio	0.41	0.30	0.01	0.00		0.65	0.26		0.50			
Uniform Delay, d1	39.3	15.2	13.2	13.1		39.0	14.0		35.3			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	1.9	0.5	0.0	0.0		7.9	0.4		0.8			
Delay (s)	41.2	15.7	13.2	13.1		47.0	14.4		36.1			
Level of Service	D	B	B	B		D	B		D			
Approach Delay (s)		18.4					21.1		36.1			
Approach LOS		B					C		D			

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	75	317	62
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.98	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3452	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3452	
Peak-hour factor, PHF	0.96	0.96	0.96
Adj. Flow (vph)	78	330	65
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	146	395	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	9.0	25.2	
Effective Green, g (s)	9.0	25.2	
Actuated g/C Ratio	0.10	0.28	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	177	967	
v/s Ratio Prot	c0.08	0.11	
v/s Ratio Perm			
v/c Ratio	0.82	0.41	
Uniform Delay, d1	39.7	26.3	
Progression Factor	1.00	1.00	
Incremental Delay, d2	25.7	0.3	
Delay (s)	65.4	26.6	
Level of Service	E	C	
Approach Delay (s)		37.1	
Approach LOS		D	

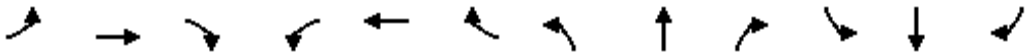
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	546	32	21	503	72	10	72	13	249	235	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3334		1770	3299			1851	1583	1770	1856	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3334		1770	3299			1851	1583	1770	1856	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	575	34	22	529	76	11	76	14	262	247	6
RTOR Reduction (vph)	0	8	0	0	14	0	0	0	12	0	2	0
Lane Group Flow (vph)	5	602	0	22	591	0	0	87	2	262	251	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.3	15.0		12.9	26.6			6.8	6.8	10.7	10.7	
Effective Green, g (s)	1.3	15.0		12.9	26.6			6.8	6.8	10.7	10.7	
Actuated g/C Ratio	0.02	0.25		0.22	0.44			0.11	0.11	0.18	0.18	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	834		381	1463			210	179	316	331	
v/s Ratio Prot	0.00	c0.18		0.01	c0.18			c0.05		c0.15	0.14	
v/s Ratio Perm									0.00			
v/c Ratio	0.13	0.72		0.06	0.40			0.41	0.01	0.83	0.76	
Uniform Delay, d1	28.8	20.6		18.7	11.3			24.7	23.6	23.8	23.4	
Progression Factor	1.00	1.00		0.83	0.77			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	3.1		0.3	0.8			1.3	0.0	16.2	9.6	
Delay (s)	30.4	23.7		15.9	9.5			26.1	23.6	40.0	33.0	
Level of Service	C	C		B	A			C	C	D	C	
Approach Delay (s)		23.7			9.7			25.7			36.6	
Approach LOS		C			A			C			D	

Intersection Summary			
HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

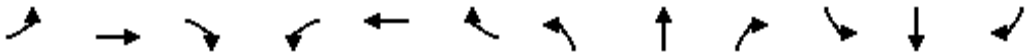
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	794	10	27	577	64	5	18	22	168	19	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.93			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1770	3356		1770	3312			1730			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.72	
Satd. Flow (perm)	1770	3356		1770	3312			1691			1338	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	827	10	28	601	67	5	19	23	175	20	8
RTOR Reduction (vph)	0	1	0	0	8	0	0	17	0	0	3	0
Lane Group Flow (vph)	2	836	0	28	660	0	0	30	0	0	200	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Effective Green, g (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Actuated g/C Ratio	0.02	0.54		0.05	0.56			0.25			0.25	
Clearance Time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	35	1795		89	1871			420			332	
v/s Ratio Prot	0.00	c0.25		c0.02	0.20							
v/s Ratio Perm								0.02			c0.15	
v/c Ratio	0.06	0.47		0.31	0.35			0.07			0.60	
Uniform Delay, d1	28.8	8.6		27.5	7.1			17.3			19.9	
Progression Factor	1.42	0.16		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.6		2.0	0.5			0.1			3.1	
Delay (s)	41.5	2.0		29.5	7.6			17.3			23.0	
Level of Service	D	A		C	A			B			C	
Approach Delay (s)		2.1			8.5			17.3			23.0	
Approach LOS		A			A			B			C	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	913	8	13	571	87	1	1	9	175	3	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.89			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3535		1770	3469			1649			1724	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.79	
Satd. Flow (perm)	1770	3535		1770	3469			1619			1414	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	54	932	8	13	583	89	1	1	9	179	3	88
RTOR Reduction (vph)	0	1	0	0	18	0	0	6	0	0	36	0
Lane Group Flow (vph)	54	939	0	13	654	0	0	5	0	0	234	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	1.6	20.3		0.7	19.4			12.7			12.7	
Effective Green, g (s)	1.6	20.3		0.7	19.4			12.7			12.7	
Actuated g/C Ratio	0.04	0.46		0.02	0.44			0.29			0.29	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	64	1624		28	1523			465			406	
v/s Ratio Prot	c0.03	c0.27		0.01	0.19							
v/s Ratio Perm								0.00			c0.17	
v/c Ratio	0.84	0.58		0.46	0.43			0.01			0.58	
Uniform Delay, d1	21.2	8.8		21.6	8.6			11.3			13.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	60.7	0.5		11.7	0.2			0.0			2.0	
Delay (s)	81.8	9.3		33.3	8.8			11.3			15.4	
Level of Service	F	A		C	A			B			B	
Approach Delay (s)		13.2			9.2			11.3			15.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	6.5
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

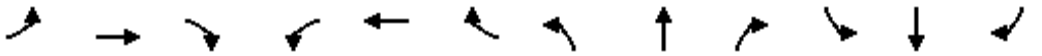
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	19	56	748	16	15	1	85	612	34	26	15	72
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	0.99				1.00	0.99				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3369				1770	3481				1816
Flt Permitted		0.95	1.00				0.32	1.00				0.95
Satd. Flow (perm)		1653	3369				601	3481				1816
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	60	804	17	16	1	91	658	37	28	16	77
RTOR Reduction (vph)	0	0	1	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	74	842	0	0	0	92	721	0	0	0	93
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		50.3	50.3				40.2	40.2				11.1
Effective Green, g (s)		51.3	51.3				41.2	41.2				10.6
Actuated g/C Ratio		0.29	0.29				0.23	0.23				0.06
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		475	968				139	803				108
v/s Ratio Prot		0.04	c0.25					c0.21				c0.05
v/s Ratio Perm							0.15					
v/c Ratio		0.16	0.87				0.66	0.90				0.86
Uniform Delay, d1		47.4	60.4				62.3	66.6				83.2
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	8.4				8.8	12.5				45.0
Delay (s)		47.5	68.8				71.1	79.1				128.2
Level of Service		D	E				E	E				F
Approach Delay (s)			67.1					78.2				
Approach LOS			E					E				

Intersection Summary			
HCM Average Control Delay	67.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

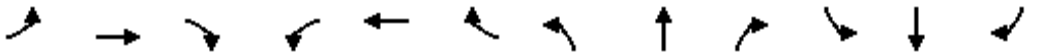
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	142	50	6	33	7	390	58	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.98				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.96				1.00	0.98		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3329				1816	3465		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3329				1816	3465		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	153	54	6	35	8	419	62	6
RTOR Reduction (vph)	1	0	0	0	0	1	0	0
Lane Group Flow (vph)	212	0	0	0	43	486	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	61.5				7.5	57.9		
Effective Green, g (s)	63.0				7.0	59.4		
Actuated g/C Ratio	0.35				0.04	0.33		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	1175				71	1153		
v/s Ratio Prot	c0.06				0.02	c0.14		
v/s Ratio Perm								
v/c Ratio	0.18				0.61	0.42		
Uniform Delay, d1	39.9				84.4	46.2		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	0.3				9.6	1.1		
Delay (s)	40.3				94.0	47.4		
Level of Service	D				F	D		
Approach Delay (s)	67.0					51.1		
Approach LOS	E					D		

Intersection Summary



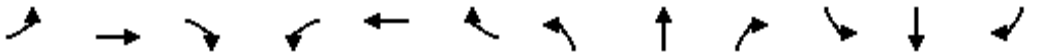
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	733	83	67	658	17	50	52	58	24	116	3
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00			1.00	
Frt		0.98		1.00	1.00		1.00	0.92			1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3485		1816	3526		1816	1716			1842	
Flt Permitted		1.00		0.95	1.00		0.48	1.00			0.93	
Satd. Flow (perm)		3485		1816	3526		917	1716			1732	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	772	87	71	693	18	53	55	61	25	122	3
RTOR Reduction (vph)	0	6	0	0	1	0	0	53	0	0	1	0
Lane Group Flow (vph)	0	853	0	71	710	0	53	63	0	0	149	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)		51.2		6.6	61.3		11.2	11.2			11.2	
Effective Green, g (s)		51.2		6.1	61.3		10.7	10.7			10.7	
Actuated g/C Ratio		0.64		0.08	0.77		0.13	0.13			0.13	
Clearance Time (s)		4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		2230		138	2702		123	230			232	
v/s Ratio Prot		c0.24		c0.04	0.20			0.04				
v/s Ratio Perm							0.06				c0.09	
v/c Ratio		0.38		0.51	0.26		0.43	0.27			0.64	
Uniform Delay, d1		6.9		35.5	2.7		31.9	31.2			32.8	
Progression Factor		1.00		0.71	1.95		1.00	1.00			1.00	
Incremental Delay, d2		0.5		1.2	0.2		0.9	0.2			4.5	
Delay (s)		7.4		26.4	5.6		32.7	31.4			37.3	
Level of Service		A		C	A		C	C			D	
Approach Delay (s)		7.4			7.5			31.8			37.3	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	793	16	33	695	102	14	12	21	265	34	30
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3527		1816	3471			1715			1765	
Flt Permitted	0.95	1.00		0.95	1.00			0.90			0.73	
Satd. Flow (perm)	1816	3527		1816	3471			1561			1347	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	844	17	35	739	109	15	13	22	282	36	32
RTOR Reduction (vph)	0	1	0	0	10	0	0	16	0	0	5	0
Lane Group Flow (vph)	11	860	0	35	838	0	0	34	0	0	345	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	40.4		4.2	43.4			24.0			24.0	
Effective Green, g (s)	0.7	40.8		3.7	43.8			23.5			23.5	
Actuated g/C Ratio	0.01	0.51		0.05	0.55			0.29			0.29	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	16	1799		84	1900			459			396	
v/s Ratio Prot	0.01	c0.24		c0.02	c0.24							
v/s Ratio Perm								0.02			c0.26	
v/c Ratio	0.69	0.48		0.42	0.44			0.08			0.87	
Uniform Delay, d1	39.5	12.7		37.1	10.8			20.4			26.8	
Progression Factor	1.30	0.60		1.00	1.00			1.00			1.00	
Incremental Delay, d2	65.0	0.9		1.2	0.7			0.0			18.0	
Delay (s)	116.6	8.5		38.3	11.5			20.4			44.8	
Level of Service	F	A		D	B			C			D	
Approach Delay (s)		9.9			12.6			20.4			44.8	
Approach LOS		A			B			C			D	

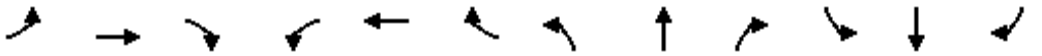
Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	1035	40	87	712	272	27	35	35	463	83	111
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	71	1067	41	90	734	280	28	36	36	477	86	114
RTOR Reduction (vph)	0	1	0	0	0	116	0	34	0	0	0	69
Lane Group Flow (vph)	71	1107	0	90	734	164	28	38	0	281	282	45
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	5.8	65.9		10.3	70.4	70.4	6.5	6.5		22.8	22.8	22.8
Effective Green, g (s)	5.3	65.9		9.8	70.4	70.4	6.0	6.0		22.3	22.3	22.3
Actuated g/C Ratio	0.04	0.55		0.08	0.59	0.59	0.05	0.05		0.19	0.19	0.19
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	156	1933		148	2076	929	91	85		321	318	294
v/s Ratio Prot	0.02	c0.31		c0.05	0.21		0.02	c0.02		0.16	c0.16	
v/s Ratio Perm						0.10						0.03
v/c Ratio	0.46	0.57		0.61	0.35	0.18	0.31	0.44		0.88	0.89	0.15
Uniform Delay, d1	55.9	17.8		53.2	12.9	11.4	55.0	55.4		47.5	47.6	40.9
Progression Factor	1.00	1.00		0.92	0.92	3.53	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	1.2		4.3	0.4	0.4	0.7	1.3		21.7	23.7	0.1
Delay (s)	56.7	19.0		53.3	12.4	40.7	55.7	56.7		69.2	71.3	41.0
Level of Service	E	B		D	B	D	E	E		E	E	D
Approach Delay (s)		21.3			22.9			56.4			65.4	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

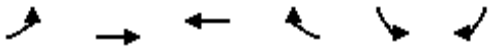
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1124	0	0	950	399	0	0	0	1011	0	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1171	0	0	990	416	0	0	0	1053	0	131
RTOR Reduction (vph)	0	0	0	0	0	198	0	0	0	0	0	63
Lane Group Flow (vph)	0	1171	0	0	990	218	0	0	0	1053	0	68
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		31.5			31.5	31.5				19.4		19.4
Effective Green, g (s)		32.4			32.4	31.5				19.6		19.6
Actuated g/C Ratio		0.54			0.54	0.52				0.33		0.33
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1911			1911	831				1151		517
v/s Ratio Prot		c0.33			0.28					c0.30		0.04
v/s Ratio Perm						0.14						
v/c Ratio		0.61			0.52	0.26				0.91		0.13
Uniform Delay, d1		9.5			8.8	7.9				19.4		14.2
Progression Factor		0.69			1.21	2.81				1.00		1.00
Incremental Delay, d2		1.2			1.0	0.8				11.0		0.0
Delay (s)		7.7			11.6	22.9				30.3		14.3
Level of Service		A			B	C				C		B
Approach Delay (s)		7.7			14.9			0.0			28.6	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

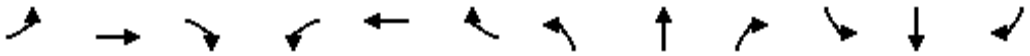
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	226	1855	930	726	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	235	1932	969	756	0	0
RTOR Reduction (vph)	0	0	0	141	0	0
Lane Group Flow (vph)	235	1932	969	615	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	11.3	60.0	39.8	39.8		
Effective Green, g (s)	11.3	60.0	40.7	39.8		
Actuated g/C Ratio	0.19	1.00	0.68	0.66		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	342	3539	2401	1037		
v/s Ratio Prot	0.13	c0.55	0.27			
v/s Ratio Perm				0.39		
v/c Ratio	0.69	0.55	0.40	0.59		
Uniform Delay, d1	22.7	0.0	4.3	5.6		
Progression Factor	0.92	1.00	1.00	1.00		
Incremental Delay, d2	2.9	0.4	0.5	2.5		
Delay (s)	23.7	0.4	4.8	8.1		
Level of Service	C	A	A	A		
Approach Delay (s)		2.9	6.2		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

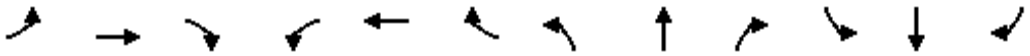
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	22	21	33	12	8	6	74	5	9	294	4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	6	23	22	35	13	9	6	79	5	10	313	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	52	56	90	327
Volume Left (vph)	6	35	6	10
Volume Right (vph)	22	9	5	4
Hadj (s)	-0.20	0.07	0.01	0.03
Departure Headway (s)	4.7	5.0	4.5	4.3
Degree Utilization, x	0.07	0.08	0.11	0.39
Capacity (veh/h)	690	657	756	808
Control Delay (s)	8.1	8.4	8.1	10.1
Approach Delay (s)	8.1	8.4	8.1	10.1
Approach LOS	A	A	A	B

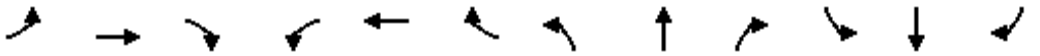
Intersection Summary				
Delay	9.4			
HCM Level of Service	A			
Intersection Capacity Utilization	34.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	9	10	21	4	0	3	90	30	3	297	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	8	9	10	22	4	0	3	94	31	3	309	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	439	453	315	452	443	109	321			125		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	439	453	315	452	443	109	321			125		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	96	99	100	100			100		
cM capacity (veh/h)	523	500	725	501	507	944	1239			1462		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	26	128	324
Volume Left	8	22	3	3
Volume Right	10	0	31	11
cSH	574	502	1239	1462
Volume to Capacity	0.05	0.05	0.00	0.00
Queue Length 95th (ft)	4	4	0	0
Control Delay (s)	11.6	12.6	0.2	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	11.6	12.6	0.2	0.1
Approach LOS	B	B		

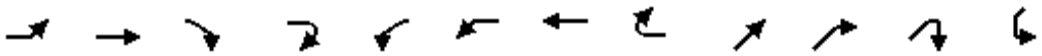
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	27.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	29	2	12	21	14	10	6	107	10	118	224	656
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	31	2	13	23	15	11	6	115	11	127	241	705
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	646	633	241	642	628	120	241			126		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	646	633	241	642	628	120	241			126		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	98	94	96	99	100			91		
cM capacity (veh/h)	342	361	798	353	363	931	1326			1461		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	46	48	132	368	705
Volume Left	31	23	6	127	0
Volume Right	13	11	11	0	705
cSH	408	413	1326	1461	1700
Volume to Capacity	0.11	0.12	0.00	0.09	0.41
Queue Length 95th (ft)	9	10	0	7	0
Control Delay (s)	14.9	14.9	0.4	3.2	0.0
Lane LOS	B	B	A	A	
Approach Delay (s)	14.9	14.9	0.4	1.1	
Approach LOS	B	B			

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			

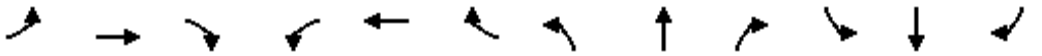


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	128	537	10	15	9	90	555	85	484	148	3	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3468		3413			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3468		3413			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	132	554	10	15	9	93	572	88	499	153	3	84
RTOR Reduction (vph)	0	0	0	9	0	0	12	0	0	0	0	0
Lane Group Flow (vph)	132	555	9	6	0	102	648	0	655	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	10.9	38.3	38.3	38.3		9.4	36.8		22.5			
Effective Green, g (s)	10.9	38.3	38.3	38.3		9.4	36.8		22.5			
Actuated g/C Ratio	0.11	0.39	0.39	0.39		0.09	0.37		0.23			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	195	1311	557	612		168	1289		776			
v/s Ratio Prot	c0.07	0.16	0.01			0.06	c0.19		c0.19			
v/s Ratio Perm				0.00								
v/c Ratio	0.68	0.42	0.02	0.01		0.61	0.50		0.84			
Uniform Delay, d1	42.4	22.3	18.7	18.7		43.0	24.0		36.6			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	9.0	1.0	0.1	0.0		6.1	1.4		8.3			
Delay (s)	51.3	23.3	18.8	18.7		49.1	25.4		44.9			
Level of Service	D	C	B	B		D	C		D			
Approach Delay (s)		28.3					28.6		44.9			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	30	209	78
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.96	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3395	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3395	
Peak-hour factor, PHF	0.97	0.97	0.97
Adj. Flow (vph)	31	215	80
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	115	295	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	11.3	36.8	
Effective Green, g (s)	11.3	36.8	
Actuated g/C Ratio	0.11	0.37	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	202	1262	
v/s Ratio Prot	c0.06	0.09	
v/s Ratio Perm			
v/c Ratio	0.57	0.23	
Uniform Delay, d1	41.5	21.4	
Progression Factor	1.00	1.00	
Incremental Delay, d2	3.7	0.1	
Delay (s)	45.2	21.5	
Level of Service	D	C	
Approach Delay (s)		28.1	
Approach LOS		C	

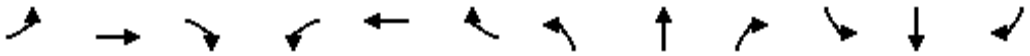
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	724	19	29	700	262	34	293	50	229	107	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3349		1770	3225			1853	1583	1770	1844	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3349		1770	3225			1853	1583	1770	1844	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	14	762	20	31	737	276	36	308	53	241	113	8
RTOR Reduction (vph)	0	3	0	0	43	0	0	0	39	0	4	0
Lane Group Flow (vph)	14	779	0	31	970	0	0	344	14	241	117	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.4	17.8		14.8	31.2			9.4	9.4	9.4	9.4	
Effective Green, g (s)	1.4	17.8		14.8	31.2			9.4	9.4	9.4	9.4	
Actuated g/C Ratio	0.02	0.27		0.22	0.47			0.14	0.14	0.14	0.14	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	903		397	1525			264	225	252	263	
v/s Ratio Prot	0.01	c0.23		0.02	c0.30			c0.19		c0.14	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.37	0.86		0.08	0.64			1.30	0.06	0.96	0.44	
Uniform Delay, d1	31.9	22.9		20.2	13.1			28.3	24.5	28.1	25.9	
Progression Factor	1.00	1.00		0.82	0.76			1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.0	8.5		0.3	1.8			161.2	0.1	44.3	1.2	
Delay (s)	37.8	31.5		16.9	11.8			189.5	24.6	72.4	27.1	
Level of Service	D	C		B	B			F	C	E	C	
Approach Delay (s)		31.6			12.0			167.5			57.2	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM Average Control Delay	48.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

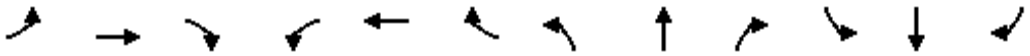
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	972	6	17	961	160	10	48	50	137	11	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1770	3359		1770	3290			1738			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.67	
Satd. Flow (perm)	1770	3359		1770	3290			1696			1241	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	24	992	6	17	981	163	10	49	51	140	11	10
RTOR Reduction (vph)	0	0	0	0	10	0	0	42	0	0	4	0
Lane Group Flow (vph)	24	998	0	17	1134	0	0	68	0	0	157	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Effective Green, g (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Actuated g/C Ratio	0.05	0.64		0.02	0.63			0.18			0.18	
Clearance Time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	80	2158		40	2089			311			228	
v/s Ratio Prot	0.01	0.30		c0.01	c0.34							
v/s Ratio Perm								0.04			c0.13	
v/c Ratio	0.30	0.46		0.42	0.54			0.22			0.69	
Uniform Delay, d1	30.5	6.0		31.8	6.7			22.9			25.2	
Progression Factor	1.40	0.21		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.1	0.4		7.1	1.0			0.4			8.4	
Delay (s)	43.8	1.7		38.9	7.7			23.3			33.5	
Level of Service	D	A		D	A			C			C	
Approach Delay (s)		2.6			8.2			23.3			33.5	
Approach LOS		A			A			C			C	

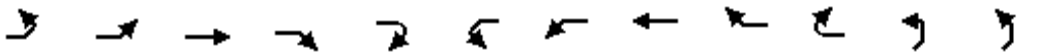
Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	1012	22	5	1045	185	0	6	17	142	2	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3528		1770	3459			1674			1708	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.81	
Satd. Flow (perm)	1770	3528		1770	3459			1674			1422	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	131	1054	23	5	1089	193	0	6	18	148	2	108
RTOR Reduction (vph)	0	2	0	0	21	0	0	14	0	0	57	0
Lane Group Flow (vph)	131	1075	0	5	1261	0	0	10	0	0	201	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.0	27.0		0.8	22.8			12.0			12.0	
Effective Green, g (s)	5.0	27.0		0.8	22.8			12.0			12.0	
Actuated g/C Ratio	0.10	0.54		0.02	0.45			0.24			0.24	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	176	1894		28	1568			399			339	
v/s Ratio Prot	c0.07	0.30		0.00	c0.36			0.01				
v/s Ratio Perm											c0.14	
v/c Ratio	0.74	0.57		0.18	0.80			0.03			0.59	
Uniform Delay, d1	22.0	7.8		24.4	11.8			14.7			17.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.6	0.4		3.0	3.1			0.0			2.8	
Delay (s)	37.7	8.2		27.5	14.9			14.7			19.8	
Level of Service	D	A		C	B			B			B	
Approach Delay (s)		11.4			15.0			14.7			19.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	50.3	Sum of lost time (s)	10.5
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



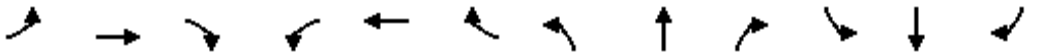
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	22	105	855	6	17	5	55	941	67	27	86	92
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	1.00				1.00	0.99				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3375				1770	3480				1816
Flt Permitted		0.95	1.00				0.28	1.00				0.95
Satd. Flow (perm)		1653	3375				523	3480				1816
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	115	940	7	19	5	60	1034	74	30	95	101
RTOR Reduction (vph)	0	0	1	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	127	977	0	0	0	65	1137	0	0	0	196
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		51.1	51.1				52.1	52.1				17.5
Effective Green, g (s)		52.1	52.1				53.1	53.1				17.0
Actuated g/C Ratio		0.30	0.30				0.31	0.31				0.10
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		502	1026				162	1078				180
v/s Ratio Prot		0.08	c0.29					c0.33				c0.11
v/s Ratio Perm							0.12					
v/c Ratio		0.25	0.95				0.40	1.05				1.09
Uniform Delay, d1		45.0	58.4				46.6	59.2				77.2
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	17.6				0.6	42.9				92.8
Delay (s)		45.1	76.0				47.2	102.1				170.0
Level of Service		D	E				D	F				F
Approach Delay (s)			72.5					99.1				
Approach LOS			E					F				

Intersection Summary			
HCM Average Control Delay	87.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	171.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

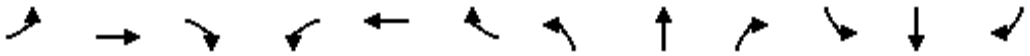
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	567	62	6	62	38	282	101	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.99				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.98				1.00	0.95		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3459				1816	3376		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3459				1816	3376		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	623	68	7	68	42	310	111	27
RTOR Reduction (vph)	1	0	0	0	0	2	0	0
Lane Group Flow (vph)	697	0	0	0	110	446	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	37.7				11.5	31.7		
Effective Green, g (s)	39.2				11.0	33.2		
Actuated g/C Ratio	0.23				0.06	0.19		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	791				117	654		
v/s Ratio Prot	c0.20				0.06	0.13		
v/s Ratio Perm								
v/c Ratio	0.88				0.94	0.68		
Uniform Delay, d1	63.9				79.9	64.2		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	11.0				63.9	2.3		
Delay (s)	74.9				143.8	66.5		
Level of Service	E				F	E		
Approach Delay (s)	95.7					81.8		
Approach LOS	F					F		

Intersection Summary



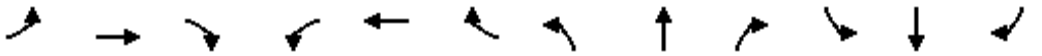
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	868	77	67	927	35	104	108	108	21	42	2
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92			1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1816	3496		1816	3520		1816	1723			1825	
Flt Permitted	0.95	1.00		0.95	1.00		0.78	1.00			0.67	
Satd. Flow (perm)	1816	3496		1816	3520		1487	1723			1235	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	895	79	69	956	36	107	111	111	22	43	2
RTOR Reduction (vph)	0	5	0	0	2	0	0	57	0	0	2	0
Lane Group Flow (vph)	7	969	0	69	990	0	107	165	0	0	65	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.1	50.4		6.6	55.9		12.0	12.0			12.0	
Effective Green, g (s)	0.6	50.4		6.1	55.9		11.5	11.5			11.5	
Actuated g/C Ratio	0.01	0.63		0.08	0.70		0.14	0.14			0.14	
Clearance Time (s)	3.5	4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	14	2202		138	2460		214	248			178	
v/s Ratio Prot	0.00	c0.28		c0.04	0.28			c0.10				
v/s Ratio Perm							0.07				0.05	
v/c Ratio	0.50	0.44		0.50	0.40		0.50	0.66			0.37	
Uniform Delay, d1	39.6	7.6		35.5	5.1		31.6	32.4			31.0	
Progression Factor	1.00	1.00		1.20	0.64		1.00	1.00			1.00	
Incremental Delay, d2	9.9	0.6		0.9	0.4		0.7	5.1			0.5	
Delay (s)	49.4	8.2		43.4	3.6		32.3	37.5			31.4	
Level of Service	D	A		D	A		C	D			C	
Approach Delay (s)		8.5			6.2			35.8			31.4	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	947	23	25	1001	349	14	32	44	146	13	22
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.96			0.93			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3525		1816	3402			1714			1757	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			0.72	
Satd. Flow (perm)	1816	3525		1816	3402			1653			1316	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	24	957	23	25	1011	353	14	32	44	147	13	22
RTOR Reduction (vph)	0	1	0	0	25	0	0	36	0	0	7	0
Lane Group Flow (vph)	24	979	0	25	1339	0	0	54	0	0	175	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.7	51.3		2.7	51.3			14.6			14.6	
Effective Green, g (s)	2.2	51.7		2.2	51.7			14.1			14.1	
Actuated g/C Ratio	0.03	0.65		0.03	0.65			0.18			0.18	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	50	2278		50	2199			291			232	
v/s Ratio Prot	0.01	0.28		c0.01	c0.39							
v/s Ratio Perm								0.03			c0.13	
v/c Ratio	0.48	0.43		0.50	0.61			0.18			0.75	
Uniform Delay, d1	38.3	6.9		38.4	8.3			28.1			31.3	
Progression Factor	0.82	1.28		0.94	2.10			1.00			1.00	
Incremental Delay, d2	2.4	0.5		2.4	1.1			0.1			11.5	
Delay (s)	33.7	9.4		38.4	18.4			28.2			42.8	
Level of Service	C	A		D	B			C			D	
Approach Delay (s)		10.0			18.8			28.2			42.8	
Approach LOS		A			B			C			D	

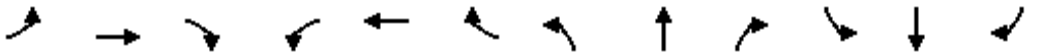
Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	1015	15	40	1225	238	44	71	44	343	56	100
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	120	1046	15	41	1263	245	45	73	45	354	58	103
RTOR Reduction (vph)	0	1	0	0	0	89	0	15	0	0	0	67
Lane Group Flow (vph)	120	1060	0	41	1263	156	45	103	0	205	207	36
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	9.5	67.1		39.0	96.6	96.6	15.6	15.6		23.8	23.8	23.8
Effective Green, g (s)	9.0	67.1		38.5	96.6	96.6	15.1	15.1		23.3	23.3	23.3
Actuated g/C Ratio	0.06	0.42		0.24	0.60	0.60	0.09	0.09		0.15	0.15	0.15
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	198	1481		437	2137	956	171	165		251	249	231
v/s Ratio Prot	c0.03	c0.30		0.02	c0.36		0.02	c0.06		0.12	c0.12	
v/s Ratio Perm						0.10						0.02
v/c Ratio	0.61	0.72		0.09	0.59	0.16	0.26	0.62		0.82	0.83	0.16
Uniform Delay, d1	73.8	38.5		47.2	19.5	13.9	67.3	69.7		66.3	66.4	59.8
Progression Factor	0.94	1.06		1.00	0.94	2.16	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.3	1.5		0.0	1.0	0.3	0.3	5.2		17.4	19.6	0.1
Delay (s)	72.8	42.2		47.4	19.3	30.5	67.6	74.9		83.7	86.1	59.9
Level of Service	E	D		D	B	C	E	E		F	F	E
Approach Delay (s)		45.3			21.8			72.8			79.9	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	41.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

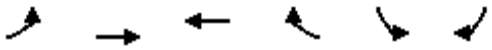
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1028	0	0	1448	379	0	0	0	502	0	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1071	0	0	1508	395	0	0	0	523	0	102
RTOR Reduction (vph)	0	0	0	0	0	124	0	0	0	0	0	30
Lane Group Flow (vph)	0	1071	0	0	1508	271	0	0	0	523	0	72
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		54.9			54.9	54.9				16.0		16.0
Effective Green, g (s)		55.8			55.8	54.9				16.2		16.2
Actuated g/C Ratio		0.70			0.70	0.69				0.20		0.20
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		2468			2468	1086				713		321
v/s Ratio Prot		0.30			c0.43					c0.15		0.05
v/s Ratio Perm						0.17						
v/c Ratio		0.43			0.61	0.25				0.73		0.23
Uniform Delay, d1		5.2			6.4	4.8				29.9		26.7
Progression Factor		0.27			1.05	1.37				1.00		1.00
Incremental Delay, d2		0.4			1.1	0.5				3.4		0.1
Delay (s)		1.8			7.8	7.0				33.3		26.8
Level of Service		A			A	A				C		C
Approach Delay (s)		1.8			7.6			0.0			32.2	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

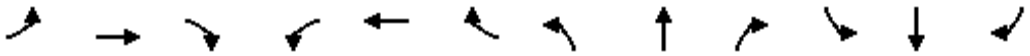
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	171	1678	1548	688	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	173	1695	1564	695	0	0
RTOR Reduction (vph)	0	0	0	174	0	0
Lane Group Flow (vph)	173	1695	1564	521	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	15.8	66.4	55.3	55.3		
Effective Green, g (s)	15.8	67.3	56.2	55.3		
Actuated g/C Ratio	0.20	0.84	0.70	0.69		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	359	2977	2486	1081		
v/s Ratio Prot	c0.10	c0.48	c0.44			
v/s Ratio Perm				0.33		
v/c Ratio	0.48	0.57	0.63	0.48		
Uniform Delay, d1	28.5	1.9	6.3	5.7		
Progression Factor	0.88	1.05	1.00	1.00		
Incremental Delay, d2	0.4	0.8	1.2	1.5		
Delay (s)	25.5	2.8	7.6	7.3		
Level of Service	C	A	A	A		
Approach Delay (s)		4.9	7.5		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

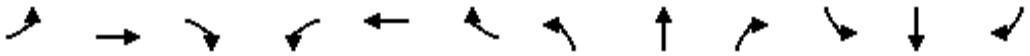
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	12	9	15	18	11	18	366	33	7	128	21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	12	14	11	18	21	13	21	431	39	8	151	25

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	36	52	491	184
Volume Left (vph)	12	18	21	8
Volume Right (vph)	11	13	39	25
Hadj (s)	-0.08	-0.05	0.00	-0.04
Departure Headway (s)	5.4	5.4	4.4	4.6
Degree Utilization, x	0.06	0.08	0.59	0.24
Capacity (veh/h)	578	581	812	741
Control Delay (s)	8.7	8.9	13.5	9.1
Approach Delay (s)	8.7	8.9	13.5	9.1
Approach LOS	A	A	B	A

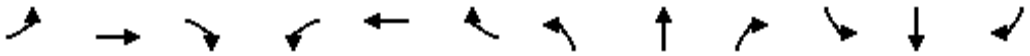
Intersection Summary				
Delay	11.9			
HCM Level of Service	B			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	11	25	24	9	3	7	395	28	1	139	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	15	13	29	28	11	4	8	465	33	1	164	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	674	682	165	701	667	481	167			498		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	674	682	165	701	667	481	167			498		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	96	97	91	97	99	99			100		
cM capacity (veh/h)	356	370	879	331	377	585	1411			1066		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	58	42	506	168
Volume Left	15	28	8	1
Volume Right	29	4	33	4
cSH	518	354	1411	1066
Volume to Capacity	0.11	0.12	0.01	0.00
Queue Length 95th (ft)	9	10	0	0
Control Delay (s)	12.8	16.5	0.2	0.1
Lane LOS	B	C	A	A
Approach Delay (s)	12.8	16.5	0.2	0.1
Approach LOS	B	C		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	38.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	389	2	39	6	2	12	4	316	0	6	188	119
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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 (vph)	423	2	42	7	2	13	4	343	0	7	204	129
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	584	570	204	613	570	343	204			343		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	584	570	204	613	570	343	204			343		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	99	95	98	99	98	100			99		
cM capacity (veh/h)	411	428	836	380	428	699	1367			1216		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	467	22	348	211	129
Volume Left	423	7	4	7	0
Volume Right	42	13	0	0	129
cSH	431	532	1367	1216	1700
Volume to Capacity	1.08	0.04	0.00	0.01	0.08
Queue Length 95th (ft)	393	3	0	0	0
Control Delay (s)	98.9	12.1	0.1	0.3	0.0
Lane LOS	F	B	A	A	
Approach Delay (s)	98.9	12.1	0.1	0.2	
Approach LOS	F	B			

Intersection Summary				
Average Delay	39.6			
Intersection Capacity Utilization	57.2%	ICU Level of Service	B	
Analysis Period (min)	15			

Appendix E-3:

Worksheets for Baseline Conditions

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☑ Yes ☑ On
☑ No ☐ Off		☐ No ☐ Off
L_{up} = ft		L_{down} = 1085 ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = 507 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4800	0.90	Level	5	0	0.976	1.00	5467
Ramp	120	0.90	Level	5	0	0.976	1.00	137
UpStream								
DownStream	507	0.90	Level	5	0	0.976	1.00	577

Merge Areas | Diverge Areas

Estimation of v_{12}

Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.344 using Equation (Exhibit 25-5)

V_{12}= 1881 pc/h

Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	5604	See Exhibit 25-7	No
V_{R12}	2018	4600:All	No

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 18.3 (pc/ m/ln)

LOS = B (Exhibit 25-4)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

M_S = 0.319 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= 50.3 mph(Exhibit 25-19)

S= 50.5 mph(Exhibit 25-14)

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☑ Yes ☑ On		☐ Yes ☐ On
☐ No ☐ Off		☑ No ☐ Off
L_{up} = 950 ft		L_{down} = ft
V_u = 195 veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph	V_D = veh/h
	Sketch (show lanes, L_A, L_D, V_R, V_f)	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8999	0.90	Level	5	0	0.976	1.00	10249
Ramp	337	0.90	Level	5	0	0.976	1.00	384
UpStream	195	0.90	Level	5	0	0.976	1.00	222
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.393 using Equation (Exhibit 25-5)

V_{12}= 4026 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10633	See Exhibit 25-7	Yes
V_{R12}	4410	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.3 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.593 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 43.6 mph(Exhibit 25-19)

S= 45.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5085	0.90	Level	5	0	0.976	1.00	5791
Ramp	630	0.90	Level	5	0	0.976	1.00	718
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.346 using Equation (Exhibit 25-5)

V_{12}= 2005 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6509	See Exhibit 25-7	No
V_{R12}	2723	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.332 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.0 mph(Exhibit 25-19)

S= 50.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8607	0.90	Level	5	0	0.976	1.00	9802
Ramp	834	0.90	Level	5	0	0.976	1.00	950
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 9802 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10752	See Exhibit 25-7	Yes
V_{R12}	11928	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 85.4 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 590.760 (Exibit 25-19)

S_R= -7624.9 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2380	0.90	Level	6	0	0.971	1.00	2724
Ramp	359	0.90	Level	6	0	0.971	1.00	411
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2724 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3135	See Exhibit 25-7	No
V_{R12}	3135	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.2 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.383 (Exibit 25-19)

S_R= 50.0 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.0 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 604 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9287	0.90	Level	5	0	0.976	1.00	10577
Ramp	158	0.90	Level	5	0	0.976	1.00	180
UpStream								
DownStream	604	0.90	Level	5	0	0.976	1.00	688

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.339 using Equation (Exhibit 25-5)

V_{12}= 3582 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10757	See Exhibit 25-7	Yes
V_{R12}	3762	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 31.9 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.457 (Exibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 41.3 mph(Exhibit 25-19)

S= 43.7 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 237 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5163	0.90	Level	5	0	0.976	1.00	5880
Ramp	451	0.90	Level	5	0	0.976	1.00	514
UpStream	237	0.90	Level	5	0	0.976	1.00	270
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.377 using Equation (Exhibit 25-5)

V_{12}= 2214 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6394	See Exhibit 25-7	No
V_{R12}	2728	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.332 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.2 mph(Exhibit 25-19)

S= 50.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9539	0.90	Level	5	0	0.976	1.00	10864
Ramp	838	0.90	Level	5	0	0.976	1.00	954
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.317 using Equation (Exhibit 25-5)

V_{12}= 3441 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11818	See Exhibit 25-7	Yes
V_{R12}	4395	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.0 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.589 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 40.0 mph(Exhibit 25-19)

S= 42.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4782	0.90	Level	5	0	0.976	1.00	5446
Ramp	1145	0.90	Level	5	0	0.976	1.00	1304
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 5446 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6750	See Exhibit 25-7	No
V_{R12}	7403	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 47.2 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 6.511 (Exibit 25-19)

S_R= -29.6 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1254	0.90	Level	6	0	0.971	1.00	1435
Ramp	192	0.90	Level	6	0	0.971	1.00	220
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1435 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1655	See Exhibit 25-7	No
V_{R12}	1655	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.8 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.313 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5715	0.90	Level	5	0	0.976	1.00	6509
Ramp	915	0.90	Level	5	0	0.976	1.00	1042
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2463 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6509	9000	No
V_{12}	2463	4400:All	No
$V_{FO} = V_F - V_R$	5467	9000	No
V_R	1042	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.2 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.522 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 56.3 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9073	0.90	Level	5	0	0.976	1.00	10333
Ramp	269	0.90	Level	5	0	0.976	1.00	306
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 4678 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10333	9000	Yes
V_{12}	4678	4400:All	Yes
$V_{FO} = V_F - V_R$	10027	9000	Yes
V_R	306	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 42.9 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.456 (Exhibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 53.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.3 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5392	0.90	Level	5	0	0.976	1.00	6141
Ramp	771	0.90	Level	5	0	0.976	1.00	878
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3173 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6141	9000	No
V_{12}	3173	4400:All	No
$V_{FO} = V_F - V_R$	5263	9000	No
V_R	878	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 22.5 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.507 (Exhibit 25-19)

S_R= 48.4 mph (Exhibit 25-19)

S_0= 58.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.8 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9336	0.90	Level	5	0	0.976	1.00	10633
Ramp	729	0.90	Level	5	0	0.976	1.00	830
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5104 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10633	9000	Yes
V_{12}	5104	4400:All	Yes
$V_{FO} = V_F - V_R$	9803	9000	Yes
V_R	830	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 46.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.503 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= 53.5 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.9 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	992	0.90	Level	6	0	0.971	1.00	1135
Ramp	528	0.90	Level	6	0	0.971	1.00	604
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 1135 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1135	4500	No
V_{12}	1135	4400:All	No
$V_{FO} = V_F - V_R$	531	4500	No
V_R	604	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.6 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.482 (Exhibit 25-19)

S_R= 48.7 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10377	0.90	Level	5	0	0.976	1.00	11818
Ramp	1090	0.90	Level	5	0	0.976	1.00	1241
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3991 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11818	9000	Yes
V_{12}	3991	4400:All	No
$V_{FO} = V_F - V_R$	10577	9000	Yes
V_R	1241	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 25.3 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.540 (Exhibit 25-19)

S_R= 48.0 mph (Exhibit 25-19)

S_0= 49.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5285	0.90	Level	5	0	0.976	1.00	6019
Ramp	359	0.90	Level	5	0	0.976	1.00	409
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 2855 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6019	9000	No
V_{12}	2855	4400:All	No
$V_{FO} = V_F - V_R$	5610	9000	No
V_R	409	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 27.2 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.465 (Exhibit 25-19)

S_R= 49.0 mph (Exhibit 25-19)

S_0= 58.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.4 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8891	0.90	Level	5	0	0.976	1.00	10126
Ramp	1016	0.90	Level	5	0	0.976	1.00	1157
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5067 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10126	9000	Yes
V_{12}	5067	4400:All	Yes
$V_{FO} = V_F - V_R$	8969	9000	No
V_R	1157	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 38.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.532 (Exhibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 54.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5614	0.90	Level	5	0	0.976	1.00	6394
Ramp	832	0.90	Level	5	0	0.976	1.00	948
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3322 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6394	9000	No
V_{12}	3322	4400:All	No
$V_{FO} = V_F - V_R$	5446	9000	No
V_R	948	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 31.5 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.513 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 58.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	3553	0.90	Level	6	0	0.971	1.00	4066
Ramp	1889	0.90	Level	6	0	0.971	1.00	2162
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 4066 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	4066	4500	No
V_{12}	4066	4400:All	No
$V_{FO} = V_F - V_R$	1904	4500	No
V_R	2162	2000	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 37.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

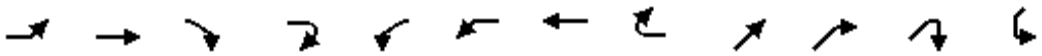
Speed Estimation

D_s = 0.623 (Exhibit 25-19)

S_R= 46.9 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 46.9 mph (Exhibit 25-15)

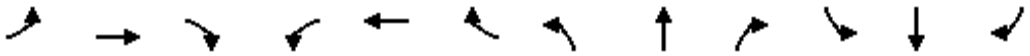


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	58	451	10	6	6	107	365	59	177	63	1	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3466		3398			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3466		3398			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	470	10	6	6	111	380	61	184	66	1	68
RTOR Reduction (vph)	0	0	0	3	0	0	11	0	0	0	0	0
Lane Group Flow (vph)	60	471	9	3	0	117	430	0	251	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	7.3	41.2	41.2	41.2		9.0	42.9		13.3			
Effective Green, g (s)	7.3	41.2	41.2	41.2		9.0	42.9		13.3			
Actuated g/C Ratio	0.08	0.46	0.46	0.46		0.10	0.48		0.15			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	144	1551	660	725		177	1652		502			
v/s Ratio Prot	0.03	c0.14	0.01			c0.07	0.12		0.07			
v/s Ratio Perm				0.00								
v/c Ratio	0.42	0.30	0.01	0.00		0.66	0.26		0.50			
Uniform Delay, d1	39.3	15.4	13.3	13.3		39.0	14.1		35.3			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	1.9	0.5	0.0	0.0		8.9	0.4		0.8			
Delay (s)	41.3	15.9	13.4	13.3		47.9	14.5		36.1			
Level of Service	D	B	B	B		D	B		D			
Approach Delay (s)		18.6					21.5		36.1			
Approach LOS		B					C		D			

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	75	331	64
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.98	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3453	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3453	
Peak-hour factor, PHF	0.96	0.96	0.96
Adj. Flow (vph)	78	345	67
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	146	412	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	9.0	25.3	
Effective Green, g (s)	9.0	25.3	
Actuated g/C Ratio	0.10	0.28	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	177	971	
v/s Ratio Prot	c0.08	c0.12	
v/s Ratio Perm			
v/c Ratio	0.82	0.42	
Uniform Delay, d1	39.7	26.4	
Progression Factor	1.00	1.00	
Incremental Delay, d2	25.7	0.3	
Delay (s)	65.4	26.7	
Level of Service	E	C	
Approach Delay (s)		36.8	
Approach LOS		D	

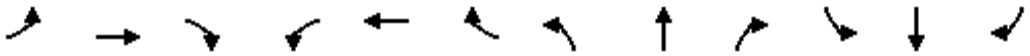
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	551	33	22	511	72	10	72	13	249	235	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3334		1770	3300			1851	1583	1770	1856	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3334		1770	3300			1851	1583	1770	1856	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	580	35	23	538	76	11	76	14	262	247	6
RTOR Reduction (vph)	0	8	0	0	14	0	0	0	12	0	2	0
Lane Group Flow (vph)	5	608	0	23	600	0	0	87	2	262	251	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.3	15.0		12.9	26.6			6.8	6.8	10.7	10.7	
Effective Green, g (s)	1.3	15.0		12.9	26.6			6.8	6.8	10.7	10.7	
Actuated g/C Ratio	0.02	0.25		0.22	0.44			0.11	0.11	0.18	0.18	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	834		381	1463			210	179	316	331	
v/s Ratio Prot	0.00	c0.18		0.01	c0.18			c0.05		c0.15	0.14	
v/s Ratio Perm									0.00			
v/c Ratio	0.13	0.73		0.06	0.41			0.41	0.01	0.83	0.76	
Uniform Delay, d1	28.8	20.6		18.7	11.4			24.7	23.6	23.8	23.4	
Progression Factor	1.00	1.00		0.84	0.77			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	3.2		0.3	0.8			1.3	0.0	16.2	9.6	
Delay (s)	30.4	23.8		16.1	9.6			26.1	23.6	40.0	33.0	
Level of Service	C	C		B	A			C	C	D	C	
Approach Delay (s)		23.9			9.8			25.7			36.6	
Approach LOS		C			A			C			D	

Intersection Summary			
HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

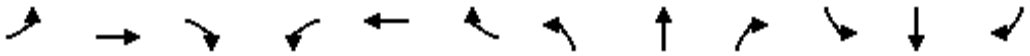
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	799	10	27	586	64	5	18	22	168	19	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.93			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1770	3356		1770	3312			1730			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.72	
Satd. Flow (perm)	1770	3356		1770	3312			1691			1338	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	832	10	28	610	67	5	19	23	175	20	8
RTOR Reduction (vph)	0	1	0	0	8	0	0	17	0	0	3	0
Lane Group Flow (vph)	2	841	0	28	669	0	0	30	0	0	200	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Effective Green, g (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Actuated g/C Ratio	0.02	0.54		0.05	0.56			0.25			0.25	
Clearance Time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	35	1795		89	1871			420			332	
v/s Ratio Prot	0.00	c0.25		c0.02	0.20							
v/s Ratio Perm								0.02			c0.15	
v/c Ratio	0.06	0.47		0.31	0.36			0.07			0.60	
Uniform Delay, d1	28.8	8.7		27.5	7.1			17.3			19.9	
Progression Factor	1.42	0.16		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.6		2.0	0.5			0.1			3.1	
Delay (s)	41.5	2.0		29.5	7.6			17.3			23.0	
Level of Service	D	A		C	A			B			C	
Approach Delay (s)		2.1			8.5			17.3			23.0	
Approach LOS		A			A			B			C	

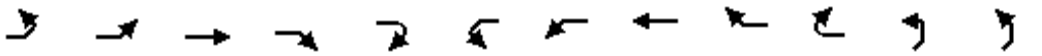
Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	917	8	13	577	91	1	1	9	176	3	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.89			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3535		1770	3467			1649			1723	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.80	
Satd. Flow (perm)	1770	3535		1770	3467			1619			1415	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	55	936	8	13	589	93	1	1	9	180	3	91
RTOR Reduction (vph)	0	1	0	0	19	0	0	6	0	0	37	0
Lane Group Flow (vph)	55	943	0	13	663	0	0	5	0	0	237	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	1.6	20.2		0.7	19.3			12.8			12.8	
Effective Green, g (s)	1.6	20.2		0.7	19.3			12.8			12.8	
Actuated g/C Ratio	0.04	0.46		0.02	0.44			0.29			0.29	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	64	1616		28	1514			469			410	
v/s Ratio Prot	c0.03	c0.27		0.01	0.19							
v/s Ratio Perm								0.00			c0.17	
v/c Ratio	0.86	0.58		0.46	0.44			0.01			0.58	
Uniform Delay, d1	21.2	8.9		21.6	8.7			11.2			13.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	64.6	0.5		11.7	0.2			0.0			2.0	
Delay (s)	85.8	9.4		33.3	8.9			11.2			15.4	
Level of Service	F	A		C	A			B			B	
Approach Delay (s)		13.6			9.3			11.2			15.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	6.5
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



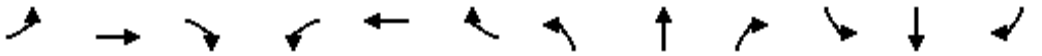
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	19	61	756	16	15	1	87	614	34	48	15	72
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	0.99				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3369				1770	3462				1816
Flt Permitted		0.95	1.00				0.32	1.00				0.95
Satd. Flow (perm)		1653	3369				595	3462				1816
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	66	813	17	16	1	94	660	37	52	16	77
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	79	852	0	0	0	95	746	0	0	0	93
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		50.8	50.8				41.3	41.3				11.1
Effective Green, g (s)		51.8	51.8				42.3	42.3				10.6
Actuated g/C Ratio		0.29	0.29				0.24	0.24				0.06
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		480	978				141	820				108
v/s Ratio Prot		0.05	c0.25					c0.22				c0.05
v/s Ratio Perm							0.16					
v/c Ratio		0.16	0.87				0.67	0.91				0.86
Uniform Delay, d1		47.2	60.2				61.8	66.2				83.2
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	8.4				9.6	13.6				45.0
Delay (s)		47.3	68.5				71.4	79.8				128.2
Level of Service		D	E				E	E				F
Approach Delay (s)			66.7					78.9				
Approach LOS			E					E				

Intersection Summary			
HCM Average Control Delay	68.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

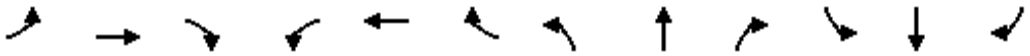
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	147	58	6	48	7	392	60	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.98				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.95				1.00	0.98		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3315				1816	3463		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3315				1816	3463		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	158	62	6	52	8	422	65	6
RTOR Reduction (vph)	1	0	0	0	0	1	0	0
Lane Group Flow (vph)	225	0	0	0	60	492	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	57.9				9.5	56.3		
Effective Green, g (s)	59.4				9.0	57.8		
Actuated g/C Ratio	0.33				0.05	0.32		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	1103				92	1121		
v/s Ratio Prot	0.07				0.03	c0.14		
v/s Ratio Perm								
v/c Ratio	0.20				0.65	0.44		
Uniform Delay, d1	42.6				83.2	47.6		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	0.4				11.9	1.3		
Delay (s)	43.1				95.1	48.8		
Level of Service	D				F	D		
Approach Delay (s)	67.9					53.9		
Approach LOS	E					D		

Intersection Summary



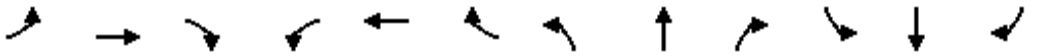
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	742	98	71	691	17	61	52	59	24	119	3
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00			1.00	
Frt		0.98		1.00	1.00		1.00	0.92			1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3477		1816	3526		1816	1715			1843	
Flt Permitted		1.00		0.95	1.00		0.47	1.00			0.93	
Satd. Flow (perm)		3477		1816	3526		903	1715			1735	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	781	103	75	727	18	64	55	62	25	125	3
RTOR Reduction (vph)	0	7	0	0	1	0	0	54	0	0	1	0
Lane Group Flow (vph)	0	877	0	75	744	0	64	63	0	0	152	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)		50.9		6.8	61.2		11.3	11.3			11.3	
Effective Green, g (s)		50.9		6.3	61.2		10.8	10.8			10.8	
Actuated g/C Ratio		0.64		0.08	0.76		0.14	0.14			0.14	
Clearance Time (s)		4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		2212		143	2697		122	232			234	
v/s Ratio Prot		c0.25		c0.04	0.21			0.04				
v/s Ratio Perm							0.07				c0.09	
v/c Ratio		0.40		0.52	0.28		0.52	0.27			0.65	
Uniform Delay, d1		7.1		35.4	2.8		32.2	31.1			32.8	
Progression Factor		1.00		0.71	1.99		1.00	1.00			1.00	
Incremental Delay, d2		0.5		1.5	0.2		1.9	0.2			4.9	
Delay (s)		7.6		26.4	5.8		34.1	31.3			37.7	
Level of Service		A		C	A		C	C			D	
Approach Delay (s)		7.6			7.7			32.3			37.7	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	803	16	33	732	105	14	12	21	265	34	30
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3527		1816	3472			1715			1765	
Flt Permitted	0.95	1.00		0.95	1.00			0.90			0.73	
Satd. Flow (perm)	1816	3527		1816	3472			1561			1347	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	854	17	35	779	112	15	13	22	282	36	32
RTOR Reduction (vph)	0	1	0	0	10	0	0	16	0	0	5	0
Lane Group Flow (vph)	11	870	0	35	881	0	0	34	0	0	345	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	40.4		4.2	43.4			24.0			24.0	
Effective Green, g (s)	0.7	40.8		3.7	43.8			23.5			23.5	
Actuated g/C Ratio	0.01	0.51		0.05	0.55			0.29			0.29	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	16	1799		84	1901			459			396	
v/s Ratio Prot	0.01	0.25		c0.02	c0.25							
v/s Ratio Perm								0.02			c0.26	
v/c Ratio	0.69	0.48		0.42	0.46			0.08			0.87	
Uniform Delay, d1	39.5	12.7		37.1	11.0			20.4			26.8	
Progression Factor	1.31	0.59		1.00	1.00			1.00			1.00	
Incremental Delay, d2	64.8	0.9		1.2	0.8			0.0			18.0	
Delay (s)	116.5	8.4		38.3	11.8			20.4			44.8	
Level of Service	F	A		D	B			C			D	
Approach Delay (s)		9.7			12.8			20.4			44.8	
Approach LOS		A			B			C			D	

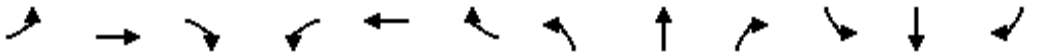
Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	1044	40	87	747	272	27	35	35	463	83	116
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	1076	41	90	770	280	28	36	36	477	86	120
RTOR Reduction (vph)	0	1	0	0	0	116	0	34	0	0	0	72
Lane Group Flow (vph)	72	1116	0	90	770	164	28	38	0	281	282	48
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	5.9	65.9		10.3	70.3	70.3	6.5	6.5		22.8	22.8	22.8
Effective Green, g (s)	5.4	65.9		9.8	70.3	70.3	6.0	6.0		22.3	22.3	22.3
Actuated g/C Ratio	0.05	0.55		0.08	0.59	0.59	0.05	0.05		0.19	0.19	0.19
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	159	1933		148	2073	927	91	85		321	318	294
v/s Ratio Prot	0.02	c0.32		c0.05	0.22		0.02	c0.02		0.16	c0.16	
v/s Ratio Perm						0.10						0.03
v/c Ratio	0.45	0.58		0.61	0.37	0.18	0.31	0.44		0.88	0.89	0.16
Uniform Delay, d1	55.9	17.9		53.2	13.2	11.5	55.0	55.4		47.5	47.6	41.0
Progression Factor	1.00	1.00		0.92	0.92	3.44	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	1.3		4.2	0.5	0.4	0.7	1.3		21.7	23.7	0.1
Delay (s)	56.6	19.1		53.3	12.5	39.8	55.7	56.7		69.2	71.3	41.1
Level of Service	E	B		D	B	D	E	E		E	E	D
Approach Delay (s)		21.4			22.5			56.4			65.2	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	32.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

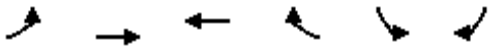
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1133	0	0	974	399	0	0	0	1011	0	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1180	0	0	1015	416	0	0	0	1053	0	143
RTOR Reduction (vph)	0	0	0	0	0	198	0	0	0	0	0	59
Lane Group Flow (vph)	0	1180	0	0	1015	218	0	0	0	1053	0	84
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		31.5			31.5	31.5				19.4		19.4
Effective Green, g (s)		32.4			32.4	31.5				19.6		19.6
Actuated g/C Ratio		0.54			0.54	0.52				0.33		0.33
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1911			1911	831				1151		517
v/s Ratio Prot		c0.33			0.29					c0.30		0.05
v/s Ratio Perm						0.14						
v/c Ratio		0.62			0.53	0.26				0.91		0.16
Uniform Delay, d1		9.5			8.9	7.9				19.4		14.4
Progression Factor		0.69			1.20	2.82				1.00		1.00
Incremental Delay, d2		1.2			1.0	0.8				11.0		0.1
Delay (s)		7.8			11.8	22.9				30.3		14.4
Level of Service		A			B	C				C		B
Approach Delay (s)		7.8			15.0			0.0			28.4	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

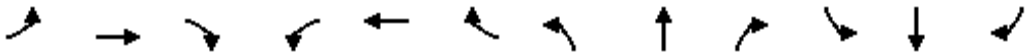
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	232	1858	943	726	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	242	1935	982	756	0	0
RTOR Reduction (vph)	0	0	0	138	0	0
Lane Group Flow (vph)	242	1935	982	618	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	11.5	60.0	39.6	39.6		
Effective Green, g (s)	11.5	60.0	40.5	39.6		
Actuated g/C Ratio	0.19	1.00	0.68	0.66		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	348	3539	2389	1032		
v/s Ratio Prot	0.13	c0.55	0.28			
v/s Ratio Perm				0.39		
v/c Ratio	0.70	0.55	0.41	0.60		
Uniform Delay, d1	22.6	0.0	4.4	5.7		
Progression Factor	0.91	1.00	1.00	1.00		
Incremental Delay, d2	3.1	0.4	0.5	2.6		
Delay (s)	23.8	0.4	4.9	8.3		
Level of Service	C	A	A	A		
Approach Delay (s)		3.0	6.4		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

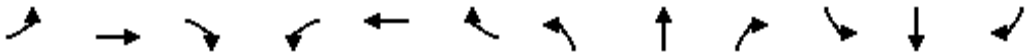
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	22	21	33	13	8	6	74	5	9	294	4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	6	23	22	35	14	9	6	79	5	10	313	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	52	57	90	327
Volume Left (vph)	6	35	6	10
Volume Right (vph)	22	9	5	4
Hadj (s)	-0.20	0.07	0.01	0.03
Departure Headway (s)	4.7	5.0	4.5	4.3
Degree Utilization, x	0.07	0.08	0.11	0.39
Capacity (veh/h)	689	657	755	808
Control Delay (s)	8.1	8.4	8.1	10.1
Approach Delay (s)	8.1	8.4	8.1	10.1
Approach LOS	A	A	A	B

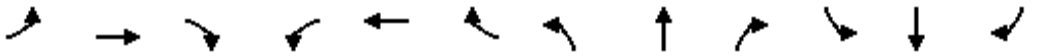
Intersection Summary				
Delay	9.4			
HCM Level of Service	A			
Intersection Capacity Utilization	34.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	9	10	21	4	0	3	90	30	3	297	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	8	9	10	22	4	0	3	94	31	3	309	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	439	453	315	452	443	109	321			125		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	439	453	315	452	443	109	321			125		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	96	99	100	100			100		
cM capacity (veh/h)	523	500	725	501	507	944	1239			1462		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	26	128	324
Volume Left	8	22	3	3
Volume Right	10	0	31	11
cSH	574	502	1239	1462
Volume to Capacity	0.05	0.05	0.00	0.00
Queue Length 95th (ft)	4	4	0	0
Control Delay (s)	11.6	12.6	0.2	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	11.6	12.6	0.2	0.1
Approach LOS	B	B		

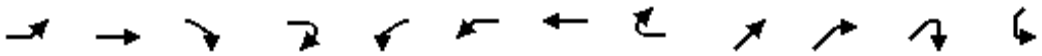
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	29	2	13	21	14	10	10	108	10	118	227	657
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	31	2	14	23	15	11	11	116	11	127	244	706
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	659	646	244	656	641	122	244			127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	659	646	244	656	641	122	244			127		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	98	93	96	99	99			91		
cM capacity (veh/h)	335	353	795	344	356	930	1322			1459		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	47	48	138	371	706
Volume Left	31	23	11	127	0
Volume Right	14	11	11	0	706
cSH	405	405	1322	1459	1700
Volume to Capacity	0.12	0.12	0.01	0.09	0.42
Queue Length 95th (ft)	10	10	1	7	0
Control Delay (s)	15.1	15.1	0.7	3.1	0.0
Lane LOS	C	C	A	A	
Approach Delay (s)	15.1	15.1	0.7	1.1	
Approach LOS	C	C			

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	60.9%	ICU Level of Service	B	
Analysis Period (min)	15			

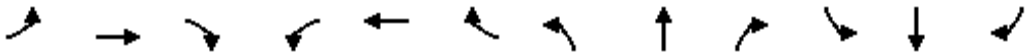


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	133	556	10	23	9	94	567	85	514	158	3	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3470		3413			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3470		3413			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	137	573	10	24	9	97	585	88	530	163	3	80
RTOR Reduction (vph)	0	0	0	15	0	0	11	0	0	0	0	0
Lane Group Flow (vph)	137	574	9	9	0	106	662	0	696	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	11.0	37.7	37.7	37.7		9.5	36.2		23.2			
Effective Green, g (s)	11.0	37.7	37.7	37.7		9.5	36.2		23.2			
Actuated g/C Ratio	0.11	0.38	0.38	0.38		0.10	0.37		0.23			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	197	1291	549	603		170	1269		800			
v/s Ratio Prot	c0.08	0.17	0.01			0.06	c0.19		c0.20			
v/s Ratio Perm				0.01								
v/c Ratio	0.70	0.44	0.02	0.02		0.62	0.52		0.87			
Uniform Delay, d1	42.4	22.8	19.1	19.1		43.0	24.6		36.4			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	10.2	1.1	0.1	0.0		6.9	1.5		10.2			
Delay (s)	52.6	24.0	19.2	19.1		50.0	26.1		46.6			
Level of Service	D	C	B	B		D	C		D			
Approach Delay (s)		29.0					29.4		46.6			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	33.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	30	222	86
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.96	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3391	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3391	
Peak-hour factor, PHF	0.97	0.97	0.97
Adj. Flow (vph)	31	229	89
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	111	318	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	11.1	37.3	
Effective Green, g (s)	11.1	37.3	
Actuated g/C Ratio	0.11	0.38	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	198	1278	
v/s Ratio Prot	c0.06	0.09	
v/s Ratio Perm			
v/c Ratio	0.56	0.25	
Uniform Delay, d1	41.6	21.2	
Progression Factor	1.00	1.00	
Incremental Delay, d2	3.6	0.1	
Delay (s)	45.2	21.3	
Level of Service	D	C	
Approach Delay (s)		27.5	
Approach LOS		C	

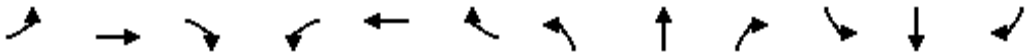
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	751	20	30	712	262	34	293	51	229	107	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3349		1770	3226			1853	1583	1770	1844	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3349		1770	3226			1853	1583	1770	1844	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	14	791	21	32	749	276	36	308	54	241	113	8
RTOR Reduction (vph)	0	3	0	0	42	0	0	0	39	0	4	0
Lane Group Flow (vph)	14	809	0	32	983	0	0	344	15	241	117	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.4	18.0		14.6	31.2			9.4	9.4	9.4	9.4	
Effective Green, g (s)	1.4	18.0		14.6	31.2			9.4	9.4	9.4	9.4	
Actuated g/C Ratio	0.02	0.27		0.22	0.47			0.14	0.14	0.14	0.14	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	913		392	1525			264	225	252	263	
v/s Ratio Prot	0.01	c0.24		0.02	c0.30			c0.19		c0.14	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.37	0.89		0.08	0.64			1.30	0.06	0.96	0.44	
Uniform Delay, d1	31.9	23.0		20.4	13.2			28.3	24.5	28.1	25.9	
Progression Factor	1.00	1.00		0.82	0.76			1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.0	10.3		0.4	1.9			161.2	0.1	44.3	1.2	
Delay (s)	37.8	33.3		17.0	11.9			189.5	24.6	72.4	27.1	
Level of Service	D	C		B	B			F	C	E	C	
Approach Delay (s)		33.4			12.1			167.1			57.2	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM Average Control Delay	48.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

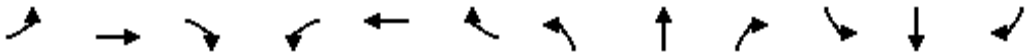
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	1000	6	17	974	160	10	48	50	137	11	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1770	3359		1770	3291			1738			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.67	
Satd. Flow (perm)	1770	3359		1770	3291			1696			1241	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	24	1020	6	17	994	163	10	49	51	140	11	10
RTOR Reduction (vph)	0	0	0	0	10	0	0	42	0	0	4	0
Lane Group Flow (vph)	24	1026	0	17	1147	0	0	68	0	0	157	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Effective Green, g (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Actuated g/C Ratio	0.05	0.64		0.02	0.63			0.18			0.18	
Clearance Time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	80	2158		40	2089			311			228	
v/s Ratio Prot	0.01	0.31		c0.01	c0.35							
v/s Ratio Perm								0.04			c0.13	
v/c Ratio	0.30	0.48		0.42	0.55			0.22			0.69	
Uniform Delay, d1	30.5	6.1		31.8	6.8			22.9			25.2	
Progression Factor	1.39	0.22		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.0	0.4		7.1	1.0			0.4			8.4	
Delay (s)	43.5	1.7		38.9	7.8			23.3			33.5	
Level of Service	D	A		D	A			C			C	
Approach Delay (s)		2.6			8.2			23.3			33.5	
Approach LOS		A			A			C			C	

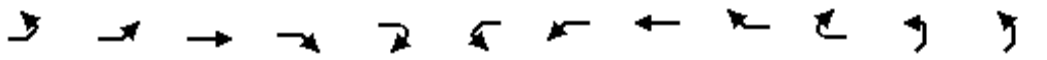
Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	1033	22	5	1054	187	0	6	17	149	2	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3528		1770	3459			1674			1708	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.81	
Satd. Flow (perm)	1770	3528		1770	3459			1674			1423	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	140	1076	23	5	1098	195	0	6	18	155	2	114
RTOR Reduction (vph)	0	2	0	0	21	0	0	14	0	0	57	0
Lane Group Flow (vph)	140	1097	0	5	1272	0	0	10	0	0	214	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.0	26.6		0.8	22.4			12.3			12.3	
Effective Green, g (s)	5.0	26.6		0.8	22.4			12.3			12.3	
Actuated g/C Ratio	0.10	0.53		0.02	0.45			0.25			0.25	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	176	1869		28	1543			410			349	
v/s Ratio Prot	c0.08	0.31		0.00	c0.37			0.01				
v/s Ratio Perm											c0.15	
v/c Ratio	0.80	0.59		0.18	0.82			0.03			0.61	
Uniform Delay, d1	22.1	8.1		24.4	12.2			14.4			16.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	21.5	0.5		3.0	3.7			0.0			3.2	
Delay (s)	43.6	8.5		27.4	15.9			14.4			20.0	
Level of Service	D	A		C	B			B			B	
Approach Delay (s)		12.5			15.9			14.4			20.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	10.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



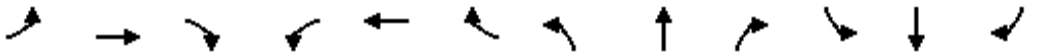
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	22	113	861	6	17	5	70	956	67	75	86	92
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	1.00				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3375				1770	3456				1816
Flt Permitted		0.95	1.00				0.28	1.00				0.95
Satd. Flow (perm)		1653	3375				520	3456				1816
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	124	946	7	19	5	77	1051	74	82	95	101
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	136	983	0	0	0	82	1204	0	0	0	196
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		51.4	51.4				52.1	52.1				17.5
Effective Green, g (s)		52.4	52.4				53.1	53.1				17.0
Actuated g/C Ratio		0.30	0.30				0.31	0.31				0.10
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		502	1025				160	1064				179
v/s Ratio Prot		0.08	c0.29					c0.35				c0.11
v/s Ratio Perm							0.16					
v/c Ratio		0.27	0.96				0.51	1.13				1.09
Uniform Delay, d1		45.6	59.0				49.1	59.7				77.8
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	18.7				1.2	71.4				94.9
Delay (s)		45.7	77.7				50.2	131.1				172.7
Level of Service		D	E				D	F				F
Approach Delay (s)			73.8					125.9				
Approach LOS			E					F				

Intersection Summary			
HCM Average Control Delay	105.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	172.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

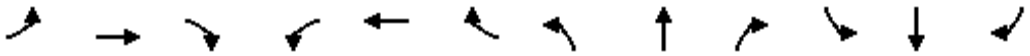
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	575	68	6	112	38	296	115	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.99				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.98				1.00	0.95		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3453				1816	3369		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3453				1816	3369		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	632	75	7	123	42	325	126	27
RTOR Reduction (vph)	1	0	0	0	0	2	0	0
Lane Group Flow (vph)	713	0	0	0	165	476	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	38.5				11.5	32.5		
Effective Green, g (s)	40.0				11.0	34.0		
Actuated g/C Ratio	0.23				0.06	0.20		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	801				116	664		
v/s Ratio Prot	c0.21				c0.09	0.14		
v/s Ratio Perm								
v/c Ratio	0.89				1.42	0.72		
Uniform Delay, d1	64.1				80.8	64.7		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	11.8				232.8	3.1		
Delay (s)	75.9				313.5	67.8		
Level of Service	E				F	E		
Approach Delay (s)	96.8					130.9		
Approach LOS	F					F		

Intersection Summary



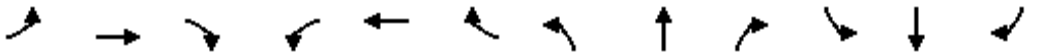
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	952	99	68	970	35	131	111	113	21	43	2
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92			1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1816	3489		1816	3521		1816	1722			1826	
Flt Permitted	0.95	1.00		0.95	1.00		0.77	1.00			0.67	
Satd. Flow (perm)	1816	3489		1816	3521		1480	1722			1237	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	8	981	102	70	1000	36	135	114	116	22	44	2
RTOR Reduction (vph)	0	6	0	0	2	0	0	58	0	0	2	0
Lane Group Flow (vph)	8	1077	0	70	1034	0	135	172	0	0	66	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	50.0		6.6	55.4		12.4	12.4			12.4	
Effective Green, g (s)	0.7	50.0		6.1	55.4		11.9	11.9			11.9	
Actuated g/C Ratio	0.01	0.62		0.08	0.69		0.15	0.15			0.15	
Clearance Time (s)	3.5	4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	16	2181		138	2438		220	256			184	
v/s Ratio Prot	0.00	c0.31		c0.04	0.29			c0.10				
v/s Ratio Perm							0.09				0.05	
v/c Ratio	0.50	0.49		0.51	0.42		0.61	0.67			0.36	
Uniform Delay, d1	39.5	8.1		35.5	5.4		31.9	32.2			30.6	
Progression Factor	1.00	1.00		1.20	0.64		1.00	1.00			1.00	
Incremental Delay, d2	8.7	0.8		0.9	0.4		3.5	5.4			0.4	
Delay (s)	48.1	8.9		43.3	3.8		35.4	37.6			31.1	
Level of Service	D	A		D	A		D	D			C	
Approach Delay (s)		9.2			6.3			36.8			31.1	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1036	23	25	1047	353	14	32	44	146	13	22
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.96			0.93			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3526		1816	3405			1714			1757	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			0.72	
Satd. Flow (perm)	1816	3526		1816	3405			1653			1316	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	25	1046	23	25	1058	357	14	32	44	147	13	22
RTOR Reduction (vph)	0	1	0	0	23	0	0	36	0	0	7	0
Lane Group Flow (vph)	25	1068	0	25	1392	0	0	54	0	0	175	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.7	51.3		2.7	51.3			14.6			14.6	
Effective Green, g (s)	2.2	51.7		2.2	51.7			14.1			14.1	
Actuated g/C Ratio	0.03	0.65		0.03	0.65			0.18			0.18	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	50	2279		50	2200			291			232	
v/s Ratio Prot	c0.01	0.30		0.01	c0.41							
v/s Ratio Perm								0.03			c0.13	
v/c Ratio	0.50	0.47		0.50	0.63			0.18			0.75	
Uniform Delay, d1	38.4	7.2		38.4	8.5			28.1			31.3	
Progression Factor	0.86	1.24		0.94	2.12			1.00			1.00	
Incremental Delay, d2	2.6	0.6		2.3	1.2			0.1			11.5	
Delay (s)	35.5	9.5		38.3	19.1			28.2			42.8	
Level of Service	D	A		D	B			C			D	
Approach Delay (s)		10.1			19.4			28.2			42.8	
Approach LOS		B			B			C			D	

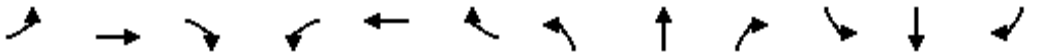
Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	1094	15	40	1271	238	44	71	44	343	56	104
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	130	1128	15	41	1310	245	45	73	45	354	58	107
RTOR Reduction (vph)	0	1	0	0	0	87	0	15	0	0	0	70
Lane Group Flow (vph)	130	1142	0	41	1310	158	45	103	0	205	207	37
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	9.9	67.8		38.3	96.2	96.2	15.6	15.6		23.8	23.8	23.8
Effective Green, g (s)	9.4	67.8		37.8	96.2	96.2	15.1	15.1		23.3	23.3	23.3
Actuated g/C Ratio	0.06	0.42		0.24	0.60	0.60	0.09	0.09		0.15	0.15	0.15
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	207	1497		429	2128	952	171	165		251	249	231
v/s Ratio Prot	c0.04	c0.32		0.02	c0.37		0.02	c0.06		0.12	c0.12	
v/s Ratio Perm						0.10						0.02
v/c Ratio	0.63	0.76		0.10	0.62	0.17	0.26	0.62		0.82	0.83	0.16
Uniform Delay, d1	73.6	39.3		47.7	20.2	14.1	67.3	69.7		66.3	66.4	59.8
Progression Factor	0.94	1.06		1.00	0.93	1.97	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.9	2.1		0.0	1.1	0.3	0.3	5.2		17.4	19.6	0.1
Delay (s)	72.9	43.7		47.7	19.9	28.2	67.6	74.9		83.7	86.1	59.9
Level of Service	E	D		D	B	C	E	E		F	F	E
Approach Delay (s)		46.6			21.9			72.8			79.7	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	41.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

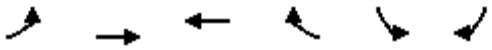
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1107	0	0	1480	379	0	0	0	502	0	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1153	0	0	1542	395	0	0	0	523	0	116
RTOR Reduction (vph)	0	0	0	0	0	124	0	0	0	0	0	27
Lane Group Flow (vph)	0	1153	0	0	1542	271	0	0	0	523	0	89
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		54.8			54.8	54.8				16.1		16.1
Effective Green, g (s)		55.7			55.7	54.8				16.3		16.3
Actuated g/C Ratio		0.70			0.70	0.68				0.20		0.20
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		2464			2464	1084				718		323
v/s Ratio Prot		0.33			c0.44					c0.15		0.06
v/s Ratio Perm						0.17						
v/c Ratio		0.47			0.63	0.25				0.73		0.28
Uniform Delay, d1		5.5			6.5	4.8				29.8		26.9
Progression Factor		0.29			0.99	1.02				1.00		1.00
Incremental Delay, d2		0.5			1.1	0.5				3.1		0.2
Delay (s)		2.1			7.6	5.4				32.9		27.0
Level of Service		A			A	A				C		C
Approach Delay (s)		2.1			7.2			0.0			31.9	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

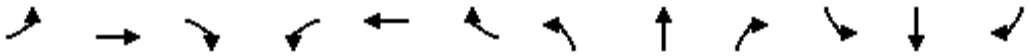
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	225	1704	1567	688	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	227	1721	1583	695	0	0
RTOR Reduction (vph)	0	0	0	152	0	0
Lane Group Flow (vph)	227	1721	1583	543	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	17.6	66.4	53.5	53.5		
Effective Green, g (s)	17.6	67.3	54.4	53.5		
Actuated g/C Ratio	0.22	0.84	0.68	0.67		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	400	2977	2407	1046		
v/s Ratio Prot	c0.12	c0.49	c0.45			
v/s Ratio Perm				0.35		
v/c Ratio	0.57	0.58	0.66	0.52		
Uniform Delay, d1	27.8	2.0	7.4	6.7		
Progression Factor	0.90	1.11	1.00	1.00		
Incremental Delay, d2	1.0	0.8	1.4	1.8		
Delay (s)	26.0	3.0	8.8	8.6		
Level of Service	C	A	A	A		
Approach Delay (s)		5.6	8.8		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	7.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

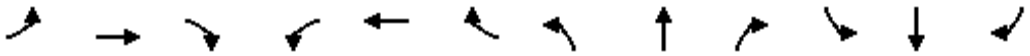
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	11	13	9	15	19	11	18	366	33	7	128	21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	13	15	11	18	22	13	21	431	39	8	151	25

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	39	53	491	184
Volume Left (vph)	13	18	21	8
Volume Right (vph)	11	13	39	25
Hadj (s)	-0.06	-0.05	0.00	-0.04
Departure Headway (s)	5.5	5.4	4.4	4.7
Degree Utilization, x	0.06	0.08	0.60	0.24
Capacity (veh/h)	575	580	809	738
Control Delay (s)	8.8	8.9	13.6	9.1
Approach Delay (s)	8.8	8.9	13.6	9.1
Approach LOS	A	A	B	A

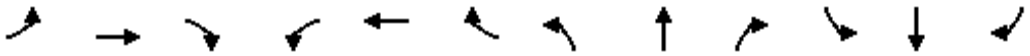
Intersection Summary				
Delay	11.9			
HCM Level of Service	B			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	11	25	24	9	3	7	395	28	1	139	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	15	13	29	28	11	4	8	465	33	1	164	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	674	682	165	701	667	481	167			498		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	674	682	165	701	667	481	167			498		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	96	97	91	97	99	99			100		
cM capacity (veh/h)	356	370	879	331	377	585	1411			1066		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	58	42	506	168
Volume Left	15	28	8	1
Volume Right	29	4	33	4
cSH	518	354	1411	1066
Volume to Capacity	0.11	0.12	0.01	0.00
Queue Length 95th (ft)	9	10	0	0
Control Delay (s)	12.8	16.5	0.2	0.1
Lane LOS	B	C	A	A
Approach Delay (s)	12.8	16.5	0.2	0.1
Approach LOS	B	C		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	38.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	392	2	46	6	2	12	6	324	0	6	193	121
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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 (vph)	426	2	50	7	2	13	7	352	0	7	210	132
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	602	588	210	639	588	352	210			352		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	602	588	210	639	588	352	210			352		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	99	94	98	99	98	100			99		
cM capacity (veh/h)	399	417	830	361	417	691	1361			1207		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	478	22	359	216	132
Volume Left	426	7	7	7	0
Volume Right	50	13	0	0	132
cSH	422	516	1361	1207	1700
Volume to Capacity	1.13	0.04	0.00	0.01	0.08
Queue Length 95th (ft)	434	3	0	0	0
Control Delay (s)	116.0	12.3	0.2	0.3	0.0
Lane LOS	F	B	A	A	
Approach Delay (s)	116.0	12.3	0.2	0.2	
Approach LOS	F	B			

Intersection Summary				
Average Delay	46.3			
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			

Appendix E-4:

Worksheets for
Baseline plus Proposed Project Conditions

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☑ Yes ☑ On
☑ No ☐ Off		☐ No ☐ Off
L_{up} = ft		L_{down} = 1085 ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = 507 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4809	0.90	Level	5	0	0.976	1.00	5477
Ramp	120	0.90	Level	5	0	0.976	1.00	137
UpStream								
DownStream	507	0.90	Level	5	0	0.976	1.00	577

Merge Areas | Diverge Areas

Estimation of v_{12}

Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.344 using Equation (Exhibit 25-5)

V_{12}= 1884 pc/h

Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

Merge Areas

	Actual	Maximum	LOS F?
V_{FO}	5614	See Exhibit 25-7	No
V_{R12}	2021	4600:All	No

Diverge Areas

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

Merge Areas

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.4 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Diverge Areas

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

Merge Areas

M_S = 0.319 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= 50.3 mph(Exhibit 25-19)

S= 50.5 mph(Exhibit 25-14)

Diverge Areas

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 195 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8983	0.90	Level	5	0	0.976	1.00	10231
Ramp	337	0.90	Level	5	0	0.976	1.00	384
UpStream	195	0.90	Level	5	0	0.976	1.00	222
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.393 using Equation (Exhibit 25-5)

V_{12}= 4019 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10615	See Exhibit 25-7	Yes
V_{R12}	4403	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.3 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.591 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 43.6 mph(Exhibit 25-19)

S= 45.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5085	0.90	Level	5	0	0.976	1.00	5791
Ramp	639	0.90	Level	5	0	0.976	1.00	728
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.345 using Equation (Exhibit 25-5)

V_{12}= 1998 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6519	See Exhibit 25-7	No
V_{R12}	2726	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.333 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.0 mph(Exhibit 25-19)

S= 50.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8607	0.90	Level	5	0	0.976	1.00	9802
Ramp	850	0.90	Level	5	0	0.976	1.00	968
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 9802 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10770	See Exhibit 25-7	Yes
V_{R12}	11946	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 85.5 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 601.488 (Exibit 25-19)

S_R= -7764.3 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2380	0.90	Level	6	0	0.971	1.00	2724
Ramp	359	0.90	Level	6	0	0.971	1.00	411
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2724 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3135	See Exhibit 25-7	No
V_{R12}	3135	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 27.2 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.383 (Exibit 25-19)

S_R= 50.0 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.0 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 604 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9262	0.90	Level	5	0	0.976	1.00	10548
Ramp	158	0.90	Level	5	0	0.976	1.00	180
UpStream								
DownStream	604	0.90	Level	5	0	0.976	1.00	688

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.339 using Equation (Exhibit 25-5)

V_{12}= 3572 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	10728	See Exhibit 25-7	Yes
V_{R12}	3752	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 31.8 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.456 (Exibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 41.3 mph(Exhibit 25-19)

S= 43.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☑ Yes ☑ On		☐ Yes ☐ On
☐ No ☐ Off		☑ No ☐ Off
L_{up} = 950 ft		L_{down} = ft
V_u = 237 veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph	V_D = veh/h
	Sketch (show lanes, L_A, L_D, V_R, V_f)	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5157	0.90	Level	5	0	0.976	1.00	5873
Ramp	451	0.90	Level	5	0	0.976	1.00	514
UpStream	237	0.90	Level	5	0	0.976	1.00	270
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.377 using Equation (Exhibit 25-5)

V_{12}= 2211 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6387	See Exhibit 25-7	No
V_{R12}	2725	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 22.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.332 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 50.2 mph(Exhibit 25-19)

S= 50.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9539	0.90	Level	5	0	0.976	1.00	10864
Ramp	813	0.90	Level	5	0	0.976	1.00	926
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.320 using Equation (Exhibit 25-5)

V_{12}= 3479 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11790	See Exhibit 25-7	Yes
V_{R12}	4405	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 35.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.592 (Exibit 25-19)

S_R= 47.3 mph (Exhibit 25-19)

S_0= 40.1 mph(Exhibit 25-19)

S= 42.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4782	0.90	Level	5	0	0.976	1.00	5446
Ramp	1129	0.90	Level	5	0	0.976	1.00	1286
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 5446 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6732	See Exhibit 25-7	No
V_{R12}	7385	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 47.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 6.396 (Exibit 25-19)

S_R= -28.2 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1254	0.90	Level	6	0	0.971	1.00	1435
Ramp	192	0.90	Level	6	0	0.971	1.00	220
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1435 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1655	See Exhibit 25-7	No
V_{R12}	1655	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.8 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.313 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5724	0.90	Level	5	0	0.976	1.00	6519
Ramp	915	0.90	Level	5	0	0.976	1.00	1042
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2466 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6519	9000	No
V_{12}	2466	4400:All	No
$V_{FO} = V_F - V_R$	5477	9000	No
V_R	1042	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.2 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.522 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 56.3 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9057	0.90	Level	5	0	0.976	1.00	10315
Ramp	269	0.90	Level	5	0	0.976	1.00	306
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 4670 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10315	9000	Yes
V_{12}	4670	4400:All	Yes
$V_{FO} = V_F - V_R$	10009	9000	Yes
V_R	306	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 42.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.456 (Exhibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 53.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.3 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5376	0.90	Level	5	0	0.976	1.00	6123
Ramp	755	0.90	Level	5	0	0.976	1.00	860
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3155 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6123	9000	No
V_{12}	3155	4400:All	No
$V_{FO} = V_F - V_R$	5263	9000	No
V_R	860	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 22.4 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.505 (Exhibit 25-19)

S_R= 48.4 mph (Exhibit 25-19)

S_0= 58.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.8 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9320	0.90	Level	5	0	0.976	1.00	10614
Ramp	713	0.90	Level	5	0	0.976	1.00	812
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5086 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10614	9000	Yes
V_{12}	5086	4400:All	Yes
$V_{FO} = V_F - V_R$	9802	9000	Yes
V_R	812	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 46.6 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.501 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= 53.5 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	992	0.90	Level	6	0	0.971	1.00	1135
Ramp	528	0.90	Level	6	0	0.971	1.00	604
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 1135 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1135	4500	No
V_{12}	1135	4400:All	No
$V_{FO} = V_F - V_R$	531	4500	No
V_R	604	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 12.6 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.482 (Exhibit 25-19)

S_R= 48.7 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10352	0.90	Level	5	0	0.976	1.00	11790
Ramp	1090	0.90	Level	5	0	0.976	1.00	1241
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3984 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11790	9000	Yes
V_{12}	3984	4400:All	No
$V_{FO} = V_F - V_R$	10549	9000	Yes
V_R	1241	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 25.3 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.540 (Exhibit 25-19)

S_R= 48.0 mph (Exhibit 25-19)

S_0= 49.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5279	0.90	Level	5	0	0.976	1.00	6012
Ramp	359	0.90	Level	5	0	0.976	1.00	409
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 2852 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6012	9000	No
V_{12}	2852	4400:All	No
$V_{FO} = V_F - V_R$	5603	9000	No
V_R	409	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 27.2 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.465 (Exhibit 25-19)

S_R= 49.0 mph (Exhibit 25-19)

S_0= 58.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.4 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8885	0.90	Level	5	0	0.976	1.00	10119
Ramp	1010	0.90	Level	5	0	0.976	1.00	1150
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5060 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10119	9000	Yes
V_{12}	5060	4400:All	Yes
$V_{FO} = V_F - V_R$	8969	9000	No
V_R	1150	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 38.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.531 (Exhibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 54.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5608	0.90	Level	5	0	0.976	1.00	6387
Ramp	826	0.90	Level	5	0	0.976	1.00	941
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3315 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6387	9000	No
V_{12}	3315	4400:All	No
$V_{FO} = V_F - V_R$	5446	9000	No
V_R	941	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 31.4 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.513 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 58.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	3553	0.90	Level	6	0	0.971	1.00	4066
Ramp	1889	0.90	Level	6	0	0.971	1.00	2162
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 4066 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	4066	4500	No
V_{12}	4066	4400:All	No
$V_{FO} = V_F - V_R$	1904	4500	No
V_R	2162	2000	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 37.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.623 (Exhibit 25-19)

S_R= 46.9 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

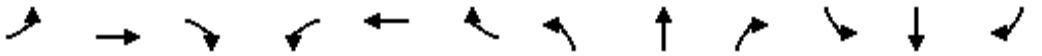
S= mph (Exhibit 25-14)	S = 46.9 mph (Exhibit 25-15)

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	58	449	10	6	6	109	367	63	177	61	1	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3461		3401			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3461		3401			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	468	10	6	6	114	382	66	184	64	1	62
RTOR Reduction (vph)	0	0	0	3	0	0	12	0	0	0	0	0
Lane Group Flow (vph)	60	469	9	3	0	120	436	0	249	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	7.3	39.8	39.8	39.8		10.5	43.0		13.3			
Effective Green, g (s)	7.3	39.8	39.8	39.8		10.5	43.0		13.3			
Actuated g/C Ratio	0.08	0.44	0.44	0.44		0.12	0.48		0.15			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	144	1499	637	700		207	1654		503			
v/s Ratio Prot	0.03	c0.14	0.01			c0.07	c0.13		0.07			
v/s Ratio Perm				0.00								
v/c Ratio	0.42	0.31	0.01	0.00		0.58	0.26		0.50			
Uniform Delay, d1	39.3	16.2	14.1	14.0		37.7	14.0		35.3			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	1.9	0.5	0.0	0.0		3.9	0.4		0.8			
Delay (s)	41.3	16.8	14.1	14.0		41.6	14.4		36.0			
Level of Service	D	B	B	B		D	B		D			
Approach Delay (s)		19.4					20.2		36.0			
Approach LOS		B					C		D			

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	75	331	64
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.98	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3453	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3453	
Peak-hour factor, PHF	0.96	0.96	0.96
Adj. Flow (vph)	78	345	67
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	140	412	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	8.9	25.2	
Effective Green, g (s)	8.9	25.2	
Actuated g/C Ratio	0.10	0.28	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	175	967	
v/s Ratio Prot	c0.08	c0.12	
v/s Ratio Perm			
v/c Ratio	0.80	0.43	
Uniform Delay, d1	39.7	26.5	
Progression Factor	1.00	1.00	
Incremental Delay, d2	22.4	0.3	
Delay (s)	62.1	26.8	
Level of Service	E	C	
Approach Delay (s)		35.7	
Approach LOS		D	

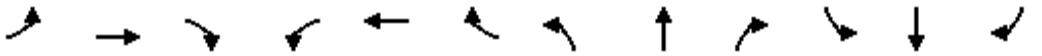
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	550	27	17	512	72	14	78	17	249	227	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3339		1770	3300			1848	1583	1770	1856	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3339		1770	3300			1848	1583	1770	1856	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	579	28	18	539	76	15	82	18	262	239	6
RTOR Reduction (vph)	0	6	0	0	14	0	0	0	16	0	2	0
Lane Group Flow (vph)	5	601	0	18	601	0	0	97	2	262	243	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.3	15.0		12.9	26.6			6.9	6.9	10.6	10.6	
Effective Green, g (s)	1.3	15.0		12.9	26.6			6.9	6.9	10.6	10.6	
Actuated g/C Ratio	0.02	0.25		0.22	0.44			0.12	0.12	0.18	0.18	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	835		381	1463			213	182	313	328	
v/s Ratio Prot	0.00	c0.18		0.01	c0.18			c0.05		c0.15	0.13	
v/s Ratio Perm									0.00			
v/c Ratio	0.13	0.72		0.05	0.41			0.46	0.01	0.84	0.74	
Uniform Delay, d1	28.8	20.6		18.7	11.4			24.8	23.5	23.9	23.4	
Progression Factor	1.00	1.00		0.83	0.77			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	3.0		0.2	0.8			1.5	0.0	17.4	8.7	
Delay (s)	30.4	23.6		15.8	9.5			26.3	23.6	41.3	32.1	
Level of Service	C	C		B	A			C	C	D	C	
Approach Delay (s)		23.6			9.7			25.9			36.9	
Approach LOS		C			A			C			D	

Intersection Summary			
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

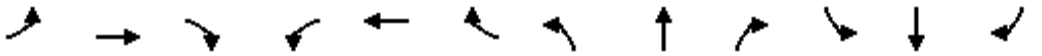
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	805	10	27	579	64	5	18	22	168	19	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.93			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1770	3356		1770	3312			1730			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.72	
Satd. Flow (perm)	1770	3356		1770	3312			1691			1338	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	839	10	28	603	67	5	19	23	175	20	8
RTOR Reduction (vph)	0	1	0	0	8	0	0	17	0	0	3	0
Lane Group Flow (vph)	2	848	0	28	662	0	0	30	0	0	200	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Effective Green, g (s)	1.2	32.1		3.0	33.9			14.9			14.9	
Actuated g/C Ratio	0.02	0.54		0.05	0.56			0.25			0.25	
Clearance Time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	35	1795		89	1871			420			332	
v/s Ratio Prot	0.00	c0.25		c0.02	0.20							
v/s Ratio Perm								0.02			c0.15	
v/c Ratio	0.06	0.47		0.31	0.35			0.07			0.60	
Uniform Delay, d1	28.8	8.7		27.5	7.1			17.3			19.9	
Progression Factor	1.41	0.16		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.6		2.0	0.5			0.1			3.1	
Delay (s)	41.2	2.0		29.5	7.6			17.3			23.0	
Level of Service	D	A		C	A			B			C	
Approach Delay (s)		2.1			8.5			17.3			23.0	
Approach LOS		A			A			B			C	

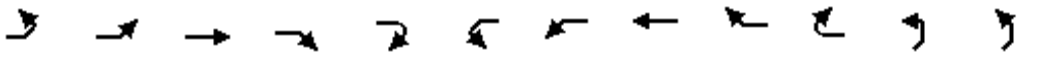
Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	921	8	13	572	91	1	1	9	176	3	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.89			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3535		1770	3466			1649			1724	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.79	
Satd. Flow (perm)	1770	3535		1770	3466			1619			1414	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	57	940	8	13	584	93	1	1	9	180	3	88
RTOR Reduction (vph)	0	1	0	0	19	0	0	6	0	0	36	0
Lane Group Flow (vph)	57	947	0	13	658	0	0	5	0	0	235	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	1.6	20.3		0.7	19.4			12.7			12.7	
Effective Green, g (s)	1.6	20.3		0.7	19.4			12.7			12.7	
Actuated g/C Ratio	0.04	0.46		0.02	0.44			0.29			0.29	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	64	1624		28	1521			465			406	
v/s Ratio Prot	c0.03	c0.27		0.01	0.19							
v/s Ratio Perm								0.00			c0.17	
v/c Ratio	0.89	0.58		0.46	0.43			0.01			0.58	
Uniform Delay, d1	21.2	8.8		21.6	8.6			11.3			13.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	74.9	0.5		11.7	0.2			0.0			2.0	
Delay (s)	96.1	9.4		33.3	8.8			11.3			15.5	
Level of Service	F	A		C	A			B			B	
Approach Delay (s)		14.3			9.2			11.3			15.5	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	6.5
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



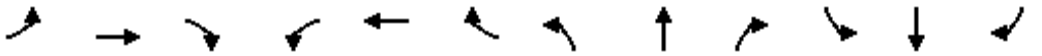
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	19	58	749	16	15	1	93	620	34	48	15	72
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	0.99				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3369				1770	3463				1816
Flt Permitted		0.95	1.00				0.32	1.00				0.95
Satd. Flow (perm)		1653	3369				601	3463				1816
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	62	805	17	16	1	100	667	37	52	16	77
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	76	843	0	0	0	101	753	0	0	0	93
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		50.3	50.3				41.5	41.5				11.1
Effective Green, g (s)		51.3	51.3				42.5	42.5				10.6
Actuated g/C Ratio		0.29	0.29				0.24	0.24				0.06
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		475	968				143	825				108
v/s Ratio Prot		0.05	c0.25					c0.22				c0.05
v/s Ratio Perm							0.17					
v/c Ratio		0.16	0.87				0.71	0.91				0.86
Uniform Delay, d1		47.5	60.5				62.3	66.2				83.2
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	8.4				12.2	14.1				45.0
Delay (s)		47.6	68.9				74.5	80.3				128.2
Level of Service		D	E				E	F				F
Approach Delay (s)			67.1					79.6				
Approach LOS			E					E				

Intersection Summary			
HCM Average Control Delay	68.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

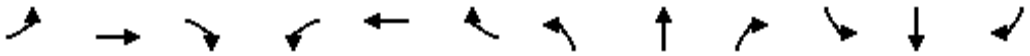
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	144	51	6	48	7	394	62	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.98				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.96				1.00	0.98		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3328				1816	3461		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3328				1816	3461		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	155	55	6	52	8	424	67	6
RTOR Reduction (vph)	1	0	0	0	0	1	0	0
Lane Group Flow (vph)	215	0	0	0	60	496	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	58.2				9.5	56.6		
Effective Green, g (s)	59.7				9.0	58.1		
Actuated g/C Ratio	0.33				0.05	0.33		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	1113				92	1127		
v/s Ratio Prot	0.06				0.03	c0.14		
v/s Ratio Perm								
v/c Ratio	0.19				0.65	0.44		
Uniform Delay, d1	42.3				83.2	47.4		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	0.4				11.9	1.3		
Delay (s)	42.7				95.1	48.7		
Level of Service	D				F	D		
Approach Delay (s)	68.4					53.7		
Approach LOS	E					D		

Intersection Summary



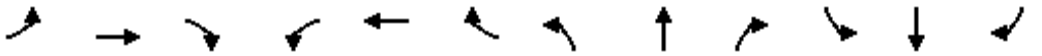
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	727	98	79	702	17	61	52	48	24	119	3
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00			1.00	
Frt		0.98		1.00	1.00		1.00	0.93			1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3476		1816	3527		1816	1728			1843	
Flt Permitted		1.00		0.95	1.00		0.47	1.00			0.94	
Satd. Flow (perm)		3476		1816	3527		903	1728			1738	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	765	103	83	739	18	64	55	51	25	125	3
RTOR Reduction (vph)	0	8	0	0	1	0	0	44	0	0	1	0
Lane Group Flow (vph)	0	860	0	83	756	0	64	62	0	0	152	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)		50.6		7.1	61.2		11.3	11.3			11.3	
Effective Green, g (s)		50.6		6.6	61.2		10.8	10.8			10.8	
Actuated g/C Ratio		0.63		0.08	0.76		0.14	0.14			0.14	
Clearance Time (s)		4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		2199		150	2698		122	233			235	
v/s Ratio Prot		c0.25		c0.05	0.21			0.04				
v/s Ratio Perm							0.07				c0.09	
v/c Ratio		0.39		0.55	0.28		0.52	0.27			0.65	
Uniform Delay, d1		7.2		35.3	2.8		32.2	31.0			32.8	
Progression Factor		1.00		0.72	1.91		1.00	1.00			1.00	
Incremental Delay, d2		0.5		2.3	0.2		1.9	0.2			4.5	
Delay (s)		7.7		27.6	5.6		34.1	31.3			37.3	
Level of Service		A		C	A		C	C			D	
Approach Delay (s)		7.7			7.8			32.3			37.3	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	807	16	33	727	60	14	12	21	300	34	47
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.94			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3527		1816	3499			1715			1758	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.74	
Satd. Flow (perm)	1816	3527		1816	3499			1544			1348	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	859	17	35	773	64	15	13	22	319	36	50
RTOR Reduction (vph)	0	2	0	0	6	0	0	15	0	0	7	0
Lane Group Flow (vph)	11	874	0	35	831	0	0	35	0	0	398	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	38.2		4.2	41.2			26.2			26.2	
Effective Green, g (s)	0.7	38.6		3.7	41.6			25.7			25.7	
Actuated g/C Ratio	0.01	0.48		0.05	0.52			0.32			0.32	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	16	1702		84	1819			496			433	
v/s Ratio Prot	0.01	c0.25		c0.02	c0.24							
v/s Ratio Perm								0.02			c0.30	
v/c Ratio	0.69	0.51		0.42	0.46			0.07			0.92	
Uniform Delay, d1	39.5	14.2		37.1	12.1			18.9			26.2	
Progression Factor	1.31	0.61		1.00	1.00			1.00			1.00	
Incremental Delay, d2	65.1	1.1		1.2	0.8			0.0			24.0	
Delay (s)	116.8	9.7		38.3	12.9			18.9			50.1	
Level of Service	F	A		D	B			B			D	
Approach Delay (s)		11.0			13.9			18.9			50.1	
Approach LOS		B			B			B			D	

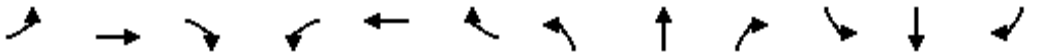
Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	1081	40	87	700	272	27	35	35	463	83	114
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3520		1816	3539	1583	1816	1705		1725	1710	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	1114	41	90	722	280	28	36	36	477	86	118
RTOR Reduction (vph)	0	1	0	0	0	116	0	34	0	0	0	72
Lane Group Flow (vph)	74	1154	0	90	722	164	28	38	0	281	282	46
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	5.9	65.9		10.3	70.3	70.3	6.5	6.5		22.8	22.8	22.8
Effective Green, g (s)	5.4	65.9		9.8	70.3	70.3	6.0	6.0		22.3	22.3	22.3
Actuated g/C Ratio	0.05	0.55		0.08	0.59	0.59	0.05	0.05		0.19	0.19	0.19
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	159	1933		148	2073	927	91	85		321	318	294
v/s Ratio Prot	0.02	c0.33		c0.05	0.20		0.02	c0.02		0.16	c0.16	
v/s Ratio Perm						0.10						0.03
v/c Ratio	0.47	0.60		0.61	0.35	0.18	0.31	0.44		0.88	0.89	0.16
Uniform Delay, d1	55.9	18.1		53.2	12.9	11.5	55.0	55.4		47.5	47.6	41.0
Progression Factor	1.00	1.00		0.92	0.93	3.56	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	1.4		4.3	0.4	0.4	0.7	1.3		21.7	23.7	0.1
Delay (s)	56.7	19.5		53.2	12.4	41.2	55.7	56.7		69.2	71.3	41.1
Level of Service	E	B		D	B	D	E	E		E	E	D
Approach Delay (s)		21.7			23.1			56.4			65.2	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

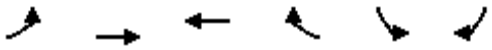
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱				↰↰		↱
Volume (vph)	0	1170	0	0	942	399	0	0	0	1011	0	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1219	0	0	981	416	0	0	0	1053	0	126
RTOR Reduction (vph)	0	0	0	0	0	198	0	0	0	0	0	64
Lane Group Flow (vph)	0	1219	0	0	981	218	0	0	0	1053	0	62
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		31.5			31.5	31.5				19.4		19.4
Effective Green, g (s)		32.4			32.4	31.5				19.6		19.6
Actuated g/C Ratio		0.54			0.54	0.52				0.33		0.33
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1911			1911	831				1151		517
v/s Ratio Prot		c0.34			0.28					c0.30		0.04
v/s Ratio Perm						0.14						
v/c Ratio		0.64			0.51	0.26				0.91		0.12
Uniform Delay, d1		9.7			8.8	7.9				19.4		14.2
Progression Factor		0.71			1.17	2.68				1.00		1.00
Incremental Delay, d2		1.3			1.0	0.8				11.0		0.0
Delay (s)		8.1			11.2	21.8				30.3		14.2
Level of Service		A			B	C				C		B
Approach Delay (s)		8.1			14.4			0.0			28.6	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

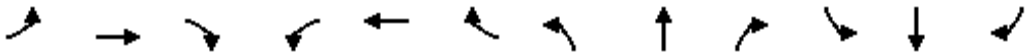
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	257	1870	927	726	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	268	1948	966	756	0	0
RTOR Reduction (vph)	0	0	0	129	0	0
Lane Group Flow (vph)	268	1948	966	627	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	12.3	60.0	38.8	38.8		
Effective Green, g (s)	12.3	60.0	39.7	38.8		
Actuated g/C Ratio	0.20	1.00	0.66	0.65		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	372	3539	2342	1011		
v/s Ratio Prot	0.15	c0.55	0.27			
v/s Ratio Perm				c0.40		
v/c Ratio	0.72	0.55	0.41	0.62		
Uniform Delay, d1	22.2	0.0	4.7	6.3		
Progression Factor	0.91	1.00	1.00	1.00		
Incremental Delay, d2	3.7	0.4	0.5	2.9		
Delay (s)	23.9	0.4	5.3	9.1		
Level of Service	C	A	A	A		
Approach Delay (s)		3.2	7.0		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.9
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	22	6	29	13	8	18	89	8	9	275	4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	6	23	6	31	14	9	19	95	9	10	293	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	36	53	122	306
Volume Left (vph)	6	31	19	10
Volume Right (vph)	6	9	9	4
Hadj (s)	-0.04	0.05	0.02	0.03
Departure Headway (s)	4.9	5.0	4.5	4.3
Degree Utilization, x	0.05	0.07	0.15	0.37
Capacity (veh/h)	662	658	771	811
Control Delay (s)	8.2	8.4	8.3	9.8
Approach Delay (s)	8.2	8.4	8.3	9.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.2		
HCM Level of Service	A		
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	9	10	21	4	0	3	23	30	3	349	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	8	9	10	22	4	0	3	24	31	3	364	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	423	437	369	436	427	40	375			55		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	423	437	369	436	427	40	375			55		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	98	96	99	100	100			100		
cM capacity (veh/h)	536	511	676	513	517	1032	1183			1550		

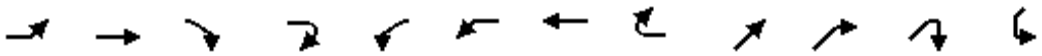
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	26	58	378
Volume Left	8	22	3	3
Volume Right	10	0	31	11
cSH	570	514	1183	1550
Volume to Capacity	0.05	0.05	0.00	0.00
Queue Length 95th (ft)	4	4	0	0
Control Delay (s)	11.6	12.4	0.5	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	11.6	12.4	0.5	0.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	30.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	2	13	21	14	10	10	110	10	118	224	655
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	2	14	23	15	11	11	118	11	127	241	704
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	658	645	241	655	640	124	241			129		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	658	645	241	655	640	124	241			129		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	99	98	93	96	99	99			91		
cM capacity (veh/h)	335	354	798	344	356	927	1326			1457		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	49	48	140	368	704
Volume Left	33	23	11	127	0
Volume Right	14	11	11	0	704
cSH	402	405	1326	1457	1700
Volume to Capacity	0.12	0.12	0.01	0.09	0.41
Queue Length 95th (ft)	10	10	1	7	0
Control Delay (s)	15.2	15.1	0.7	3.2	0.0
Lane LOS	C	C	A	A	
Approach Delay (s)	15.2	15.1	0.7	1.1	
Approach LOS	C	C			

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	60.8%	ICU Level of Service	B	
Analysis Period (min)	15			

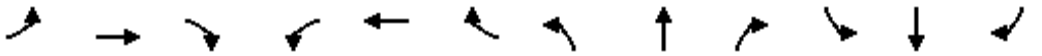


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	133	555	10	23	9	91	564	78	514	157	3	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3475		3413			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3475		3413			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	137	572	10	24	9	94	581	80	530	162	3	78
RTOR Reduction (vph)	0	0	0	15	0	0	10	0	0	0	0	0
Lane Group Flow (vph)	137	573	9	9	0	103	651	0	695	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	11.0	37.8	37.8	37.8		9.4	36.2		23.3			
Effective Green, g (s)	11.0	37.8	37.8	37.8		9.4	36.2		23.3			
Actuated g/C Ratio	0.11	0.38	0.38	0.38		0.09	0.37		0.24			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	197	1294	550	604		168	1271		803			
v/s Ratio Prot	c0.08	0.17	0.01			0.06	c0.19		c0.20			
v/s Ratio Perm				0.01								
v/c Ratio	0.70	0.44	0.02	0.02		0.61	0.51		0.87			
Uniform Delay, d1	42.4	22.8	19.0	19.0		43.1	24.5		36.3			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	10.2	1.1	0.1	0.0		6.5	1.5		9.7			
Delay (s)	52.6	23.9	19.1	19.1		49.5	26.0		46.0			
Level of Service	D	C	B	B		D	C		D			
Approach Delay (s)		28.9					29.2		46.0			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	30	222	86
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.96	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3391	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3391	
Peak-hour factor, PHF	0.97	0.97	0.97
Adj. Flow (vph)	31	229	89
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	109	318	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	11.0	37.3	
Effective Green, g (s)	11.0	37.3	
Actuated g/C Ratio	0.11	0.38	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	197	1278	
v/s Ratio Prot	c0.06	0.09	
v/s Ratio Perm			
v/c Ratio	0.55	0.25	
Uniform Delay, d1	41.7	21.2	
Progression Factor	1.00	1.00	
Incremental Delay, d2	3.3	0.1	
Delay (s)	45.0	21.3	
Level of Service	D	C	
Approach Delay (s)		27.4	
Approach LOS		C	

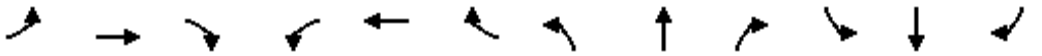
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	749	18	28	710	262	27	282	44	229	104	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3350		1770	3226			1855	1583	1770	1844	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3350		1770	3226			1855	1583	1770	1844	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	14	788	19	29	747	276	28	297	46	241	109	8
RTOR Reduction (vph)	0	3	0	0	42	0	0	0	35	0	4	0
Lane Group Flow (vph)	14	804	0	29	981	0	0	325	11	241	113	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.4	18.0		14.6	31.2			9.4	9.4	9.4	9.4	
Effective Green, g (s)	1.4	18.0		14.6	31.2			9.4	9.4	9.4	9.4	
Actuated g/C Ratio	0.02	0.27		0.22	0.47			0.14	0.14	0.14	0.14	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	914		392	1525			264	225	252	263	
v/s Ratio Prot	0.01	c0.24		0.02	c0.30			c0.18		c0.14	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.37	0.88		0.07	0.64			1.23	0.05	0.96	0.43	
Uniform Delay, d1	31.9	23.0		20.3	13.2			28.3	24.4	28.1	25.8	
Progression Factor	1.00	1.00		0.82	0.76			1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.0	9.7		0.3	1.9			132.5	0.1	44.3	1.1	
Delay (s)	37.8	32.6		17.0	11.9			160.8	24.5	72.4	27.0	
Level of Service	D	C		B	B			F	C	E	C	
Approach Delay (s)		32.7			12.0			143.9			57.5	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM Average Control Delay	43.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

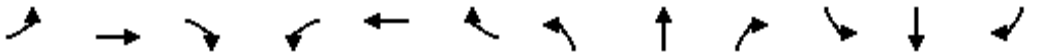
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	991	6	17	971	160	10	48	50	137	11	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1770	3359		1770	3291			1738			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.67	
Satd. Flow (perm)	1770	3359		1770	3291			1696			1241	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	24	1011	6	17	991	163	10	49	51	140	11	10
RTOR Reduction (vph)	0	0	0	0	10	0	0	42	0	0	4	0
Lane Group Flow (vph)	24	1017	0	17	1144	0	0	68	0	0	157	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Effective Green, g (s)	3.0	42.4		1.5	41.9			12.1			12.1	
Actuated g/C Ratio	0.05	0.64		0.02	0.63			0.18			0.18	
Clearance Time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	80	2158		40	2089			311			228	
v/s Ratio Prot	0.01	0.30		c0.01	c0.35							
v/s Ratio Perm								0.04			c0.13	
v/c Ratio	0.30	0.47		0.42	0.55			0.22			0.69	
Uniform Delay, d1	30.5	6.1		31.8	6.7			22.9			25.2	
Progression Factor	1.40	0.21		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.0	0.4		7.1	1.0			0.4			8.4	
Delay (s)	43.8	1.6		38.9	7.8			23.3			33.5	
Level of Service	D	A		D	A			C			C	
Approach Delay (s)		2.6			8.2			23.3			33.5	
Approach LOS		A			A			C			C	

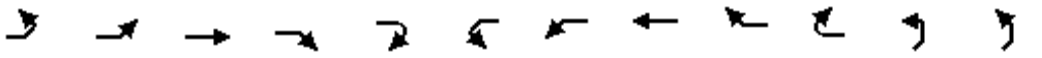
Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	1026	22	5	1052	187	0	6	17	149	2	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3528		1770	3459			1674			1709	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.81	
Satd. Flow (perm)	1770	3528		1770	3459			1674			1421	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	135	1069	23	5	1096	195	0	6	18	155	2	112
RTOR Reduction (vph)	0	2	0	0	21	0	0	14	0	0	56	0
Lane Group Flow (vph)	135	1090	0	5	1270	0	0	10	0	0	213	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.0	26.6		0.8	22.4			12.3			12.3	
Effective Green, g (s)	5.0	26.6		0.8	22.4			12.3			12.3	
Actuated g/C Ratio	0.10	0.53		0.02	0.45			0.25			0.25	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	176	1869		28	1543			410			348	
v/s Ratio Prot	c0.08	0.31		0.00	c0.37			0.01				
v/s Ratio Perm											c0.15	
v/c Ratio	0.77	0.58		0.18	0.82			0.03			0.61	
Uniform Delay, d1	22.0	8.0		24.4	12.2			14.4			16.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	17.9	0.5		3.0	3.7			0.0			3.2	
Delay (s)	40.0	8.5		27.4	15.9			14.4			20.0	
Level of Service	D	A		C	B			B			C	
Approach Delay (s)		12.0			15.9			14.4			20.0	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	10.5
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



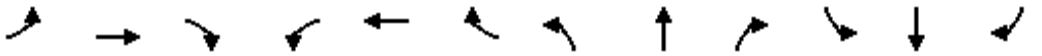
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	22	112	858	6	17	5	60	946	67	75	86	92
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	1.00				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3375				1770	3455				1816
Flt Permitted		0.95	1.00				0.28	1.00				0.95
Satd. Flow (perm)		1653	3375				521	3455				1816
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	123	943	7	19	5	66	1040	74	82	95	101
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	135	980	0	0	0	71	1193	0	0	0	196
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		51.2	51.2				52.1	52.1				17.5
Effective Green, g (s)		52.2	52.2				53.1	53.1				17.0
Actuated g/C Ratio		0.30	0.30				0.31	0.31				0.10
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		501	1024				161	1066				179
v/s Ratio Prot		0.08	c0.29					c0.35				c0.11
v/s Ratio Perm							0.14					
v/c Ratio		0.27	0.96				0.44	1.12				1.09
Uniform Delay, d1		45.5	58.9				47.6	59.5				77.6
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	18.4				0.7	66.5				94.9
Delay (s)		45.6	77.2				48.3	126.0				172.5
Level of Service		D	E				D	F				F
Approach Delay (s)			73.4					121.6				
Approach LOS			E					F				

Intersection Summary			
HCM Average Control Delay	103.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	172.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

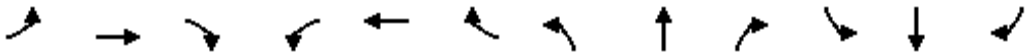
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	574	65	6	112	38	292	111	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.99				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.98				1.00	0.95		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3457				1816	3371		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3457				1816	3371		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	631	71	7	123	42	321	122	27
RTOR Reduction (vph)	1	0	0	0	0	2	0	0
Lane Group Flow (vph)	708	0	0	0	165	468	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	38.3				11.5	32.3		
Effective Green, g (s)	39.8				11.0	33.8		
Actuated g/C Ratio	0.23				0.06	0.20		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	799				116	662		
v/s Ratio Prot	c0.20				c0.09	0.14		
v/s Ratio Perm								
v/c Ratio	0.89				1.42	0.71		
Uniform Delay, d1	64.0				80.6	64.5		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	11.3				232.8	2.8		
Delay (s)	75.3				313.3	67.3		
Level of Service	E				F	E		
Approach Delay (s)	96.3					131.3		
Approach LOS	F					F		

Intersection Summary



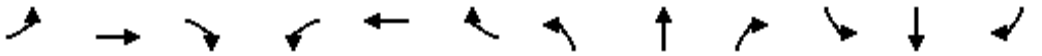
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	946	99	54	951	35	131	111	109	21	43	2
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93			1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1816	3489		1816	3520		1816	1724			1826	
Flt Permitted	0.95	1.00		0.95	1.00		0.77	1.00			0.67	
Satd. Flow (perm)	1816	3489		1816	3520		1480	1724			1250	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	8	975	102	56	980	36	135	114	112	22	44	2
RTOR Reduction (vph)	0	6	0	0	2	0	0	55	0	0	2	0
Lane Group Flow (vph)	8	1071	0	56	1014	0	135	171	0	0	66	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	51.8		4.9	55.5		12.3	12.3			12.3	
Effective Green, g (s)	0.7	51.8		4.4	55.5		11.8	11.8			11.8	
Actuated g/C Ratio	0.01	0.65		0.06	0.69		0.15	0.15			0.15	
Clearance Time (s)	3.5	4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	16	2259		100	2442		218	254			184	
v/s Ratio Prot	0.00	c0.31		c0.03	c0.29			c0.10				
v/s Ratio Perm							0.09				0.05	
v/c Ratio	0.50	0.47		0.56	0.42		0.62	0.67			0.36	
Uniform Delay, d1	39.5	7.2		36.9	5.3		32.0	32.3			30.7	
Progression Factor	1.00	1.00		1.13	0.88		1.00	1.00			1.00	
Incremental Delay, d2	8.7	0.7		3.7	0.5		3.7	5.4			0.4	
Delay (s)	48.1	7.9		45.2	5.1		35.6	37.7			31.1	
Level of Service	D	A		D	A		D	D			C	
Approach Delay (s)		8.2			7.2			36.9			31.1	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	1030	23	25	1045	336	14	32	44	88	13	17
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.96			0.93			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3526		1816	3410			1714			1756	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			0.72	
Satd. Flow (perm)	1816	3526		1816	3410			1657			1308	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	16	1040	23	25	1056	339	14	32	44	89	13	17
RTOR Reduction (vph)	0	1	0	0	18	0	0	38	0	0	10	0
Lane Group Flow (vph)	16	1062	0	25	1377	0	0	52	0	0	109	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.3	55.3		2.7	56.7			10.6			10.6	
Effective Green, g (s)	0.8	55.7		2.2	57.1			10.1			10.1	
Actuated g/C Ratio	0.01	0.70		0.03	0.71			0.13			0.13	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	18	2455		50	2434			209			165	
v/s Ratio Prot	0.01	0.30		c0.01	c0.40							
v/s Ratio Perm								0.03			c0.08	
v/c Ratio	0.89	0.43		0.50	0.57			0.25			0.66	
Uniform Delay, d1	39.6	5.3		38.4	5.5			31.5			33.3	
Progression Factor	0.91	1.22		0.93	2.44			1.00			1.00	
Incremental Delay, d2	145.7	0.5		2.4	0.8			0.2			7.5	
Delay (s)	181.8	6.9		38.2	14.2			31.7			40.9	
Level of Service	F	A		D	B			C			D	
Approach Delay (s)		9.5			14.7			31.7			40.9	
Approach LOS		A			B			C			D	

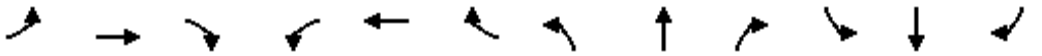
Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	1032	15	40	1253	238	44	71	44	343	56	103
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3532		1816	3539	1583	1816	1745		1725	1708	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	127	1064	15	41	1292	245	45	73	45	354	58	106
RTOR Reduction (vph)	0	1	0	0	0	88	0	15	0	0	0	69
Lane Group Flow (vph)	127	1078	0	41	1292	157	45	103	0	205	207	37
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	9.8	67.3		38.8	96.3	96.3	15.6	15.6		23.8	23.8	23.8
Effective Green, g (s)	9.3	67.3		38.3	96.3	96.3	15.1	15.1		23.3	23.3	23.3
Actuated g/C Ratio	0.06	0.42		0.24	0.60	0.60	0.09	0.09		0.15	0.15	0.15
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	205	1486		435	2130	953	171	165		251	249	231
v/s Ratio Prot	c0.04	c0.31		0.02	c0.37		0.02	c0.06		0.12	c0.12	
v/s Ratio Perm						0.10						0.02
v/c Ratio	0.62	0.73		0.09	0.61	0.17	0.26	0.62		0.82	0.83	0.16
Uniform Delay, d1	73.6	38.7		47.4	20.0	14.1	67.3	69.7		66.3	66.4	59.8
Progression Factor	0.95	1.04		1.00	0.94	2.06	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7	1.6		0.0	1.0	0.3	0.3	5.2		17.4	19.6	0.1
Delay (s)	74.0	41.9		47.4	19.8	29.3	67.6	74.9		83.7	86.1	59.9
Level of Service	E	D		D	B	C	E	E		F	F	E
Approach Delay (s)		45.3			22.0			72.8			79.8	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

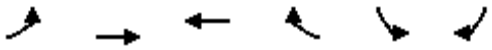
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱				↰↰		↱
Volume (vph)	0	1045	0	0	1468	379	0	0	0	502	0	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1089	0	0	1529	395	0	0	0	523	0	109
RTOR Reduction (vph)	0	0	0	0	0	124	0	0	0	0	0	28
Lane Group Flow (vph)	0	1089	0	0	1529	271	0	0	0	523	0	81
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		54.9			54.9	54.9				16.0		16.0
Effective Green, g (s)		55.8			55.8	54.9				16.2		16.2
Actuated g/C Ratio		0.70			0.70	0.69				0.20		0.20
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		2468			2468	1086				713		321
v/s Ratio Prot		0.31			c0.43					c0.15		0.05
v/s Ratio Perm						0.17						
v/c Ratio		0.44			0.62	0.25				0.73		0.25
Uniform Delay, d1		5.3			6.4	4.8				29.9		26.8
Progression Factor		0.31			1.03	1.27				1.00		1.00
Incremental Delay, d2		0.4			1.1	0.5				3.4		0.2
Delay (s)		2.1			7.8	6.6				33.3		27.0
Level of Service		A			A	A				C		C
Approach Delay (s)		2.1			7.5			0.0			32.2	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

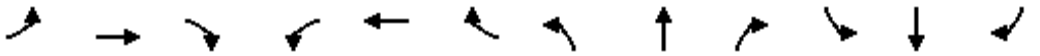
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	184	1683	1561	688	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	186	1700	1577	695	0	0
RTOR Reduction (vph)	0	0	0	169	0	0
Lane Group Flow (vph)	186	1700	1577	526	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	16.2	66.4	54.9	54.9		
Effective Green, g (s)	16.2	67.3	55.8	54.9		
Actuated g/C Ratio	0.20	0.84	0.70	0.69		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	368	2977	2468	1073		
v/s Ratio Prot	c0.10	c0.48	c0.45			
v/s Ratio Perm				0.34		
v/c Ratio	0.51	0.57	0.64	0.49		
Uniform Delay, d1	28.3	1.9	6.6	5.9		
Progression Factor	0.88	1.04	1.00	1.00		
Incremental Delay, d2	0.4	0.8	1.3	1.6		
Delay (s)	25.3	2.8	7.9	7.5		
Level of Service	C	A	A	A		
Approach Delay (s)		5.0	7.8		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

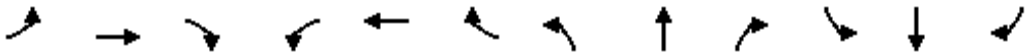
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	11	13	3	13	19	11	12	341	28	7	121	21
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	13	15	4	15	22	13	14	401	33	8	142	25

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	32	51	448	175
Volume Left (vph)	13	15	14	8
Volume Right (vph)	4	13	33	25
Hadj (s)	0.05	-0.06	0.00	-0.04
Departure Headway (s)	5.4	5.3	4.3	4.6
Degree Utilization, x	0.05	0.07	0.54	0.22
Capacity (veh/h)	583	601	817	754
Control Delay (s)	8.7	8.7	12.2	8.9
Approach Delay (s)	8.7	8.7	12.2	8.9
Approach LOS	A	A	B	A

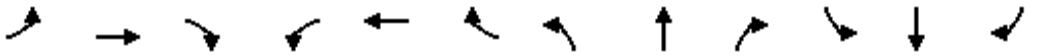
Intersection Summary				
Delay	11.0			
HCM Level of Service	B			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	11	25	24	9	3	7	369	28	1	52	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	15	13	29	28	11	4	8	434	33	1	61	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	541	549	63	568	534	451	65			467		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	541	549	63	568	534	451	65			467		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	97	97	93	98	99	99			100		
cM capacity (veh/h)	439	441	1002	409	449	609	1537			1094		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	58	42	475	66
Volume Left	15	28	8	1
Volume Right	29	4	33	4
cSH	616	431	1537	1094
Volume to Capacity	0.09	0.10	0.01	0.00
Queue Length 95th (ft)	8	8	0	0
Control Delay (s)	11.4	14.3	0.2	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	11.4	14.3	0.2	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	35.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	389	2	46	6	2	12	6	320	0	6	192	120
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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 (vph)	423	2	50	7	2	13	7	348	0	7	209	130
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	597	583	209	634	583	348	209			348		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	597	583	209	634	583	348	209			348		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	99	94	98	99	98	100			99		
cM capacity (veh/h)	402	420	832	364	420	695	1362			1211		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	475	22	354	215	130
Volume Left	423	7	7	7	0
Volume Right	50	13	0	0	130
cSH	426	519	1362	1211	1700
Volume to Capacity	1.12	0.04	0.00	0.01	0.08
Queue Length 95th (ft)	420	3	0	0	0
Control Delay (s)	109.8	12.2	0.2	0.3	0.0
Lane LOS	F	B	A	A	
Approach Delay (s)	109.8	12.2	0.2	0.2	
Approach LOS	F	B			

Intersection Summary				
Average Delay	43.9			
Intersection Capacity Utilization	59.4%	ICU Level of Service	B	
Analysis Period (min)	15			

Appendix E-5:

Worksheets for
Cumulative (2025) No Project Conditions

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 543 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5555	0.90	Level	5	0	0.976	1.00	6327
Ramp	129	0.90	Level	5	0	0.976	1.00	147
UpStream								
DownStream	543	0.90	Level	5	0	0.976	1.00	618

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.343 using Equation (Exhibit 25-5)

V_{12}= 2169 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6474	See Exhibit 25-7	No
V_{R12}	2316	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.7 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.329 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 49.3 mph(Exhibit 25-19)

S= 49.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☑ Yes ☑ On		☐ Yes ☐ On
☐ No ☐ Off		☑ No ☐ Off
L_{up} = 950 ft		L_{down} = ft
V_u = 192 veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9347	0.90	Level	5	0	0.976	1.00	10645
Ramp	331	0.90	Level	5	0	0.976	1.00	377
UpStream	192	0.90	Level	5	0	0.976	1.00	219
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.394 using Equation (Exhibit 25-5)

V_{12}= 4191 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11022	See Exhibit 25-7	Yes
V_{R12}	4568	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 36.5 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.648 (Exibit 25-19)

S_R= 46.6 mph (Exhibit 25-19)

S_0= 42.9 mph(Exhibit 25-19)

S= 44.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5824	0.90	Level	5	0	0.976	1.00	6633
Ramp	711	0.90	Level	5	0	0.976	1.00	810
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.335 using Equation (Exhibit 25-5)

V_{12}= 2221 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7443	See Exhibit 25-7	No
V_{R12}	3031	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.4 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.354 (Exibit 25-19)

S_R= 50.4 mph (Exhibit 25-19)

S_0= 48.9 mph(Exhibit 25-19)

S= 49.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8931	0.90	Level	5	0	0.976	1.00	10171
Ramp	865	0.90	Level	5	0	0.976	1.00	985
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 10171 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11156	See Exhibit 25-7	Yes
V_{R12}	12376	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 89.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 924.582 (Exibit 25-19)

S_R= -11964.6 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2511	0.90	Level	6	0	0.971	1.00	2874
Ramp	380	0.90	Level	6	0	0.971	1.00	435
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2874 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3309	See Exhibit 25-7	No
V_{R12}	3309	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.6 (pc/ m/ln)

LOS = D (Exhibit 25-4)

Speed Estimation

M_S = 0.400 (Exibit 25-19)

S_R= 49.8 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 49.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 532 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10232	0.90	Level	5	0	0.976	1.00	11653
Ramp	140	0.90	Level	5	0	0.976	1.00	159
UpStream								
DownStream	532	0.90	Level	5	0	0.976	1.00	606

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.341 using Equation (Exhibit 25-5)

V_{12}= 3977 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11812	See Exhibit 25-7	Yes
V_{R12}	4136	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 34.8 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.533 (Exibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 39.2 mph(Exhibit 25-19)

S= 41.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 212 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5551	0.90	Level	5	0	0.976	1.00	6322
Ramp	404	0.90	Level	5	0	0.976	1.00	460
UpStream	212	0.90	Level	5	0	0.976	1.00	241
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.383 using Equation (Exhibit 25-5)

V_{12}= 2423 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6782	See Exhibit 25-7	No
V_{R12}	2883	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 23.4 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.342 (Exibit 25-19)

S_R= 50.6 mph (Exhibit 25-19)

S_0= 49.8 mph(Exhibit 25-19)

S= 50.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10439	0.90	Level	5	0	0.976	1.00	11889
Ramp	753	0.90	Level	5	0	0.976	1.00	858
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.329 using Equation (Exhibit 25-5)

V_{12}= 3909 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	12747	See Exhibit 25-7	Yes
V_{R12}	4767	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 38.0 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.732 (Exibit 25-19)

S_R= 45.5 mph (Exhibit 25-19)

S_0= 38.3 mph(Exhibit 25-19)

S= 40.7 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5178	0.90	Level	5	0	0.976	1.00	5897
Ramp	1065	0.90	Level	5	0	0.976	1.00	1213
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 5897 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7110	See Exhibit 25-7	No
V_{R12}	7817	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 50.8 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 9.793 (Exibit 25-19)

S_R= -72.3 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1441	0.90	Level	6	0	0.971	1.00	1649
Ramp	198	0.90	Level	6	0	0.971	1.00	227
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1649 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1876	See Exhibit 25-7	No
V_{R12}	1876	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.5 (pc/ m/ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.318 (Exibit 25-19)

S_R= 50.9 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 50.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6535	0.90	Level	5	0	0.976	1.00	7443
Ramp	980	0.90	Level	5	0	0.976	1.00	1116
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2761 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	7443	9000	No
V_{12}	2761	4400:All	No
$V_{FO} = V_F - V_R$	6327	9000	No
V_R	1116	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 14.8 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.528 (Exhibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 55.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.3 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9419	0.90	Level	5	0	0.976	1.00	10727
Ramp	264	0.90	Level	5	0	0.976	1.00	301
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 4847 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10727	9000	Yes
V_{12}	4847	4400:All	Yes
$V_{FO} = V_F - V_R$	10426	9000	Yes
V_R	301	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 44.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.455 (Exhibit 25-19)

S_R= 49.1 mph (Exhibit 25-19)

S_0= 52.8 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6084	0.90	Level	5	0	0.976	1.00	6929
Ramp	861	0.90	Level	5	0	0.976	1.00	981
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3574 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6929	9000	No
V_{12}	3574	4400:All	No
$V_{FO} = V_F - V_R$	5948	9000	No
V_R	981	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 26.0 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.516 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 57.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.4 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9678	0.90	Level	5	0	0.976	1.00	11022
Ramp	747	0.90	Level	5	0	0.976	1.00	851
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5286 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11022	9000	Yes
V_{12}	5286	4400:All	Yes
$V_{FO} = V_F - V_R$	10171	9000	Yes
V_R	851	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 48.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.505 (Exhibit 25-19)

S_R= 48.4 mph (Exhibit 25-19)

S_0= 53.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1283	0.90	Level	6	0	0.971	1.00	1468
Ramp	682	0.90	Level	6	0	0.971	1.00	781
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 1468 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1468	4500	No
V_{12}	1468	4400:All	No
$V_{FO} = V_F - V_R$	687	4500	No
V_R	781	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 15.4 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.498 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.5 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11192	0.90	Level	5	0	0.976	1.00	12746
Ramp	960	0.90	Level	5	0	0.976	1.00	1093
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4123 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12746	9000	Yes
V_{12}	4123	4400:All	No
$V_{FO} = V_F - V_R$	11653	9000	Yes
V_R	1093	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 26.5 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.526 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 47.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 47.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5661	0.90	Level	5	0	0.976	1.00	6447
Ramp	322	0.90	Level	5	0	0.976	1.00	367
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3018 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6447	9000	No
V_{12}	3018	4400:All	No
$V_{FO} = V_F - V_R$	6080	9000	No
V_R	367	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 28.6 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.461 (Exhibit 25-19)

S_R= 49.0 mph (Exhibit 25-19)

S_0= 57.6 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.2 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9236	0.90	Level	5	0	0.976	1.00	10519
Ramp	936	0.90	Level	5	0	0.976	1.00	1066
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5188 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10519	9000	Yes
V_{12}	5188	4400:All	Yes
$V_{FO} = V_F - V_R$	9453	9000	Yes
V_R	1066	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 39.9 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.524 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 53.8 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.9 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5955	0.90	Level	5	0	0.976	1.00	6782
Ramp	777	0.90	Level	5	0	0.976	1.00	885
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3456 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6782	9000	No
V_{12}	3456	4400:All	No
$V_{FO} = V_F - V_R$	5897	9000	No
V_R	885	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 32.6 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.508 (Exhibit 25-19)

S_R= 48.4 mph (Exhibit 25-19)

S_0= 57.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4092	0.90	Level	6	0	0.971	1.00	4683
Ramp	1953	0.90	Level	6	0	0.971	1.00	2235
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 4683 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	4683	4500	Yes
V_{12}	4683	4400:All	Yes
$V_{FO} = V_F - V_R$	2448	4500	No
V_R	2235	2000	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 43.1 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

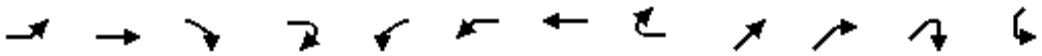
Speed Estimation

D_s = 0.629 (Exhibit 25-19)

S_R= 46.8 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 46.8 mph (Exhibit 25-15)

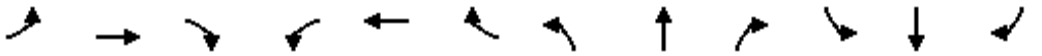


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	79	620	10	8	6	95	444	51	216	94	1	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.95			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3485		3377			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3485		3377			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	82	646	10	8	6	99	462	53	225	98	1	106
RTOR Reduction (vph)	0	0	0	4	0	0	8	0	0	0	0	0
Lane Group Flow (vph)	82	647	9	4	0	105	507	0	324	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	8.0	40.0	40.0	40.0		8.7	40.7		14.8			
Effective Green, g (s)	8.0	40.0	40.0	40.0		8.7	40.7		14.8			
Actuated g/C Ratio	0.09	0.44	0.44	0.44		0.10	0.45		0.16			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	157	1506	640	704		171	1576		555			
v/s Ratio Prot	0.05	c0.19	0.01			c0.06	0.15		0.10			
v/s Ratio Perm				0.00								
v/c Ratio	0.52	0.43	0.01	0.01		0.61	0.32		0.58			
Uniform Delay, d1	39.2	17.2	14.0	13.9		39.0	15.8		34.8			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	3.1	0.9	0.0	0.0		6.4	0.5		1.6			
Delay (s)	42.3	18.1	14.0	13.9		45.4	16.3		36.3			
Level of Service	D	B	B	B		D	B		D			
Approach Delay (s)		20.6					21.3		36.3			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	75	484	93
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.98	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3454	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3454	
Peak-hour factor, PHF	0.96	0.96	0.96
Adj. Flow (vph)	78	504	97
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	184	601	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	9.0	26.8	
Effective Green, g (s)	9.0	26.8	
Actuated g/C Ratio	0.10	0.30	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	177	1029	
v/s Ratio Prot	c0.10	c0.17	
v/s Ratio Perm			
v/c Ratio	1.04	0.58	
Uniform Delay, d1	40.5	26.9	
Progression Factor	1.00	1.00	
Incremental Delay, d2	78.4	0.9	
Delay (s)	118.9	27.7	
Level of Service	F	C	
Approach Delay (s)		49.1	
Approach LOS		D	

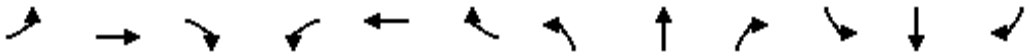
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	689	37	23	548	80	12	84	16	300	282	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3337		1770	3298			1851	1583	1770	1856	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3337		1770	3298			1851	1583	1770	1856	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	6	725	39	24	577	84	13	88	17	316	297	7
RTOR Reduction (vph)	0	7	0	0	15	0	0	0	15	0	2	0
Lane Group Flow (vph)	6	757	0	24	646	0	0	101	2	316	302	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.3	15.8		10.4	24.9			6.9	6.9	12.3	12.3	
Effective Green, g (s)	1.3	15.8		10.4	24.9			6.9	6.9	12.3	12.3	
Actuated g/C Ratio	0.02	0.26		0.17	0.42			0.12	0.12	0.20	0.20	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	879		307	1369			213	182	363	380	
v/s Ratio Prot	0.00	c0.23		0.01	c0.20			c0.05		c0.18	0.16	
v/s Ratio Perm									0.00			
v/c Ratio	0.16	0.86		0.08	0.47			0.47	0.01	0.87	0.80	
Uniform Delay, d1	28.8	21.1		20.8	12.8			24.9	23.5	23.1	22.7	
Progression Factor	1.00	1.00		0.87	0.80			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	8.7		0.5	1.1			1.7	0.0	19.7	11.0	
Delay (s)	30.8	29.7		18.5	11.3			26.5	23.5	42.8	33.6	
Level of Service	C	C		B	B			C	C	D	C	
Approach Delay (s)		29.8			11.6			26.1			38.3	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

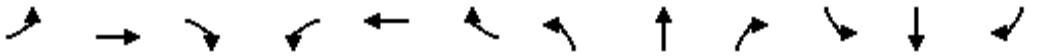
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	964	12	33	615	77	7	20	23	184	21	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1770	3356		1770	3306			1735			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			0.72	
Satd. Flow (perm)	1770	3356		1770	3306			1679			1332	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	3	1004	12	34	641	80	7	21	24	192	22	9
RTOR Reduction (vph)	0	1	0	0	10	0	0	18	0	0	3	0
Lane Group Flow (vph)	3	1015	0	34	711	0	0	34	0	0	220	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	31.4		3.1	33.3			15.5			15.5	
Effective Green, g (s)	1.2	31.4		3.1	33.3			15.5			15.5	
Actuated g/C Ratio	0.02	0.52		0.05	0.55			0.26			0.26	
Clearance Time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	35	1756		91	1835			434			344	
v/s Ratio Prot	0.00	c0.30		c0.02	0.22							
v/s Ratio Perm								0.02			c0.17	
v/c Ratio	0.09	0.58		0.37	0.39			0.08			0.64	
Uniform Delay, d1	28.9	9.8		27.5	7.6			16.8			19.8	
Progression Factor	1.40	0.14		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.7		2.6	0.6			0.1			3.9	
Delay (s)	40.8	2.1		30.1	8.2			16.9			23.7	
Level of Service	D	A		C	A			B			C	
Approach Delay (s)		2.2			9.2			16.9			23.7	
Approach LOS		A			A			B			C	

Intersection Summary			
HCM Average Control Delay	7.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	1098	10	16	612	59	1	1	11	207	4	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.89			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3535		1770	3493			1644			1721	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.80	
Satd. Flow (perm)	1770	3535		1770	3493			1617			1417	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	66	1120	10	16	624	60	1	1	11	211	4	113
RTOR Reduction (vph)	0	1	0	0	11	0	0	8	0	0	39	0
Lane Group Flow (vph)	66	1129	0	16	673	0	0	5	0	0	289	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.7	22.3		0.8	20.4			14.2			14.2	
Effective Green, g (s)	2.7	22.3		0.8	20.4			14.2			14.2	
Actuated g/C Ratio	0.06	0.47		0.02	0.43			0.30			0.30	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	100	1649		30	1491			480			421	
v/s Ratio Prot	c0.04	c0.32		0.01	0.19							
v/s Ratio Perm								0.00			c0.20	
v/c Ratio	0.66	0.68		0.53	0.45			0.01			0.69	
Uniform Delay, d1	22.1	10.0		23.3	9.7			11.8			14.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.1	1.2		17.0	0.2			0.0			4.6	
Delay (s)	37.2	11.2		40.3	9.9			11.9			19.5	
Level of Service	D	B		D	A			B			B	
Approach Delay (s)		12.6			10.6			11.9			19.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	6.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

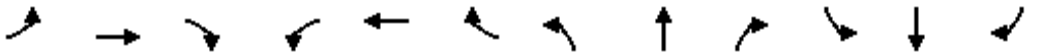
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	19	82	906	16	18	1	102	794	34	68	18	72
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	0.99				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3371				1770	3465				1816
Flt Permitted		0.95	1.00				0.27	1.00				0.95
Satd. Flow (perm)		1653	3371				501	3465				1816
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	88	974	17	19	1	110	854	37	73	19	77
RTOR Reduction (vph)	0	0	1	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	99	1018	0	0	0	111	960	0	0	0	96
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		57.9	57.9				45.0	45.0				11.2
Effective Green, g (s)		58.9	58.9				46.0	46.0				10.7
Actuated g/C Ratio		0.33	0.33				0.26	0.26				0.06
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		545	1112				129	893				109
v/s Ratio Prot		0.06	c0.30					c0.28				c0.05
v/s Ratio Perm							0.22					
v/c Ratio		0.18	0.92				0.86	1.08				0.88
Uniform Delay, d1		42.6	57.4				63.2	66.2				83.3
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	11.3				39.5	52.5				49.7
Delay (s)		42.7	68.8				102.7	118.7				132.9
Level of Service		D	E				F	F				F
Approach Delay (s)			66.5					117.1				
Approach LOS			E					F				

Intersection Summary			
HCM Average Control Delay	84.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

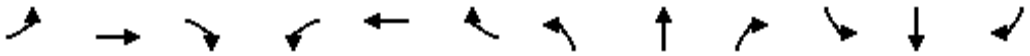
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	185	71	6	57	7	458	53	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.98				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.96				1.00	0.98		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3321				1816	3479		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3321				1816	3479		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	199	76	6	61	8	492	57	6
RTOR Reduction (vph)	1	0	0	0	0	1	0	0
Lane Group Flow (vph)	280	0	0	0	69	554	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	46.6				10.0	45.4		
Effective Green, g (s)	48.1				9.5	46.9		
Actuated g/C Ratio	0.27				0.05	0.26		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	895				97	914		
v/s Ratio Prot	0.08				0.04	c0.16		
v/s Ratio Perm								
v/c Ratio	0.31				0.71	0.61		
Uniform Delay, d1	52.0				83.2	57.7		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	0.9				18.4	3.0		
Delay (s)	52.9				101.6	60.7		
Level of Service	D				F	E		
Approach Delay (s)	73.3					65.2		
Approach LOS	E					E		

Intersection Summary



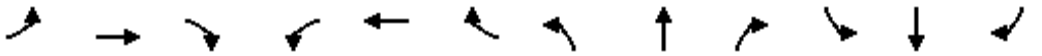
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1017	123	73	811	20	136	114	140	31	148	4
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00			1.00	
Frt		0.98		1.00	1.00		1.00	0.92			1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3482		1816	3526		1816	1709			1842	
Flt Permitted		1.00		0.95	1.00		0.46	1.00			0.65	
Satd. Flow (perm)		3482		1816	3526		871	1709			1209	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1071	129	77	854	21	143	120	147	33	156	4
RTOR Reduction (vph)	0	7	0	0	1	0	0	67	0	0	1	0
Lane Group Flow (vph)	0	1193	0	77	874	0	143	200	0	0	192	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)		47.3		6.9	57.7		14.8	14.8			14.8	
Effective Green, g (s)		47.3		6.4	57.7		14.3	14.3			14.3	
Actuated g/C Ratio		0.59		0.08	0.72		0.18	0.18			0.18	
Clearance Time (s)		4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		2059		145	2543		156	305			216	
v/s Ratio Prot		c0.34		c0.04	0.25			0.12				
v/s Ratio Perm							c0.16				0.16	
v/c Ratio		0.58		0.53	0.34		0.92	0.65			0.89	
Uniform Delay, d1		10.2		35.4	4.1		32.3	30.6			32.1	
Progression Factor		1.00		0.72	1.98		1.00	1.00			1.00	
Incremental Delay, d2		1.2		1.6	0.3		47.1	3.8			32.0	
Delay (s)		11.4		27.1	8.5		79.4	34.4			64.1	
Level of Service		B		C	A		E	C			E	
Approach Delay (s)		11.4			10.0			50.1			64.1	
Approach LOS		B			A			D			E	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	989	20	13	860	132	15	13	23	313	43	26
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3527		1815	3469			1715			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.73	
Satd. Flow (perm)	1816	3527		1815	3469			1543			1341	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	14	1052	21	14	915	140	16	14	24	333	46	28
RTOR Reduction (vph)	0	1	0	0	12	0	0	16	0	0	3	0
Lane Group Flow (vph)	14	1072	0	14	1043	0	0	38	0	0	404	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.3	40.9		1.3	40.9			26.4			26.4	
Effective Green, g (s)	0.8	41.3		0.8	41.3			25.9			25.9	
Actuated g/C Ratio	0.01	0.52		0.01	0.52			0.32			0.32	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	18	1821		18	1791			500			434	
v/s Ratio Prot	0.01	c0.30		c0.01	0.30							
v/s Ratio Perm								0.02			c0.30	
v/c Ratio	0.78	0.59		0.78	0.58			0.08			0.93	
Uniform Delay, d1	39.5	13.4		39.5	13.4			18.8			26.2	
Progression Factor	1.15	0.73		1.00	1.00			1.00			1.00	
Incremental Delay, d2	89.9	1.2		101.0	1.4			0.0			25.9	
Delay (s)	135.3	11.1		140.5	14.8			18.8			52.1	
Level of Service	F	B		F	B			B			D	
Approach Delay (s)		12.7			16.4			18.8			52.1	
Approach LOS		B			B			B			D	

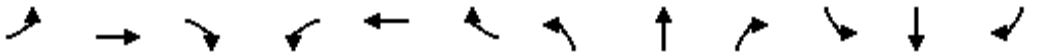
Intersection Summary			
HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	1201	48	104	904	344	35	44	35	526	99	128
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3519		1816	3539	1583	1816	1723		1725	1711	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3519		1816	3539	1583	1816	1723		1725	1711	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	95	1238	49	107	932	355	36	45	36	542	102	132
RTOR Reduction (vph)	0	1	0	0	0	159	0	29	0	0	0	68
Lane Group Flow (vph)	95	1286	0	107	932	196	36	52	0	320	324	64
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	7.6	62.4		11.3	66.1	66.1	7.2	7.2		24.6	24.6	24.6
Effective Green, g (s)	7.1	62.4		10.8	66.1	66.1	6.7	6.7		24.1	24.1	24.1
Actuated g/C Ratio	0.06	0.52		0.09	0.55	0.55	0.06	0.06		0.20	0.20	0.20
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	208	1830		163	1949	872	101	96		346	344	318
v/s Ratio Prot	0.03	c0.37		c0.06	c0.26		0.02	c0.03		0.19	c0.19	
v/s Ratio Perm						0.12						0.04
v/c Ratio	0.46	0.70		0.66	0.48	0.22	0.36	0.54		0.92	0.94	0.20
Uniform Delay, d1	54.6	21.8		52.8	16.4	13.8	54.6	55.1		47.1	47.3	39.9
Progression Factor	1.00	1.00		0.94	0.89	3.43	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	2.3		5.6	0.7	0.5	0.8	2.9		29.3	33.3	0.1
Delay (s)	55.2	24.1		55.0	15.3	47.9	55.4	58.0		76.4	80.5	40.1
Level of Service	E	C		E	B	D	E	E		E	F	D
Approach Delay (s)		26.2			26.7			57.2			71.9	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	37.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

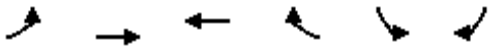
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱				↰↰		↱
Volume (vph)	0	1268	0	0	1191	477	0	0	0	1209	0	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1321	0	0	1241	497	0	0	0	1259	0	180
RTOR Reduction (vph)	0	0	0	0	0	239	0	0	0	0	0	32
Lane Group Flow (vph)	0	1321	0	0	1241	258	0	0	0	1259	0	148
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		31.1			31.1	31.1				19.8		19.8
Effective Green, g (s)		32.0			32.0	31.1				20.0		20.0
Actuated g/C Ratio		0.53			0.53	0.52				0.33		0.33
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1887			1887	821				1174		528
v/s Ratio Prot		c0.37			0.35					c0.36		0.09
v/s Ratio Perm						0.16						
v/c Ratio		0.70			0.66	0.31				1.07		0.28
Uniform Delay, d1		10.4			10.1	8.3				20.0		14.7
Progression Factor		0.69			1.21	3.37				1.00		1.00
Incremental Delay, d2		1.4			1.7	1.0				48.0		0.1
Delay (s)		8.6			13.9	29.0				68.0		14.8
Level of Service		A			B	C				E		B
Approach Delay (s)		8.6			18.2			0.0			61.3	
Approach LOS		A			B			A			E	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

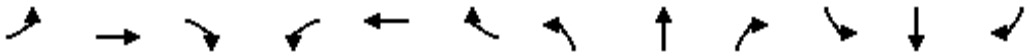
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	250	2174	1145	868	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	260	2265	1193	904	0	0
RTOR Reduction (vph)	0	0	0	132	0	0
Lane Group Flow (vph)	260	2265	1193	772	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	12.1	60.0	39.0	39.0		
Effective Green, g (s)	12.1	60.0	39.9	39.0		
Actuated g/C Ratio	0.20	1.00	0.66	0.65		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	366	3539	2353	1017		
v/s Ratio Prot	0.14	c0.64	0.34			
v/s Ratio Perm				c0.49		
v/c Ratio	0.71	0.64	0.51	0.76		
Uniform Delay, d1	22.3	0.0	5.1	7.3		
Progression Factor	0.95	1.00	1.00	1.00		
Incremental Delay, d2	3.3	0.5	0.8	5.3		
Delay (s)	24.4	0.5	5.9	12.6		
Level of Service	C	A	A	B		
Approach Delay (s)		3.0	8.8		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.9
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

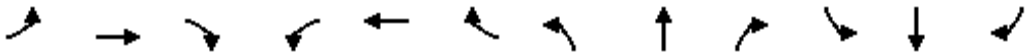
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	30	24	39	15	12	1	89	7	16	350	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	7	32	26	41	16	13	1	95	7	17	372	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	65	70	103	395
Volume Left (vph)	7	41	1	17
Volume Right (vph)	26	13	7	5
Hadj (s)	-0.18	0.04	-0.01	0.03
Departure Headway (s)	5.0	5.2	4.7	4.4
Degree Utilization, x	0.09	0.10	0.13	0.48
Capacity (veh/h)	646	622	725	789
Control Delay (s)	8.5	8.8	8.4	11.5
Approach Delay (s)	8.5	8.8	8.4	11.5
Approach LOS	A	A	A	B

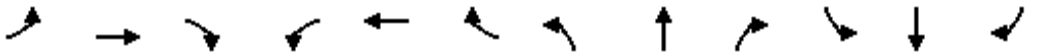
Intersection Summary			
Delay	10.4		
HCM Level of Service	B		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	10	11	23	6	0	4	112	40	4	343	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	9	10	11	24	6	0	4	117	42	4	357	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	522	540	365	535	526	138	372			158		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	522	540	365	535	526	138	372			158		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	98	95	99	100	100			100		
cM capacity (veh/h)	458	446	680	438	454	911	1187			1421		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	30	162	376
Volume Left	9	24	4	4
Volume Right	11	0	42	15
cSH	515	441	1187	1421
Volume to Capacity	0.06	0.07	0.00	0.00
Queue Length 95th (ft)	5	5	0	0
Control Delay (s)	12.4	13.8	0.2	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	12.4	13.8	0.2	0.1
Approach LOS	B	B		

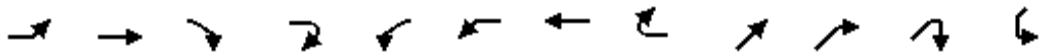
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	3	15	25	17	12	12	116	12	146	284	816
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	39	3	16	27	18	13	13	125	13	157	305	877
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	798	783	305	794	776	131	305			138		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	798	783	305	794	776	131	305			138		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	99	98	90	94	99	99			89		
cM capacity (veh/h)	260	287	734	270	290	918	1255			1446		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	58	58	151	462	877
Volume Left	39	27	13	157	0
Volume Right	16	13	13	0	877
cSH	319	329	1255	1446	1700
Volume to Capacity	0.18	0.18	0.01	0.11	0.52
Queue Length 95th (ft)	16	16	1	9	0
Control Delay (s)	18.8	18.3	0.8	3.3	0.0
Lane LOS	C	C	A	A	
Approach Delay (s)	18.8	18.3	0.8	1.1	
Approach LOS	C	C			

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	71.4%	ICU Level of Service	C	
Analysis Period (min)	15			

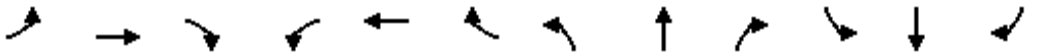


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	159	646	10	48	9	185	717	93	722	173	3	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.97			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3478		3435			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3478		3435			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	164	666	10	49	9	191	739	96	744	178	3	95
RTOR Reduction (vph)	0	0	0	33	0	0	10	0	0	0	0	0
Lane Group Flow (vph)	164	667	9	16	0	200	825	0	925	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	11.5	31.5	31.5	31.5		13.5	33.5		24.9			
Effective Green, g (s)	11.5	31.5	31.5	31.5		13.5	33.5		24.9			
Actuated g/C Ratio	0.12	0.32	0.32	0.32		0.14	0.34		0.25			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	206	1078	459	504		241	1177		864			
v/s Ratio Prot	0.09	0.20	0.01			c0.11	c0.24		c0.27			
v/s Ratio Perm				0.01								
v/c Ratio	0.80	0.62	0.02	0.03		0.83	0.70		1.07			
Uniform Delay, d1	42.6	28.7	23.2	23.2		41.6	28.4		37.1			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	18.9	2.7	0.1	0.1		20.5	3.5		51.3			
Delay (s)	61.5	31.3	23.2	23.4		62.1	31.9		88.4			
Level of Service	E	C	C	C		E	C		F			
Approach Delay (s)		36.4					37.7		88.4			
Approach LOS		D					D		F			

Intersection Summary			
HCM Average Control Delay	48.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	30	343	132
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.96	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3392	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3392	
Peak-hour factor, PHF	0.97	0.97	0.97
Adj. Flow (vph)	31	354	136
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	126	490	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	11.6	39.5	
Effective Green, g (s)	11.6	39.5	
Actuated g/C Ratio	0.12	0.40	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	207	1353	
v/s Ratio Prot	c0.07	0.14	
v/s Ratio Perm			
v/c Ratio	0.61	0.36	
Uniform Delay, d1	41.5	20.9	
Progression Factor	1.00	1.00	
Incremental Delay, d2	5.0	0.2	
Delay (s)	46.5	21.1	
Level of Service	D	C	
Approach Delay (s)		26.3	
Approach LOS		C	

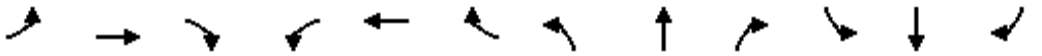
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	728	18	22	777	304	40	353	59	268	115	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3350		1770	3220			1853	1583	1770	1839	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3350		1770	3220			1853	1583	1770	1839	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	17	766	19	23	818	320	42	372	62	282	121	11
RTOR Reduction (vph)	0	3	0	0	45	0	0	0	38	0	5	0
Lane Group Flow (vph)	17	782	0	23	1093	0	0	414	24	282	127	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.5	17.8		14.8	31.1			9.4	9.4	9.4	9.4	
Effective Green, g (s)	1.5	17.8		14.8	31.1			9.4	9.4	9.4	9.4	
Actuated g/C Ratio	0.02	0.27		0.22	0.47			0.14	0.14	0.14	0.14	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	40	903		397	1517			264	225	252	262	
v/s Ratio Prot	0.01	c0.23		0.01	c0.34			c0.22		c0.16	0.07	
v/s Ratio Perm									0.02			
v/c Ratio	0.42	0.87		0.06	0.72			1.57	0.11	1.12	0.48	
Uniform Delay, d1	31.8	23.0		20.1	14.0			28.3	24.6	28.3	26.1	
Progression Factor	1.00	1.00		0.85	0.74			1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	8.7		0.2	2.5			273.3	0.2	92.5	1.4	
Delay (s)	38.9	31.7		17.3	12.9			301.6	24.9	120.8	27.5	
Level of Service	D	C		B	B			F	C	F	C	
Approach Delay (s)		31.9			13.0			265.5			91.0	
Approach LOS		C			B			F			F	

Intersection Summary			
HCM Average Control Delay	71.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

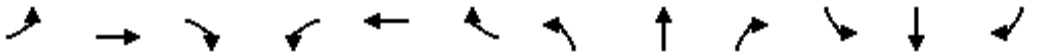
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	1025	7	13	1012	191	11	53	50	150	12	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1770	3359		1770	3282			1744			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.67	
Satd. Flow (perm)	1770	3359		1770	3282			1700			1243	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	30	1046	7	13	1033	195	11	54	51	153	12	11
RTOR Reduction (vph)	0	0	0	0	13	0	0	40	0	0	5	0
Lane Group Flow (vph)	30	1053	0	13	1215	0	0	76	0	0	171	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	3.1	40.0		1.4	39.3			14.6			14.6	
Effective Green, g (s)	3.1	40.0		1.4	39.3			14.6			14.6	
Actuated g/C Ratio	0.05	0.61		0.02	0.60			0.22			0.22	
Clearance Time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	83	2036		38	1954			376			275	
v/s Ratio Prot	c0.02	0.31		0.01	c0.37							
v/s Ratio Perm								0.04			c0.14	
v/c Ratio	0.36	0.52		0.34	0.62			0.20			0.62	
Uniform Delay, d1	30.5	7.5		31.8	8.6			21.0			23.2	
Progression Factor	1.39	0.23		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.2	0.4		5.3	1.5			0.3			4.3	
Delay (s)	43.5	2.1		37.2	10.1			21.2			27.6	
Level of Service	D	A		D	B			C			C	
Approach Delay (s)		3.3			10.4			21.2			27.6	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	1116	26	6	1118	133	0	7	20	43	2	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.90	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3527		1770	3483			1674			1658	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.91	
Satd. Flow (perm)	1770	3527		1770	3483			1674			1531	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	164	1162	27	6	1165	139	0	7	21	45	2	126
RTOR Reduction (vph)	0	2	0	0	12	0	0	18	0	0	105	0
Lane Group Flow (vph)	164	1187	0	6	1292	0	0	10	0	0	68	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.1	29.1		0.8	24.8			8.0			8.0	
Effective Green, g (s)	5.1	29.1		0.8	24.8			8.0			8.0	
Actuated g/C Ratio	0.11	0.60		0.02	0.51			0.17			0.17	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	187	2121		29	1785			277			253	
v/s Ratio Prot	c0.09	0.34		0.00	c0.37			0.01				
v/s Ratio Perm											c0.04	
v/c Ratio	0.88	0.56		0.21	0.72			0.04			0.27	
Uniform Delay, d1	21.3	5.8		23.5	9.1			17.0			17.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	33.8	0.3		3.5	1.5			0.1			0.6	
Delay (s)	55.1	6.1		27.0	10.6			17.0			18.2	
Level of Service	E	A		C	B			B			B	
Approach Delay (s)		12.1			10.7			17.0			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	10.5
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

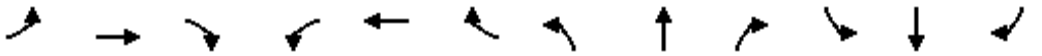
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	22	81	1020	6	21	5	61	1121	67	82	117	92
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	1.00				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3376				1770	3463				1816
Flt Permitted		0.95	1.00				0.23	1.00				0.95
Satd. Flow (perm)		1653	3376				432	3463				1816
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	89	1121	7	23	5	67	1232	74	90	129	101
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	104	1159	0	0	0	72	1393	0	0	0	230
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		52.0	52.0				52.0	52.0				17.5
Effective Green, g (s)		53.0	53.0				53.0	53.0				17.0
Actuated g/C Ratio		0.30	0.30				0.30	0.30				0.10
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		491	1002				128	1028				173
v/s Ratio Prot		0.06	c0.34					c0.40				c0.13
v/s Ratio Perm							0.17					
v/c Ratio		0.21	1.16				0.56	1.36				1.33
Uniform Delay, d1		47.1	62.7				53.0	62.7				80.8
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	82.0				3.3	166.3				182.4
Delay (s)		47.2	144.8				56.3	229.0				263.1
Level of Service		D	F				E	F				F
Approach Delay (s)			136.8					220.6				
Approach LOS			F					F				

Intersection Summary			
HCM Average Control Delay	174.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

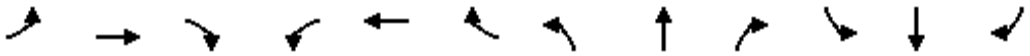
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	724	152	6	141	38	349	118	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.99				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.97				1.00	0.96		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3405				1816	3385		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3405				1816	3385		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	796	167	7	155	42	384	130	27
RTOR Reduction (vph)	0	0	0	0	0	2	0	0
Lane Group Flow (vph)	970	0	0	0	197	539	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	44.0				11.5	38.0		
Effective Green, g (s)	45.5				11.0	39.5		
Actuated g/C Ratio	0.25				0.06	0.22		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	868				112	749		
v/s Ratio Prot	c0.28				c0.11	0.16		
v/s Ratio Perm								
v/c Ratio	1.12				1.76	0.72		
Uniform Delay, d1	66.5				83.8	64.4		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	68.2				375.4	2.8		
Delay (s)	134.7				459.2	67.1		
Level of Service	F				F	E		
Approach Delay (s)	159.3					171.8		
Approach LOS	F					F		

Intersection Summary



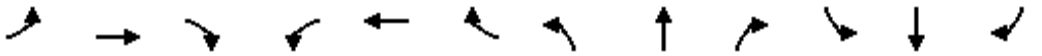
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	1065	111	58	1125	42	415	357	314	25	44	2
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93			1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1816	3489		1816	3520		1816	1732			1823	
Flt Permitted	0.95	1.00		0.95	1.00		0.76	1.00			0.40	
Satd. Flow (perm)	1816	3489		1816	3520		1448	1732			743	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	1098	114	60	1160	43	428	368	324	26	45	2
RTOR Reduction (vph)	0	9	0	0	2	0	0	40	0	0	1	0
Lane Group Flow (vph)	10	1204	0	60	1201	0	428	652	0	0	72	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	37.5		5.0	41.3		26.5	26.5			26.5	
Effective Green, g (s)	0.7	37.5		4.5	41.3		26.0	26.0			26.0	
Actuated g/C Ratio	0.01	0.47		0.06	0.52		0.32	0.32			0.32	
Clearance Time (s)	3.5	4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	16	1635		102	1817		471	563			241	
v/s Ratio Prot	0.01	c0.34		c0.03	c0.34			c0.38				
v/s Ratio Perm							0.30				0.10	
v/c Ratio	0.62	0.74		0.59	0.66		0.91	1.16			0.30	
Uniform Delay, d1	39.5	17.2		36.8	14.2		25.9	27.0			20.2	
Progression Factor	1.00	1.00		1.05	1.04		1.00	1.00			1.00	
Incremental Delay, d2	44.0	3.0		4.1	1.4		20.7	89.8			0.3	
Delay (s)	83.5	20.2		42.8	16.2		46.6	116.8			20.4	
Level of Service	F	C		D	B		D	F			C	
Approach Delay (s)		20.7			17.4			90.0			20.4	
Approach LOS		C			B			F			C	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1165	26	26	1225	334	6	29	26	139	16	5
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.94			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1816	3526		1816	3426			1736			1775	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.78	
Satd. Flow (perm)	1816	3526		1816	3426			1696			1451	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	30	1177	26	26	1237	337	6	29	26	140	16	5
RTOR Reduction (vph)	0	1	0	0	17	0	0	22	0	0	2	0
Lane Group Flow (vph)	30	1202	0	26	1557	0	0	39	0	0	159	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.9	51.7		2.8	51.6			14.1			14.1	
Effective Green, g (s)	2.4	52.1		2.3	52.0			13.6			13.6	
Actuated g/C Ratio	0.03	0.65		0.03	0.65			0.17			0.17	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	54	2296		52	2227			288			247	
v/s Ratio Prot	c0.02	0.34		0.01	c0.45							
v/s Ratio Perm								0.02			c0.11	
v/c Ratio	0.56	0.52		0.50	0.70			0.14			0.65	
Uniform Delay, d1	38.3	7.4		38.3	9.0			28.2			31.0	
Progression Factor	1.25	0.73		0.95	2.18			1.00			1.00	
Incremental Delay, d2	4.0	0.5		2.3	1.6			0.1			4.3	
Delay (s)	51.6	5.9		38.7	21.1			28.3			35.2	
Level of Service	D	A		D	C			C			D	
Approach Delay (s)		7.0			21.4			28.3			35.2	
Approach LOS		A			C			C			D	

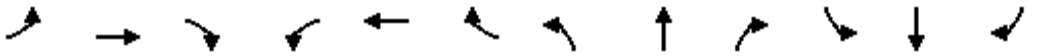
Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	1147	18	48	1278	211	44	71	44	383	67	102
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3531		1816	3539	1583	1816	1745		1725	1709	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3531		1816	3539	1583	1816	1745		1725	1709	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	112	1182	19	49	1318	218	45	73	45	395	69	105
RTOR Reduction (vph)	0	1	0	0	0	78	0	15	0	0	0	59
Lane Group Flow (vph)	112	1200	0	49	1318	140	45	103	0	229	235	46
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	9.3	67.8		35.8	94.3	94.3	15.6	15.6		26.3	26.3	26.3
Effective Green, g (s)	8.8	67.8		35.3	94.3	94.3	15.1	15.1		25.8	25.8	25.8
Actuated g/C Ratio	0.06	0.42		0.22	0.59	0.59	0.09	0.09		0.16	0.16	0.16
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	194	1496		401	2086	933	171	165		278	276	255
v/s Ratio Prot	c0.03	c0.34		0.03	c0.37		0.02	c0.06		0.13	c0.14	
v/s Ratio Perm						0.09						0.03
v/c Ratio	0.58	0.80		0.12	0.63	0.15	0.26	0.62		0.82	0.85	0.18
Uniform Delay, d1	73.8	40.3		49.9	21.5	14.8	67.3	69.7		64.9	65.2	58.0
Progression Factor	0.94	1.02		0.97	0.89	1.74	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	2.8		0.0	1.1	0.3	0.3	5.2		16.9	20.8	0.1
Delay (s)	71.8	44.0		48.4	20.2	26.0	67.6	74.9		81.8	86.0	58.1
Level of Service	E	D		D	C	C	E	E		F	F	E
Approach Delay (s)		46.3			21.8			72.8			79.2	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	42.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

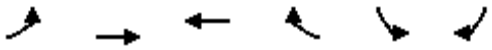


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱				↰↰		↱
Volume (vph)	205	1143	0	0	1533	453	0	0	0	600	0	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		0.99			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3512			3539	1583				3523		1583
Flt Permitted		0.50			1.00	1.00				0.95		1.00
Satd. Flow (perm)		1762			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1191	0	0	1597	472	0	0	0	625	0	130
RTOR Reduction (vph)	0	0	0	0	0	162	0	0	0	0	0	23
Lane Group Flow (vph)	0	1405	0	0	1597	310	0	0	0	625	0	107
Confl. Peds. (#/hr)												2
Turn Type	Perm		Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases	2		2			6						
Actuated Green, G (s)		52.5			52.5	52.5				18.4		18.4
Effective Green, g (s)		53.4			53.4	52.5				18.6		18.6
Actuated g/C Ratio		0.67			0.67	0.66				0.23		0.23
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1176			2362	1039				819		368
v/s Ratio Prot					0.45					c0.18		0.07
v/s Ratio Perm		c0.80				0.20						
v/c Ratio		1.73dl			0.68	0.30				0.76		0.29
Uniform Delay, d1		13.3			8.1	5.9				28.6		25.3
Progression Factor		1.82			1.01	1.07				1.00		1.00
Incremental Delay, d2		93.6			1.5	0.7				3.8		0.2
Delay (s)		117.8			9.6	7.0				32.5		25.4
Level of Service		F			A	A				C		C
Approach Delay (s)		117.8			9.0			0.0			31.3	
Approach LOS		F			A			A			C	

Intersection Summary			
HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

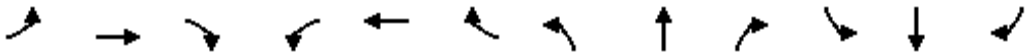
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	205	2432	1790	823	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	207	2457	1808	831	0	0
RTOR Reduction (vph)	0	0	0	160	0	0
Lane Group Flow (vph)	207	2457	1808	671	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	16.9	66.4	54.2	54.2		
Effective Green, g (s)	16.9	67.3	55.1	54.2		
Actuated g/C Ratio	0.21	0.84	0.69	0.68		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	384	2977	2437	1060		
v/s Ratio Prot	c0.11	c0.69	0.51			
v/s Ratio Perm				0.43		
v/c Ratio	0.54	0.83	0.74	0.63		
Uniform Delay, d1	28.1	3.3	7.9	7.3		
Progression Factor	1.00	1.18	1.00	1.00		
Incremental Delay, d2	0.5	2.0	2.1	2.9		
Delay (s)	28.7	5.9	10.0	10.2		
Level of Service	C	A	B	B		
Approach Delay (s)		7.7	10.1		0.0	
Approach LOS		A	B		A	

Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

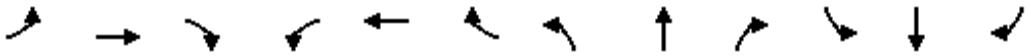
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	18	12	19	24	15	27	468	40	10	131	25
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	14	21	14	22	28	18	32	551	47	12	154	29

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	49	68	629	195
Volume Left (vph)	14	22	32	12
Volume Right (vph)	14	18	47	29
Hadj (s)	-0.08	-0.06	0.00	-0.04
Departure Headway (s)	5.9	5.9	4.5	4.9
Degree Utilization, x	0.08	0.11	0.79	0.27
Capacity (veh/h)	551	553	784	692
Control Delay (s)	9.4	9.6	22.1	9.7
Approach Delay (s)	9.4	9.6	22.1	9.7
Approach LOS	A	A	C	A

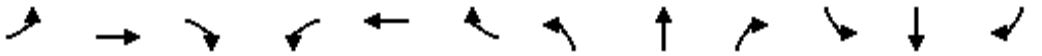
Intersection Summary			
Delay	18.0		
HCM Level of Service	C		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	12	27	26	10	3	9	431	37	1	107	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	16	14	32	31	12	4	11	507	44	1	126	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	690	702	128	719	683	529	131			551		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	690	702	128	719	683	529	131			551		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	96	97	90	97	99	99			100		
cM capacity (veh/h)	346	359	922	320	369	550	1455			1019		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	46	561	132
Volume Left	16	31	11	1
Volume Right	32	4	44	5
cSH	514	342	1455	1019
Volume to Capacity	0.12	0.13	0.01	0.00
Queue Length 95th (ft)	10	11	1	0
Control Delay (s)	13.0	17.1	0.2	0.1
Lane LOS	B	C	A	A
Approach Delay (s)	13.0	17.1	0.2	0.1
Approach LOS	B	C		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	42.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	482	2	55	7	2	14	19	369	0	9	266	181
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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 (vph)	524	2	60	8	2	15	21	401	0	10	289	197
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	767	751	289	812	751	401	289			401		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	767	751	289	812	751	401	289			401		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	99	92	97	99	98	98			99		
cM capacity (veh/h)	304	331	750	267	331	649	1273			1158		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	586	25	422	299	197
Volume Left	524	8	21	10	0
Volume Right	60	15	0	0	197
cSH	324	428	1273	1158	1700
Volume to Capacity	1.81	0.06	0.02	0.01	0.12
Queue Length 95th (ft)	962	5	1	1	0
Control Delay (s)	403.8	13.9	0.5	0.3	0.0
Lane LOS	F	B	A	A	
Approach Delay (s)	403.8	13.9	0.5	0.2	
Approach LOS	F	B			

Intersection Summary				
Average Delay	155.2			
Intersection Capacity Utilization	78.4%	ICU Level of Service	D	
Analysis Period (min)	15			

Appendix E-6:

Worksheets for
Cumulative (2025) plus Proposed Project Conditions

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 540 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5584	0.90	Level	5	0	0.976	1.00	6360
Ramp	128	0.90	Level	5	0	0.976	1.00	146
UpStream								
DownStream	540	0.90	Level	5	0	0.976	1.00	615

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.343 using Equation (Exhibit 25-5)

V_{12}= 2181 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6506	See Exhibit 25-7	No
V_{R12}	2327	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.7 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.329 (Exibit 25-19)

S_R= 50.7 mph (Exhibit 25-19)

S_0= 49.3 mph(Exhibit 25-19)

S= 49.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 191 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9352	0.90	Level	5	0	0.976	1.00	10651
Ramp	330	0.90	Level	5	0	0.976	1.00	376
UpStream	191	0.90	Level	5	0	0.976	1.00	218
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.394 using Equation (Exhibit 25-5)

V_{12}= 4194 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11027	See Exhibit 25-7	Yes
V_{R12}	4570	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 36.6 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.649 (Exibit 25-19)

S_R= 46.6 mph (Exhibit 25-19)

S_0= 42.9 mph(Exhibit 25-19)

S= 44.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5869	0.90	Level	5	0	0.976	1.00	6684
Ramp	690	0.90	Level	5	0	0.976	1.00	786
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.338 using Equation (Exhibit 25-5)

V_{12}= 2258 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7470	See Exhibit 25-7	No
V_{R12}	3044	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.6 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.355 (Exibit 25-19)

S_R= 50.4 mph (Exhibit 25-19)

S_0= 48.8 mph(Exhibit 25-19)

S= 49.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8957	0.90	Level	5	0	0.976	1.00	10201
Ramp	839	0.90	Level	5	0	0.976	1.00	956
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 10201 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11157	See Exhibit 25-7	Yes
V_{R12}	12381	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 89.2 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 929.216 (Exibit 25-19)

S_R= -12024.8 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2511	0.90	Level	6	0	0.971	1.00	2874
Ramp	368	0.90	Level	6	0	0.971	1.00	421
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2874 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3295	See Exhibit 25-7	No
V_{R12}	3295	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.5 (pc/ m/ln)

LOS = D (Exhibit 25-4)

Speed Estimation

M_S = 0.398 (Exibit 25-19)

S_R= 49.8 mph (Exhibit 25-19)

S_0= N/A mph(Exhibit 25-19)

S= 49.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1085 ft
V_D = 525 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10414	0.90	Level	5	0	0.976	1.00	11860
Ramp	138	0.90	Level	5	0	0.976	1.00	157
UpStream								
DownStream	525	0.90	Level	5	0	0.976	1.00	598

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.342 using Equation (Exhibit 25-5)

V_{12}= 4051 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	12017	See Exhibit 25-7	Yes
V_{R12}	4208	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.4 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.552 (Exibit 25-19)

S_R= 47.8 mph (Exhibit 25-19)

S_0= 38.8 mph(Exhibit 25-19)

S= 41.6 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ El Camino Ave.)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 950 ft
V_u = 209 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5579	0.90	Level	5	0	0.976	1.00	6354
Ramp	399	0.90	Level	5	0	0.976	1.00	454
UpStream	209	0.90	Level	5	0	0.976	1.00	238
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.384 using Equation (Exhibit 25-5)

V_{12}= 2440 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	6808	See Exhibit 25-7	No
V_{R12}	2894	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 23.5 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.342 (Exibit 25-19)

S_R= 50.5 mph (Exhibit 25-19)

S_0= 49.8 mph(Exhibit 25-19)

S= 50.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Slip @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	10670	0.90	Level	5	0	0.976	1.00	12152
Ramp	693	0.90	Level	5	0	0.976	1.00	789
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.337 using Equation (Exhibit 25-5)

V_{12}= 4100 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	12941	See Exhibit 25-7	Yes
V_{R12}	4889	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 39.0 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.791 (Exibit 25-19)

S_R= 44.7 mph (Exhibit 25-19)

S_0= 38.1 mph(Exhibit 25-19)

S= 40.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft		L_{down} = ft
V_u = veh/h	S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5263	0.90	Level	5	0	0.976	1.00	5994
Ramp	980	0.90	Level	5	0	0.976	1.00	1116
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 5994 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7110	See Exhibit 25-7	No
V_{R12}	7829	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 51.0 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 9.909 (Exibit 25-19)

S_R= -73.8 mph (Exhibit 25-19)

S_0= 55.0 mph(Exhibit 25-19)

S= mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Merge (Loop @ Arden Way)
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1441	0.90	Level	6	0	0.971	1.00	1649
Ramp	182	0.90	Level	6	0	0.971	1.00	208
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 25-2 or 25-3)
P_{FM}= 1.000 using Equation (Exhibit 25-5)
V_{12}= 1649 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1857	See Exhibit 25-7	No
V_{R12}	1857	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R = 17.4 (pc/ m/ln)
LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.318 (Exibit 25-19)
S_R= 50.9 mph (Exhibit 25-19)
S_0= N/A mph(Exhibit 25-19)
S= 50.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = using Equation (Exhibit 25-11)
V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$
D_R = (pc/ m/ln)
LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)
S_R= mph(Exhibit 25-19)
S_0= mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6559	0.90	Level	5	0	0.976	1.00	7470
Ramp	975	0.90	Level	5	0	0.976	1.00	1110
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2764 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	7470	9000	No
V_{12}	2764	4400:All	No
$V_{FO} = V_F - V_R$	6360	9000	No
V_R	1110	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 14.8 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.528 (Exhibit 25-19)

S_R= 48.1 mph (Exhibit 25-19)

S_0= 55.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.3 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9424	0.90	Level	5	0	0.976	1.00	10733
Ramp	263	0.90	Level	5	0	0.976	1.00	300
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$$V_{12} = V_F (P_{FM})$$

L_{EQ} = (Equation 25-2 or 25-3)
P_{FM}= using Equation (Exhibit 25-5)
V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R = (pc/ mi /ln)
LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)
S_R= mph (Exhibit 25-19)
S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} = (Equation 25-8 or 25-9)
P_{FD} = 0.436 using Equation (Exhibit 25-11)
V_{12} = 4849 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10733	9000	Yes
V_{12}	4849	4400:All	Yes
$V_{FO} = V_F - V_R$	10433	9000	Yes
V_R	300	2000	No

Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$$

D_R = 44.4 (pc/ mi /ln)
LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.455 (Exhibit 25-19)
S_R= 49.1 mph (Exhibit 25-19)
S_0= 52.8 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 51.0 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6084	0.90	Level	5	0	0.976	1.00	6929
Ramp	861	0.90	Level	5	0	0.976	1.00	981
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3574 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6929	9000	No
V_{12}	3574	4400:All	No
$V_{FO} = V_F - V_R$	5948	9000	No
V_R	981	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 26.0 (pc/ mi /ln)

LOS= C (Exhibit 25-4)

Speed Estimation

D_s = 0.516 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 57.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.4 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9682	0.90	Level	5	0	0.976	1.00	11027
Ramp	715	0.90	Level	5	0	0.976	1.00	814
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5267 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11027	9000	Yes
V_{12}	5267	4400:All	Yes
$V_{FO} = V_F - V_R$	10213	9000	Yes
V_R	814	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 48.2 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.501 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= 53.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1283	0.90	Level	6	0	0.971	1.00	1468
Ramp	663	0.90	Level	6	0	0.971	1.00	759
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 1468 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1468	4500	No
V_{12}	1468	4400:All	No
$V_{FO} = V_F - V_R$	709	4500	No
V_R	759	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 15.4 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.496 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 48.5 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11363	0.90	Level	5	0	0.976	1.00	12941
Ramp	949	0.90	Level	5	0	0.976	1.00	1081
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4165 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12941	9000	Yes
V_{12}	4165	4400:All	No
$V_{FO} = V_F - V_R$	11860	9000	Yes
V_R	1081	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 26.8 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.525 (Exhibit 25-19)

S_R= 48.2 mph (Exhibit 25-19)

S_0= 47.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 47.5 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ El Camino Ave.
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5668	0.90	Level	5	0	0.976	1.00	6455
Ramp	318	0.90	Level	5	0	0.976	1.00	362
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3019 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6455	9000	No
V_{12}	3019	4400:All	No
$V_{FO} = V_F - V_R$	6093	9000	No
V_R	362	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 28.6 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.461 (Exhibit 25-19)

S_R= 49.0 mph (Exhibit 25-19)

S_0= 57.5 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 53.2 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9236	0.90	Level	5	0	0.976	1.00	10519
Ramp	861	0.90	Level	5	0	0.976	1.00	981
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 5140 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	10519	9000	Yes
V_{12}	5140	4400:All	Yes
$V_{FO} = V_F - V_R$	9538	9000	Yes
V_R	981	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 39.5 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.516 (Exhibit 25-19)

S_R= 48.3 mph (Exhibit 25-19)

S_0= 53.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 50.9 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	BUS-80 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	5978	0.90	Level	5	0	0.976	1.00	6808
Ramp	715	0.90	Level	5	0	0.976	1.00	814
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 using Equation (Exhibit 25-11)

V_{12} = 3427 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	6808	9000	No
V_{12}	3427	4400:All	No
$V_{FO} = V_F - V_R$	5994	9000	No
V_R	814	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 32.4 (pc/ mi /ln)

LOS= D (Exhibit 25-4)

Speed Estimation

D_s = 0.501 (Exhibit 25-19)

S_R= 48.5 mph (Exhibit 25-19)

S_0= 57.6 mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 52.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	SR-160 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ Arden Way
Date Performed	10/22/2007	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative + Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D,V_R,V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	4092	0.90	Level	6	0	0.971	1.00	4683
Ramp	1797	0.90	Level	6	0	0.971	1.00	2057
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-11)

V_{12} = 4683 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	4683	4500	Yes
V_{12}	4683	4400:All	Yes
$V_{FO} = V_F - V_R$	2626	4500	No
V_R	2057	2000	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.0009 L_D$

D_R = 43.1 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

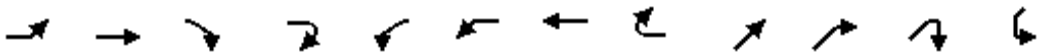
Speed Estimation

D_s = 0.613 (Exhibit 25-19)

S_R= 47.0 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S= mph (Exhibit 25-14)	S = 47.0 mph (Exhibit 25-15)

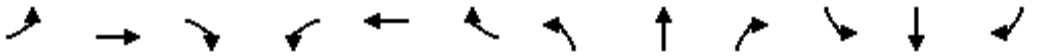


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	79	615	10	8	6	96	445	53	216	89	1	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.98		0.96			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3483		3383			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3483		3383			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	82	641	10	8	6	100	464	55	225	93	1	94
RTOR Reduction (vph)	0	0	0	4	0	0	8	0	0	0	0	0
Lane Group Flow (vph)	82	642	9	4	0	106	511	0	319	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	8.0	40.1	40.1	40.1		8.7	40.8		14.7			
Effective Green, g (s)	8.0	40.1	40.1	40.1		8.7	40.8		14.7			
Actuated g/C Ratio	0.09	0.45	0.45	0.45		0.10	0.45		0.16			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	157	1510	642	705		171	1579		553			
v/s Ratio Prot	0.05	c0.19	0.01			c0.06	0.15		0.09			
v/s Ratio Perm				0.00								
v/c Ratio	0.52	0.43	0.01	0.01		0.62	0.32		0.58			
Uniform Delay, d1	39.2	17.1	13.9	13.9		39.1	15.8		34.8			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	3.1	0.9	0.0	0.0		6.5	0.5		1.5			
Delay (s)	42.3	17.9	14.0	13.9		45.6	16.3		36.2			
Level of Service	D	B	B	B		D	B		D			
Approach Delay (s)		20.5					21.3		36.2			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	30.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	75	484	93
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.98	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3454	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3454	
Peak-hour factor, PHF	0.96	0.96	0.96
Adj. Flow (vph)	78	504	97
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	172	601	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	9.0	26.7	
Effective Green, g (s)	9.0	26.7	
Actuated g/C Ratio	0.10	0.30	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	177	1025	
v/s Ratio Prot	c0.10	c0.17	
v/s Ratio Perm			
v/c Ratio	0.97	0.59	
Uniform Delay, d1	40.4	26.9	
Progression Factor	1.00	1.00	
Incremental Delay, d2	59.0	0.9	
Delay (s)	99.4	27.8	
Level of Service	F	C	
Approach Delay (s)		43.7	
Approach LOS		D	

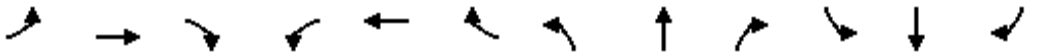
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	685	23	14	547	80	14	86	18	300	263	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3346		1770	3298			1850	1583	1770	1856	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3346		1770	3298			1850	1583	1770	1856	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	6	721	24	15	576	84	15	91	19	316	277	7
RTOR Reduction (vph)	0	4	0	0	15	0	0	0	17	0	2	0
Lane Group Flow (vph)	6	741	0	15	645	0	0	106	2	316	282	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.3	15.7		10.4	24.8			7.0	7.0	12.3	12.3	
Effective Green, g (s)	1.3	15.7		10.4	24.8			7.0	7.0	12.3	12.3	
Actuated g/C Ratio	0.02	0.26		0.17	0.41			0.12	0.12	0.20	0.20	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	876		307	1363			216	185	363	380	
v/s Ratio Prot	0.00	c0.22		0.01	c0.20			c0.06		c0.18	0.15	
v/s Ratio Perm									0.00			
v/c Ratio	0.16	0.85		0.05	0.47			0.49	0.01	0.87	0.74	
Uniform Delay, d1	28.8	21.0		20.7	12.8			24.8	23.4	23.1	22.4	
Progression Factor	1.00	1.00		0.87	0.79			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	7.6		0.3	1.1			1.8	0.0	19.7	7.7	
Delay (s)	30.8	28.6		18.3	11.3			26.6	23.5	42.8	30.0	
Level of Service	C	C		B	B			C	C	D	C	
Approach Delay (s)		28.6			11.4			26.1			36.8	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



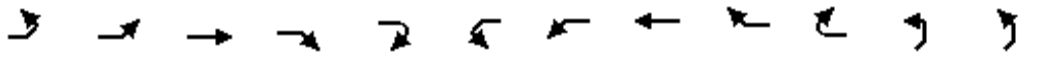
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	967	12	33	598	77	7	20	23	184	21	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1770	3356		1770	3305			1735			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			0.72	
Satd. Flow (perm)	1770	3356		1770	3305			1679			1332	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	3	1007	12	34	623	80	7	21	24	192	22	9
RTOR Reduction (vph)	0	1	0	0	10	0	0	18	0	0	3	0
Lane Group Flow (vph)	3	1018	0	34	693	0	0	34	0	0	220	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	31.4		3.1	33.3			15.5			15.5	
Effective Green, g (s)	1.2	31.4		3.1	33.3			15.5			15.5	
Actuated g/C Ratio	0.02	0.52		0.05	0.55			0.26			0.26	
Clearance Time (s)	3.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	35	1756		91	1834			434			344	
v/s Ratio Prot	0.00	c0.30		c0.02	0.21							
v/s Ratio Perm								0.02			c0.17	
v/c Ratio	0.09	0.58		0.37	0.38			0.08			0.64	
Uniform Delay, d1	28.9	9.8		27.5	7.5			16.8			19.8	
Progression Factor	1.40	0.14		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.6	0.8		2.6	0.6			0.1			3.9	
Delay (s)	41.1	2.1		30.1	8.1			16.9			23.7	
Level of Service	D	A		C	A			B			C	
Approach Delay (s)		2.3			9.1			16.9			23.7	
Approach LOS		A			A			B			C	

Intersection Summary			
HCM Average Control Delay	7.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	1100	10	16	600	59	1	1	11	207	4	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.89			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	3535		1770	3492			1644			1723	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.79	
Satd. Flow (perm)	1770	3535		1770	3492			1617			1413	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	67	1122	10	16	612	60	1	1	11	211	4	106
RTOR Reduction (vph)	0	1	0	0	11	0	0	8	0	0	36	0
Lane Group Flow (vph)	67	1131	0	16	661	0	0	5	0	0	285	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.7	22.4		0.8	20.5			14.1			14.1	
Effective Green, g (s)	2.7	22.4		0.8	20.5			14.1			14.1	
Actuated g/C Ratio	0.06	0.47		0.02	0.43			0.29			0.29	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	100	1657		30	1498			477			417	
v/s Ratio Prot	c0.04	c0.32		0.01	0.19							
v/s Ratio Perm								0.00			c0.20	
v/c Ratio	0.67	0.68		0.53	0.44			0.01			0.68	
Uniform Delay, d1	22.1	9.9		23.3	9.6			11.9			14.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	16.2	1.2		17.0	0.2			0.0			4.6	
Delay (s)	38.3	11.1		40.3	9.8			11.9			19.5	
Level of Service	D	B		D	A			B			B	
Approach Delay (s)		12.6			10.5			11.9			19.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	6.5
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



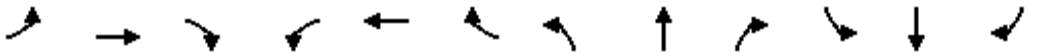
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	19	75	889	16	18	1	105	797	34	68	18	72
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	0.99				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3371				1770	3465				1816
Flt Permitted		0.95	1.00				0.27	1.00				0.95
Satd. Flow (perm)		1653	3371				511	3465				1816
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	81	956	17	19	1	113	857	37	73	19	77
RTOR Reduction (vph)	0	0	1	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	93	999	0	0	0	114	963	0	0	0	96
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		57.0	57.0				45.0	45.0				11.2
Effective Green, g (s)		58.0	58.0				46.0	46.0				10.7
Actuated g/C Ratio		0.32	0.32				0.26	0.26				0.06
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		537	1095				132	893				109
v/s Ratio Prot		0.06	c0.30					c0.28				c0.05
v/s Ratio Perm							0.22					
v/c Ratio		0.17	0.91				0.86	1.08				0.88
Uniform Delay, d1		43.1	57.8				63.3	66.2				83.3
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	11.2				39.4	53.7				49.7
Delay (s)		43.2	69.0				102.6	119.9				132.9
Level of Service		D	E				F	F				F
Approach Delay (s)			66.8					118.1				
Approach LOS			E					F				

Intersection Summary			
HCM Average Control Delay	84.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

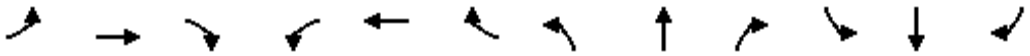
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	178	54	6	57	7	459	54	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.98				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.96				1.00	0.98		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3351				1816	3478		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3351				1816	3478		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	191	58	6	61	8	494	58	6
RTOR Reduction (vph)	1	0	0	0	0	1	0	0
Lane Group Flow (vph)	254	0	0	0	69	557	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	47.5				10.0	46.3		
Effective Green, g (s)	49.0				9.5	47.8		
Actuated g/C Ratio	0.27				0.05	0.27		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	920				97	931		
v/s Ratio Prot	0.08				0.04	c0.16		
v/s Ratio Perm								
v/c Ratio	0.28				0.71	0.60		
Uniform Delay, d1	50.8				83.2	57.0		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	0.7				18.4	2.8		
Delay (s)	51.6				101.6	59.8		
Level of Service	D				F	E		
Approach Delay (s)	73.8					64.4		
Approach LOS	E					E		

Intersection Summary



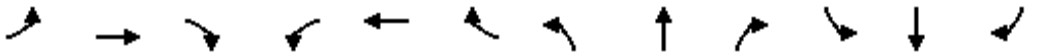
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	982	123	76	816	20	136	114	115	31	148	4
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	1.00			1.00	
Frt		0.98		1.00	1.00		1.00	0.92			1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		3480		1816	3527		1816	1722			1842	
Flt Permitted		1.00		0.95	1.00		0.46	1.00			0.73	
Satd. Flow (perm)		3480		1816	3527		871	1722			1362	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1034	129	80	859	21	143	120	121	33	156	4
RTOR Reduction (vph)	0	8	0	0	1	0	0	55	0	0	1	0
Lane Group Flow (vph)	0	1155	0	80	879	0	143	186	0	0	192	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)		47.2		7.0	57.7		14.8	14.8			14.8	
Effective Green, g (s)		47.2		6.5	57.7		14.3	14.3			14.3	
Actuated g/C Ratio		0.59		0.08	0.72		0.18	0.18			0.18	
Clearance Time (s)		4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		2053		148	2544		156	308			243	
v/s Ratio Prot		c0.33		c0.04	0.25			0.11				
v/s Ratio Perm							c0.16				0.14	
v/c Ratio		0.56		0.54	0.35		0.92	0.60			0.79	
Uniform Delay, d1		10.1		35.3	4.1		32.3	30.2			31.4	
Progression Factor		1.00		0.75	1.85		1.00	1.00			1.00	
Incremental Delay, d2		1.1		1.9	0.3		47.1	2.3			15.0	
Delay (s)		11.2		28.3	8.0		79.4	32.5			46.4	
Level of Service		B		C	A		E	C			D	
Approach Delay (s)		11.2			9.7			50.0			46.4	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	991	20	13	849	27	15	13	23	329	43	34
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	
Satd. Flow (prot)	1816	3527		1815	3523			1715			1767	
Flt Permitted	0.95	1.00		0.95	1.00			0.88			0.73	
Satd. Flow (perm)	1816	3527		1815	3523			1533			1342	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	1054	21	14	903	29	16	14	24	350	46	36
RTOR Reduction (vph)	0	1	0	0	2	0	0	16	0	0	4	0
Lane Group Flow (vph)	16	1074	0	14	930	0	0	38	0	0	428	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.3	39.9		1.3	39.9			27.4			27.4	
Effective Green, g (s)	0.8	40.3		0.8	40.3			26.9			26.9	
Actuated g/C Ratio	0.01	0.50		0.01	0.50			0.34			0.34	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	18	1777		18	1775			515			451	
v/s Ratio Prot	c0.01	c0.30		0.01	0.26							
v/s Ratio Perm								0.02			c0.32	
v/c Ratio	0.89	0.60		0.78	0.52			0.07			0.95	
Uniform Delay, d1	39.6	14.2		39.5	13.4			18.1			25.9	
Progression Factor	1.17	0.72		1.00	1.00			1.00			1.00	
Incremental Delay, d2	140.5	1.3		101.0	1.1			0.0			29.2	
Delay (s)	186.7	11.5		140.5	14.5			18.1			55.1	
Level of Service	F	B		F	B			B			E	
Approach Delay (s)		14.1			16.4			18.1			55.1	
Approach LOS		B			B			B			E	

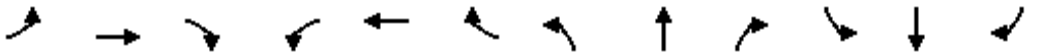
Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1218	48	104	794	344	35	44	35	526	99	123
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3519		1816	3539	1583	1816	1723		1725	1711	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3519		1816	3539	1583	1816	1723		1725	1711	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	96	1256	49	107	819	355	36	45	36	542	102	127
RTOR Reduction (vph)	0	1	0	0	0	160	0	29	0	0	0	66
Lane Group Flow (vph)	96	1304	0	107	819	195	36	52	0	320	324	61
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	7.7	62.4		11.3	66.0	66.0	7.2	7.2		24.6	24.6	24.6
Effective Green, g (s)	7.2	62.4		10.8	66.0	66.0	6.7	6.7		24.1	24.1	24.1
Actuated g/C Ratio	0.06	0.52		0.09	0.55	0.55	0.06	0.06		0.20	0.20	0.20
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	211	1830		163	1946	871	101	96		346	344	318
v/s Ratio Prot	0.03	c0.37		c0.06	c0.23		0.02	c0.03		0.19	c0.19	
v/s Ratio Perm						0.12						0.04
v/c Ratio	0.45	0.71		0.66	0.42	0.22	0.36	0.54		0.92	0.94	0.19
Uniform Delay, d1	54.5	22.0		52.8	15.8	13.9	54.6	55.1		47.1	47.3	39.9
Progression Factor	1.00	1.00		0.93	0.90	3.73	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	2.4		5.8	0.6	0.5	0.8	2.9		29.3	33.3	0.1
Delay (s)	55.1	24.3		55.2	14.8	52.2	55.4	58.0		76.4	80.5	40.0
Level of Service	E	C		E	B	D	E	E		E	F	D
Approach Delay (s)		26.5			28.5			57.2			72.1	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM Average Control Delay	38.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

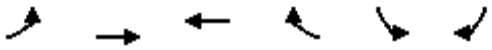
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑	↱				↰↰		↱
Volume (vph)	0	1285	0	0	1117	477	0	0	0	1209	0	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3539			3539	1583				3523		1583
Flt Permitted		1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)		3539			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1339	0	0	1164	497	0	0	0	1259	0	142
RTOR Reduction (vph)	0	0	0	0	0	239	0	0	0	0	0	39
Lane Group Flow (vph)	0	1339	0	0	1164	258	0	0	0	1259	0	103
Confl. Peds. (#/hr)												2
Turn Type			Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases			2			6						
Actuated Green, G (s)		31.1			31.1	31.1				19.8		19.8
Effective Green, g (s)		32.0			32.0	31.1				20.0		20.0
Actuated g/C Ratio		0.53			0.53	0.52				0.33		0.33
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1887			1887	821				1174		528
v/s Ratio Prot		c0.38			0.33					c0.36		0.06
v/s Ratio Perm						0.16						
v/c Ratio		0.71			0.62	0.31				1.07		0.19
Uniform Delay, d1		10.5			9.7	8.3				20.0		14.3
Progression Factor		0.70			1.20	3.42				1.00		1.00
Incremental Delay, d2		1.5			1.5	1.0				48.0		0.1
Delay (s)		8.8			13.1	29.4				68.0		14.3
Level of Service		A			B	C				E		B
Approach Delay (s)		8.8			18.0			0.0			62.6	
Approach LOS		A			B			A			E	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

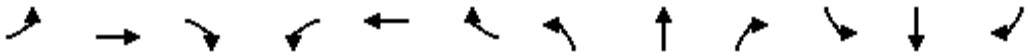
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	261	2179	1108	868	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	272	2270	1154	904	0	0
RTOR Reduction (vph)	0	0	0	128	0	0
Lane Group Flow (vph)	272	2270	1154	776	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	12.5	60.0	38.6	38.6		
Effective Green, g (s)	12.5	60.0	39.5	38.6		
Actuated g/C Ratio	0.21	1.00	0.66	0.64		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	378	3539	2330	1006		
v/s Ratio Prot	0.15	c0.64	0.33			
v/s Ratio Perm				c0.50		
v/c Ratio	0.72	0.64	0.50	0.77		
Uniform Delay, d1	22.1	0.0	5.2	7.6		
Progression Factor	0.95	1.00	1.00	1.00		
Incremental Delay, d2	3.3	0.6	0.8	5.7		
Delay (s)	24.2	0.6	6.0	13.3		
Level of Service	C	A	A	B		
Approach Delay (s)		3.1	9.2		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.9
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

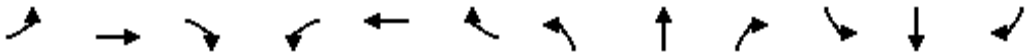
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	30	24	30	10	4	6	96	8	16	305	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	7	32	26	32	11	4	6	102	9	17	324	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	65	47	117	347
Volume Left (vph)	7	32	6	17
Volume Right (vph)	26	4	9	5
Hadj (s)	-0.18	0.12	0.00	0.03
Departure Headway (s)	4.9	5.2	4.6	4.4
Degree Utilization, x	0.09	0.07	0.15	0.42
Capacity (veh/h)	669	626	751	799
Control Delay (s)	8.3	8.5	8.4	10.5
Approach Delay (s)	8.3	8.5	8.4	10.5
Approach LOS	A	A	A	B

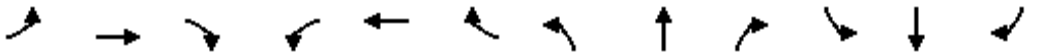
Intersection Summary				
Delay	9.7			
HCM Level of Service	A			
Intersection Capacity Utilization	37.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	10	11	23	6	0	4	108	40	4	366	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	9	10	11	24	6	0	4	112	42	4	381	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	542	559	389	555	546	133	396			154		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	542	559	389	555	546	133	396			154		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	98	94	99	100	100			100		
cM capacity (veh/h)	444	435	660	424	442	916	1163			1426		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	30	158	400
Volume Left	9	24	4	4
Volume Right	11	0	42	15
cSH	500	428	1163	1426
Volume to Capacity	0.06	0.07	0.00	0.00
Queue Length 95th (ft)	5	6	0	0
Control Delay (s)	12.7	14.0	0.2	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	12.7	14.0	0.2	0.1
Approach LOS	B	B		

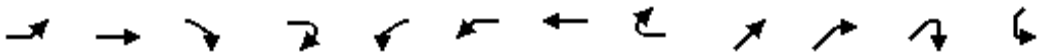
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	37	3	15	25	17	12	11	117	12	146	277	811
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	40	3	16	27	18	13	12	126	13	157	298	872
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	790	774	298	785	768	132	298			139		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	790	774	298	785	768	132	298			139		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	99	98	90	94	99	99			89		
cM capacity (veh/h)	264	291	742	274	293	917	1263			1445		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	59	58	151	455	872
Volume Left	40	27	12	157	0
Volume Right	16	13	13	0	872
cSH	322	333	1263	1445	1700
Volume to Capacity	0.18	0.17	0.01	0.11	0.51
Queue Length 95th (ft)	17	16	1	9	0
Control Delay (s)	18.7	18.1	0.7	3.4	0.0
Lane LOS	C	C	A	A	
Approach Delay (s)	18.7	18.1	0.7	1.2	
Approach LOS	C	C			

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	71.0%	ICU Level of Service	C	
Analysis Period (min)	15			

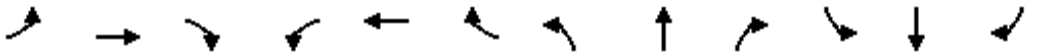


Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NET	NER	NER2	SWL2
Lane Configurations												
Volume (vph)	159	642	10	38	9	92	709	72	722	150	3	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Lane Util. Factor	1.00	0.91	0.91	1.00		1.00	0.95		0.95			
Frt	1.00	1.00	0.85	0.85		1.00	0.99		0.97			
Flt Protected	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (prot)	1770	3389	1441	1583		1770	3490		3446			
Flt Permitted	0.95	1.00	1.00	1.00		0.95	1.00		1.00			
Satd. Flow (perm)	1770	3389	1441	1583		1770	3490		3446			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	164	662	10	39	9	95	731	74	744	155	3	57
RTOR Reduction (vph)	0	0	0	25	0	0	8	0	0	0	0	0
Lane Group Flow (vph)	164	663	9	14	0	104	797	0	902	0	0	0
Turn Type	Prot		Prot	Perm	Prot	Prot						Prot
Protected Phases	1	6	6		5	5	2		4			3
Permitted Phases				6								
Actuated Green, G (s)	11.5	34.9	34.9	34.9		9.5	32.9		28.2			
Effective Green, g (s)	11.5	34.9	34.9	34.9		9.5	32.9		28.2			
Actuated g/C Ratio	0.12	0.35	0.35	0.35		0.10	0.33		0.28			
Clearance Time (s)	4.0	5.0	5.0	5.0		4.0	5.0		5.5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0			
Lane Grp Cap (vph)	206	1195	508	558		170	1160		982			
v/s Ratio Prot	c0.09	0.20	0.01			0.06	c0.23		c0.26			
v/s Ratio Perm				0.01								
v/c Ratio	0.80	0.55	0.02	0.02		0.61	0.69		0.92			
Uniform Delay, d1	42.6	25.8	20.9	20.9		43.0	28.6		34.3			
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00			
Incremental Delay, d2	18.9	1.9	0.1	0.1		6.4	3.3		13.0			
Delay (s)	61.5	27.7	20.9	21.0		49.4	31.9		47.3			
Level of Service	E	C	C	C		D	C		D			
Approach Delay (s)		33.6					33.9		47.3			
Approach LOS		C					C		D			

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWL	SWT	SWR
Lane Configurations			
Volume (vph)	30	343	132
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	3.0	5.5	
Lane Util. Factor	1.00	0.95	
Frt	1.00	0.96	
Flt Protected	0.95	1.00	
Satd. Flow (prot)	1770	3392	
Flt Permitted	0.95	1.00	
Satd. Flow (perm)	1770	3392	
Peak-hour factor, PHF	0.97	0.97	0.97
Adj. Flow (vph)	31	354	136
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	88	490	0
Turn Type	Prot		
Protected Phases	3	8	
Permitted Phases			
Actuated Green, G (s)	8.9	40.1	
Effective Green, g (s)	8.9	40.1	
Actuated g/C Ratio	0.09	0.41	
Clearance Time (s)	3.0	5.5	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	159	1374	
v/s Ratio Prot	c0.05	0.14	
v/s Ratio Perm			
v/c Ratio	0.55	0.36	
Uniform Delay, d1	43.1	20.5	
Progression Factor	1.00	1.00	
Incremental Delay, d2	4.1	0.2	
Delay (s)	47.3	20.6	
Level of Service	D	C	
Approach Delay (s)		24.7	
Approach LOS		C	

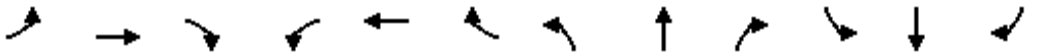
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	722	7	13	770	304	35	323	40	268	101	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3358		1770	3220			1854	1583	1770	1836	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3358		1770	3220			1854	1583	1770	1836	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	17	760	7	14	811	320	37	340	42	282	106	11
RTOR Reduction (vph)	0	1	0	0	46	0	0	0	28	0	6	0
Lane Group Flow (vph)	17	766	0	14	1085	0	0	377	14	282	111	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	1.5	17.6		15.0	31.1			9.4	9.4	9.4	9.4	
Effective Green, g (s)	1.5	17.6		15.0	31.1			9.4	9.4	9.4	9.4	
Actuated g/C Ratio	0.02	0.27		0.23	0.47			0.14	0.14	0.14	0.14	
Clearance Time (s)	3.5	3.9		3.5	3.9			3.6	3.6	3.6	3.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	40	895		402	1517			264	225	252	261	
v/s Ratio Prot	0.01	c0.23		0.01	c0.34			c0.20		c0.16	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.42	0.86		0.03	0.72			1.43	0.06	1.12	0.43	
Uniform Delay, d1	31.8	23.0		19.9	13.9			28.3	24.5	28.3	25.8	
Progression Factor	1.00	1.00		0.84	0.74			1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	8.1		0.1	2.5			213.2	0.1	92.5	1.1	
Delay (s)	38.9	31.1		16.9	12.8			241.5	24.6	120.8	27.0	
Level of Service	D	C		B	B			F	C	F	C	
Approach Delay (s)		31.3			12.8			219.7			93.3	
Approach LOS		C			B			F			F	

Intersection Summary			
HCM Average Control Delay	61.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

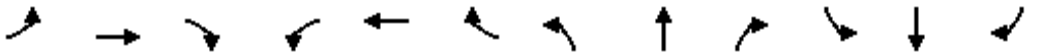
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	1000	7	13	1000	191	11	53	50	150	12	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1770	3359		1770	3281			1744			1770	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.67	
Satd. Flow (perm)	1770	3359		1770	3281			1700			1243	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	30	1020	7	13	1020	195	11	54	51	153	12	11
RTOR Reduction (vph)	0	0	0	0	13	0	0	40	0	0	5	0
Lane Group Flow (vph)	30	1027	0	13	1202	0	0	76	0	0	171	0
Parking (#/hr)		0	0		0	0						
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	3.1	40.0		1.4	39.3			14.6			14.6	
Effective Green, g (s)	3.1	40.0		1.4	39.3			14.6			14.6	
Actuated g/C Ratio	0.05	0.61		0.02	0.60			0.22			0.22	
Clearance Time (s)	2.0	3.5		3.0	3.5			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	83	2036		38	1954			376			275	
v/s Ratio Prot	c0.02	0.31		0.01	c0.37							
v/s Ratio Perm								0.04			c0.14	
v/c Ratio	0.36	0.50		0.34	0.61			0.20			0.62	
Uniform Delay, d1	30.5	7.4		31.8	8.5			21.0			23.2	
Progression Factor	1.41	0.20		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.2	0.4		5.3	1.5			0.3			4.3	
Delay (s)	44.1	1.9		37.2	10.0			21.2			27.6	
Level of Service	D	A		D	A			C			C	
Approach Delay (s)		3.1			10.3			21.2			27.6	
Approach LOS		A			B			C			C	

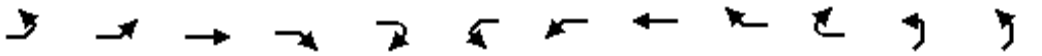
Intersection Summary			
HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	1097	26	6	1109	133	0	7	20	43	2	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.98			0.90			0.90	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3527		1770	3482			1674			1659	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.91	
Satd. Flow (perm)	1770	3527		1770	3482			1674			1529	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	152	1143	27	6	1155	139	0	7	21	45	2	121
RTOR Reduction (vph)	0	2	0	0	12	0	0	18	0	0	101	0
Lane Group Flow (vph)	152	1168	0	6	1282	0	0	10	0	0	67	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.1	29.1		0.8	24.8			8.0			8.0	
Effective Green, g (s)	5.1	29.1		0.8	24.8			8.0			8.0	
Actuated g/C Ratio	0.11	0.60		0.02	0.51			0.17			0.17	
Clearance Time (s)	3.0	4.0		3.0	4.0			3.5			3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	187	2121		29	1784			277			253	
v/s Ratio Prot	c0.09	0.33		0.00	c0.37			0.01				
v/s Ratio Perm											c0.04	
v/c Ratio	0.81	0.55		0.21	0.72			0.04			0.26	
Uniform Delay, d1	21.2	5.8		23.5	9.1			17.0			17.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	22.9	0.3		3.5	1.4			0.1			0.6	
Delay (s)	44.1	6.1		27.0	10.5			17.0			18.2	
Level of Service	D	A		C	B			B			B	
Approach Delay (s)		10.4			10.6			17.0			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	10.5
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



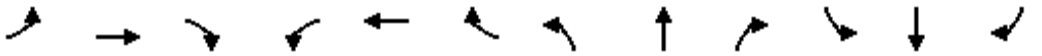
Movement	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NEL2	NEL
Lane Configurations												
Volume (vph)	22	81	1007	6	21	5	51	1094	67	82	117	92
Ideal Flow (vphpl)	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950
Total Lost time (s)		4.0	4.0				4.0	4.0				4.0
Lane Util. Factor		0.91	0.91				1.00	0.95				1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Flpb, ped/bikes		1.00	1.00				1.00	1.00				1.00
Frt		1.00	1.00				1.00	0.98				1.00
Flt Protected		0.95	1.00				0.95	1.00				0.95
Satd. Flow (prot)		1653	3376				1770	3461				1816
Flt Permitted		0.95	1.00				0.24	1.00				0.95
Satd. Flow (perm)		1653	3376				439	3461				1816
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	24	89	1107	7	23	5	56	1202	74	90	129	101
RTOR Reduction (vph)	0	0	1	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	104	1145	0	0	0	61	1363	0	0	0	230
Confl. Peds. (#/hr)	7	7							7	7		
Turn Type	Split	Split				Perm	Split				Prot	Prot
Protected Phases	3	3	3				4	4			1	1
Permitted Phases						4						
Actuated Green, G (s)		52.0	52.0				52.0	52.0				17.5
Effective Green, g (s)		53.0	53.0				53.0	53.0				17.0
Actuated g/C Ratio		0.30	0.30				0.30	0.30				0.10
Clearance Time (s)		5.0	5.0				5.0	5.0				3.5
Vehicle Extension (s)		2.0	2.0				1.5	1.5				2.0
Lane Grp Cap (vph)		491	1002				130	1028				173
v/s Ratio Prot		0.06	c0.34					c0.39				c0.13
v/s Ratio Perm							0.14					
v/c Ratio		0.21	1.14				0.47	1.33				1.33
Uniform Delay, d1		47.1	62.7				51.3	62.7				80.8
Progression Factor		1.00	1.00				1.00	1.00				1.00
Incremental Delay, d2		0.1	76.4				1.0	153.5				182.4
Delay (s)		47.2	139.2				52.2	216.3				263.1
Level of Service		D	F				D	F				F
Approach Delay (s)			131.5					209.3				
Approach LOS			F					F				

Intersection Summary			
HCM Average Control Delay	167.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	178.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

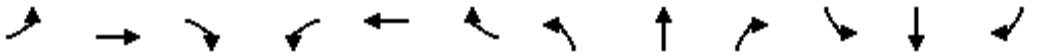
Movement	NET	NER	NER2	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations								
Volume (vph)	719	140	6	138	38	338	118	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1950	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0		
Lane Util. Factor	0.95				1.00	0.95		
Frpb, ped/bikes	0.99				1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00		
Frt	0.97				1.00	0.96		
Flt Protected	1.00				0.95	1.00		
Satd. Flow (prot)	3412				1816	3381		
Flt Permitted	1.00				0.95	1.00		
Satd. Flow (perm)	3412				1816	3381		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	790	154	7	152	42	371	130	27
RTOR Reduction (vph)	0	0	0	0	0	2	0	0
Lane Group Flow (vph)	951	0	0	0	194	526	0	0
Confl. Peds. (#/hr)		6	6	6	6			
Turn Type				Prot	Prot			
Protected Phases	6			5	5	2		
Permitted Phases								
Actuated Green, G (s)	44.0				11.5	38.0		
Effective Green, g (s)	45.5				11.0	39.5		
Actuated g/C Ratio	0.25				0.06	0.22		
Clearance Time (s)	5.5				3.5	5.5		
Vehicle Extension (s)	1.5				2.0	1.5		
Lane Grp Cap (vph)	870				112	748		
v/s Ratio Prot	c0.28				c0.11	0.16		
v/s Ratio Perm								
v/c Ratio	1.09				1.73	0.70		
Uniform Delay, d1	66.5				83.8	64.1		
Progression Factor	1.00				1.00	1.00		
Incremental Delay, d2	59.1				363.9	2.5		
Delay (s)	125.6				447.6	66.5		
Level of Service	F				F	E		
Approach Delay (s)	152.4					168.9		
Approach LOS	F					F		

Intersection Summary



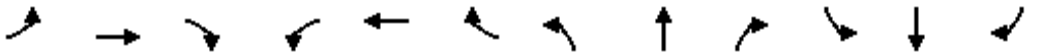
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	1040	111	30	1073	42	415	357	296	25	44	2
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93			1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1816	3488		1816	3519		1816	1736			1823	
Flt Permitted	0.95	1.00		0.95	1.00		0.76	1.00			0.40	
Satd. Flow (perm)	1816	3488		1816	3519		1448	1736			743	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	1072	114	31	1106	43	428	368	305	26	45	2
RTOR Reduction (vph)	0	8	0	0	3	0	0	37	0	0	1	0
Lane Group Flow (vph)	10	1178	0	31	1146	0	428	636	0	0	72	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.2	39.6		2.9	41.3		26.5	26.5			26.5	
Effective Green, g (s)	0.7	39.6		2.4	41.3		26.0	26.0			26.0	
Actuated g/C Ratio	0.01	0.50		0.03	0.52		0.32	0.32			0.32	
Clearance Time (s)	3.5	4.0		3.5	4.0		3.5	3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	16	1727		54	1817		471	564			241	
v/s Ratio Prot	0.01	c0.34		c0.02	0.33			c0.37				
v/s Ratio Perm							0.30				0.10	
v/c Ratio	0.62	0.68		0.57	0.63		0.91	1.13			0.30	
Uniform Delay, d1	39.5	15.4		38.3	13.9		25.9	27.0			20.2	
Progression Factor	1.00	1.00		1.12	1.08		1.00	1.00			1.00	
Incremental Delay, d2	44.0	2.2		7.0	1.3		20.7	78.1			0.3	
Delay (s)	83.5	17.6		49.7	16.4		46.6	105.1			20.4	
Level of Service	F	B		D	B		D	F			C	
Approach Delay (s)		18.2			17.2			82.3			20.4	
Approach LOS		B			B			F			C	

Intersection Summary			
HCM Average Control Delay	37.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1148	26	26	1217	258	6	29	26	120	16	5
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.94			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.96	
Satd. Flow (prot)	1816	3526		1816	3446			1736			1776	
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.79	
Satd. Flow (perm)	1816	3526		1816	3446			1696			1460	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	30	1160	26	26	1229	261	6	29	26	121	16	5
RTOR Reduction (vph)	0	1	0	0	12	0	0	22	0	0	2	0
Lane Group Flow (vph)	30	1185	0	26	1478	0	0	39	0	0	140	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)									1			
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.9	52.6		2.8	52.5			13.2			13.2	
Effective Green, g (s)	2.4	53.0		2.3	52.9			12.7			12.7	
Actuated g/C Ratio	0.03	0.66		0.03	0.66			0.16			0.16	
Clearance Time (s)	3.5	4.4		3.5	4.4			3.5			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	54	2336		52	2279			269			232	
v/s Ratio Prot	c0.02	0.34		0.01	c0.43							
v/s Ratio Perm								0.02			c0.10	
v/c Ratio	0.56	0.51		0.50	0.65			0.15			0.60	
Uniform Delay, d1	38.3	6.9		38.3	8.0			29.0			31.3	
Progression Factor	1.14	0.87		0.95	2.19			1.00			1.00	
Incremental Delay, d2	4.5	0.5		2.4	1.3			0.1			3.0	
Delay (s)	47.9	6.5		38.9	18.8			29.1			34.4	
Level of Service	D	A		D	B			C			C	
Approach Delay (s)		7.5			19.2			29.1			34.4	
Approach LOS		A			B			C			C	

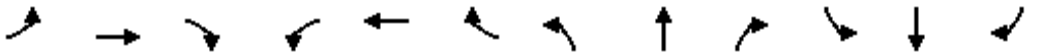
Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	978	18	48	1198	211	44	71	44	383	67	98
Ideal Flow (vphpl)	1950	1900	1900	1950	1900	1900	1950	1900	1900	1950	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	3523	3529		1816	3539	1583	1816	1745		1725	1709	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	3523	3529		1816	3539	1583	1816	1745		1725	1709	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	104	1008	19	49	1235	218	45	73	45	395	69	101
RTOR Reduction (vph)	0	1	0	0	0	83	0	15	0	0	0	57
Lane Group Flow (vph)	104	1026	0	49	1235	135	45	103	0	229	235	44
Confl. Bikes (#/hr)									2			
Turn Type	Prot			Prot		Perm	Split			Split		Perm
Protected Phases	1	5		6	2		3	3		4	4	
Permitted Phases						2						4
Actuated Green, G (s)	9.0	66.4		37.2	94.6	94.6	15.6	15.6		26.3	26.3	26.3
Effective Green, g (s)	8.5	66.4		36.7	94.6	94.6	15.1	15.1		25.8	25.8	25.8
Actuated g/C Ratio	0.05	0.42		0.23	0.59	0.59	0.09	0.09		0.16	0.16	0.16
Clearance Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	3.5		3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5		2.0	2.5	2.5	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	187	1465		417	2092	936	171	165		278	276	255
v/s Ratio Prot	c0.03	c0.29		0.03	c0.35		0.02	c0.06		0.13	c0.14	
v/s Ratio Perm						0.09						0.03
v/c Ratio	0.56	0.70		0.12	0.59	0.14	0.26	0.62		0.82	0.85	0.17
Uniform Delay, d1	73.9	38.6		48.8	20.5	14.6	67.3	69.7		64.9	65.2	57.9
Progression Factor	0.95	1.01		0.97	0.88	2.07	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	1.3		0.0	1.0	0.3	0.3	5.2		16.9	20.8	0.1
Delay (s)	72.3	40.2		47.6	19.1	30.5	67.6	74.9		81.8	86.0	58.0
Level of Service	E	D		D	B	C	E	E		F	F	E
Approach Delay (s)		43.1			21.7			72.8			79.3	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

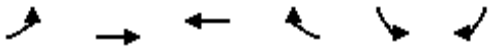


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	974	0	0	1480	453	0	0	0	600	0	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1950	1900	1900
Total Lost time (s)		4.0			4.0	4.9				4.0		4.0
Lane Util. Factor		0.95			0.95	1.00				0.97		1.00
Frpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Flpb, ped/bikes		1.00			1.00	1.00				1.00		1.00
Frt		1.00			1.00	0.85				1.00		0.85
Flt Protected		0.99			1.00	1.00				0.95		1.00
Satd. Flow (prot)		3509			3539	1583				3523		1583
Flt Permitted		0.50			1.00	1.00				0.95		1.00
Satd. Flow (perm)		1765			3539	1583				3523		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1015	0	0	1542	472	0	0	0	625	0	102
RTOR Reduction (vph)	0	0	0	0	0	162	0	0	0	0	0	26
Lane Group Flow (vph)	0	1229	0	0	1542	310	0	0	0	625	0	76
Confl. Peds. (#/hr)												2
Turn Type	Perm		Perm			Perm				Prot		custom
Protected Phases		2			6					4		4
Permitted Phases	2		2			6						
Actuated Green, G (s)		52.5			52.5	52.5				18.4		18.4
Effective Green, g (s)		53.4			53.4	52.5				18.6		18.6
Actuated g/C Ratio		0.67			0.67	0.66				0.23		0.23
Clearance Time (s)		4.9			4.9	4.9				4.2		4.2
Vehicle Extension (s)		2.2			2.2	2.2				1.7		1.7
Lane Grp Cap (vph)		1178			2362	1039				819		368
v/s Ratio Prot					0.44					c0.18		0.05
v/s Ratio Perm		c0.70				0.20						
v/c Ratio		1.55dl			0.65	0.30				0.76		0.21
Uniform Delay, d1		13.3			7.8	5.9				28.6		24.7
Progression Factor		1.70			1.02	1.21				1.00		1.00
Incremental Delay, d2		35.1			1.3	0.7				3.8		0.1
Delay (s)		57.8			9.3	7.8				32.5		24.9
Level of Service		E			A	A				C		C
Approach Delay (s)		57.8			8.9			0.0			31.4	
Approach LOS		E			A			A			C	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	100.5%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

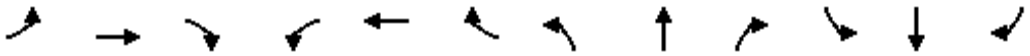
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	190	2375	1763	823	0	0
Ideal Flow (vphpl)	1950	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.9		
Lane Util. Factor	1.00	0.95	0.95	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	1.00	0.85		
Flt Protected	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1816	3539	3539	1564		
Flt Permitted	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1816	3539	3539	1564		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	192	2399	1781	831	0	0
RTOR Reduction (vph)	0	0	0	167	0	0
Lane Group Flow (vph)	192	2399	1781	664	0	0
Confl. Peds. (#/hr)	1			1		
Turn Type	Prot			Perm		
Protected Phases	2	5	1			
Permitted Phases				1		
Actuated Green, G (s)	16.5	66.4	54.6	54.6		
Effective Green, g (s)	16.5	67.3	55.5	54.6		
Actuated g/C Ratio	0.21	0.84	0.69	0.68		
Clearance Time (s)	4.0	4.9	4.9	4.9		
Vehicle Extension (s)	1.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	375	2977	2455	1067		
v/s Ratio Prot	c0.11	c0.68	0.50			
v/s Ratio Perm				0.42		
v/c Ratio	0.51	0.81	0.73	0.62		
Uniform Delay, d1	28.2	3.1	7.6	7.0		
Progression Factor	1.00	1.16	1.00	1.00		
Incremental Delay, d2	0.4	2.1	1.9	2.7		
Delay (s)	28.7	5.7	9.5	9.8		
Level of Service	C	A	A	A		
Approach Delay (s)		7.4	9.6		0.0	
Approach LOS		A	A		A	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

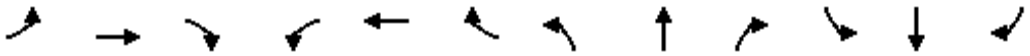
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	15	10	15	20	14	25	400	26	8	125	25
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	14	18	12	18	24	16	29	471	31	9	147	29

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	44	58	531	186
Volume Left (vph)	14	18	29	9
Volume Right (vph)	12	16	31	29
Hadj (s)	-0.06	-0.08	0.01	-0.05
Departure Headway (s)	5.6	5.5	4.4	4.7
Degree Utilization, x	0.07	0.09	0.65	0.24
Capacity (veh/h)	559	566	800	725
Control Delay (s)	9.0	9.1	15.3	9.2
Approach Delay (s)	9.0	9.1	15.3	9.2
Approach LOS	A	A	C	A

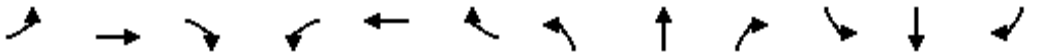
Intersection Summary				
Delay	13.1			
HCM Level of Service	B			
Intersection Capacity Utilization	41.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	12	27	26	10	3	9	317	37	1	100	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	16	14	32	31	12	4	11	373	44	1	118	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								414				
pX, platoon unblocked												
vC, conflicting volume	548	560	120	577	541	395	122			416		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	548	560	120	577	541	395	122			416		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	97	97	92	97	99	99			100		
cM capacity (veh/h)	433	433	931	400	445	654	1465			1143		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	46	427	124
Volume Left	16	31	11	1
Volume Right	32	4	44	5
cSH	596	424	1465	1143
Volume to Capacity	0.10	0.11	0.01	0.00
Queue Length 95th (ft)	9	9	1	0
Control Delay (s)	11.8	14.5	0.3	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	11.8	14.5	0.3	0.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	36.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	474	2	54	7	2	14	19	358	0	9	261	177
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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 (vph)	515	2	59	8	2	15	21	389	0	10	284	192
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								673				
pX, platoon unblocked												
vC, conflicting volume	750	734	284	793	734	389	284			389		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	750	734	284	793	734	389	284			389		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	99	92	97	99	98	98			99		
cM capacity (veh/h)	313	339	755	276	339	659	1279			1169		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	576	25	410	293	192
Volume Left	515	8	21	10	0
Volume Right	59	15	0	0	192
cSH	332	438	1279	1169	1700
Volume to Capacity	1.73	0.06	0.02	0.01	0.11
Queue Length 95th (ft)	910	5	1	1	0
Control Delay (s)	369.5	13.7	0.6	0.3	0.0
Lane LOS	F	B	A	A	
Approach Delay (s)	369.5	13.7	0.6	0.2	
Approach LOS	F	B			

Intersection Summary				
Average Delay	142.7			
Intersection Capacity Utilization	77.3%	ICU Level of Service	D	
Analysis Period (min)	15			